Aerospace Corp. **Defense Patent Holiday** technologytransfer@aero.org

Patent title	Patent Number	Inventor name(s)	Brief Description of Patent	DoD critical technology
6Li BATTERY	US20210184247A1	NEMANICK, ERIC JOSEPH | SHEN, BRIAN	A battery may include electrolyte salt and electrode material that is fabricated from isotopically pure, or otherwise enriched in, lithium-6 (6Li) to increase power and life of the battery.	Critical Minerals
Dynamic flexible circuits	US20250098073A1	FULLER, JEROME K.	A dynamic flex circuit includes a plurality of hole sets arranged along the dynamic flexible circuit. The dynamic flex circuit also includes a plurality of actuator wires coupled to the dynamic flexible circuit by way of intertwining each of the plurality of actuator wires through each hole set in the plurality of hole sets arrange along the dynamic flexible circuit. Each of the plurality of actuator wires are configured to impart a motion onto the dynamic flexible circuit depending on the amount of heat applied to each of the plurality of actuator wires.	Critical Minerals
Energy storage radiators	US20240039077A1	NEMANICK, ERIC JOSEPH | HELVAJIAN, HENRY | DELGADO, JR., ADON | FERRONE, KRISTINE L.	Energy storage radiators are disclosed. The structure of the radiator may be used as a battery to store and release energy, as well as serving to regulate the temperature of that battery and the associated device or vehicle. The structure may be configured to provide mechanical support, an enclosure, an attachment point, or an extension for a vehicle or a device. By designing an energy storage radiator to function as a battery, a separate battery superstructure may not be required. Also, the heat to be radiated away can be used to keep the battery in its operating temperature range. This may provide mass reduction of the radiator structures or materials, as well as make those materials multifunctional and replace material elsewhere with respect to conventional systems.	Critical Minerals

Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	EP3655326B1	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Critical Minerals
Physics packages including atomic or molecular vapors and sub-wavelength grating waveguides and/or radio frequency waveguides	US20250080125A1	ROSSER, DAVID	Physics packages including atomic or molecular vapors and sub-wavelength grating (SWG) waveguides and/or radio frequency (RF) waveguides are provided herein. In some examples, a physics package for interacting with atoms or molecules in a vapor includes a substrate, and a cell sealed to the substrate and storing the vapor. A SWG waveguide may be disposed on the substrate and within the cell. The SWG waveguide may include a plurality of grating segments that are spaced apart from one another and define a gap within the SWG waveguide. The vapor may be located at least within the gap. A first optical coupler couples light into the SWG waveguide such that the light propagates through the vapor located within the gap and interacts with the atoms or molecules in the vapor located within the gap. A second optical coupler receives light from the SWG waveguide.	Critical Minerals

Self-healing oxides for ionizing radiation damage	US20250051212A1	NEMANICK, ERIC JOSEPH | WALKER, DON | TRIGG, VICKY DOAN-NGUYEN | GROVOGUI, JANN ALBERT | BEAN, JR., GLENN E. | ESPINET GONZALEZ, PILAR	A method for fabricating self-healing glass includes processing a water-based or water-containing oxide material for fabrication of self-healing glass. The method includes performing a thermal annealing process on the material, and manufacturing the self-healing glass from the thermal annealed material.	Critical Minerals
Buried radial flow rapid prototyping rocket motors	US8601790B2	FULLER, JEROME K.	A hybrid rocket motor is manufactured by photopolymerizing the solid fuel grain in a stereolithography method, wherein fuel grains in a plastic matrix are deposited in layers for building a solid fuel rocket body in three dimensions for improved performance and for a compact design, the hybrid rocket motor including buried radial channels for defining a desired burn profile including the oxidizer to fuel burn ratio.	Energetics
Electro-permanent magnet mooring system	US11380468B2	DENHAM, DONALD WAYNE	An electro-permanent magnet (EPM) for an electromagnetic mooring system (EMS) includes a low coercivity magnet surrounded by a reversible coil, and one or more high coercivity magnets surrounding the low coercivity magnet and the reversible coil. The reversible coil switches polarity of the low coercivity magnet to null the stronger, one or more high coercivity magnets. The nulling of the stronger, one or more high coercivity magnets allows for the EMS to connect and disconnect to an adjacent apparatus.	Energetics

Hypergolic hybrid motor igniter	US9273635B2	BRADY, BRIAN, BLAISE | DESAIN, JOHN, D	An apparatus for igniting a larger rocket motor is provided. The apparatus may be a smaller rocket motor that can be ignited hypergolically, when a pressurized oxidizer contacts hypergolic fuel grains of the smaller rocket motor. The hypergolic ignition causes the larger rocket motor to be ignited. The hypergolic ignition of the smaller rocket motor may be stopped after the larger rocket motor is ignited, and the remaining hypergolic fuel grains and the pressurized oxidizer can be reserved for reigniting the larger rocket motor at a later time.	Energetics
Radial flow rapid prototyping rocket motors	US8707676B2	FULLER, JEROME, K.	A hybrid rocket motor is manufactured by photopolymerizing the solid fuel grain in a stereolithography method, wherein fuel grains in a plastic matrix are deposited in layers for building a solid fuel rocket body in three dimensions for improved performance and for a compact design, the hybrid rocket motor including radial channels for defining a desired burn profile including the oxidizer to fuel burn ratio.	Energetics
Stereolithographic rocket motor manufacturing method	US8844133B2	FULLER, JEROME, K.	A hybrid rocket motor is manufactured by photopolymerizing the solid fuel grain in a stereolithography method, wherein fuel grains in a plastic matrix are deposited in layers for building a solid fuel rocket body in three dimensions for improved performance and for a compact design,	Energetics
Stereolithographic rocket motor manufacturing method	US8225507B2	FULLER, JEROME K.	A hybrid rocket motor is manufactured by photopolymerizing the solid fuel grain in a stereolithography method, wherein fuel grains in a plastic matrix are deposited in layers for building a solid fuel rocket body in three dimensions for improved performance and for a compact design.	Energetics

Systems and methods for casting hybrid rocket motor fuel grains	US9429104B2	FULLER, JEROME KEITH	Embodiments of the invention relate to systems and methods for casting hybrid rocket motor fuel grains. In one embodiment, a method for casting a rocket motor fuel grain can be provided. The method can include providing a positive image of a port made from at least one material. The method can further include disposing at least one fuel material around at least a portion of the positive image of the port. Further, the method can include removing the at least one material, wherein a negative image of the port is formed in the at least one fuel material.	Energetics
Architectures and techniques for optical aberration correction	US9581812B2	WARREN, DAVID W.	Aspects of the disclosure relate to correction of aberration in optical systems. In one aspect, correction of aberration can rely on a corrector lens that is movably positioned between an objective lens and an optical member, and that can introduce a perturbation to a convergent beam of light that forms an image at the substantially the focal point of the objective lens. The formed image presents aberration and such a perturbation can correct at least a portion thereof. In another aspect, the corrector lens can embody or can comprise a positive power lens, that introduces the perturbation via, at least in part, a radially symmetric wavefront correction into the convergent beam, where such a correction varies as a fourth power of a radial distance from a central axis of propagation of the convergent beam of light.	Materials
Bonding of photovoltaic device to covering material	US9059366B2	CARPENTER, BERNIE F.	A solar energy collection system includes a solar cell, a transparent covering, and a eutectic interlayer binding the solar cell and the transparent covering together. At least some of a compound of the eutectic interlayer bonds with the transparent covering, raising the melting temperature of the eutectic interlayer above the melting temperature with the full amount of the compound present.	Materials

Bone growth enhancing implant	US8679189B1	GANEY, TIMOTHY | LIVINGSTON, FRANK EDWARD	An implant device having a non-conductive base structure with at least two exposed or exterior surfaces wherein at least one of the exposed or exterior surfaces has attained electrical conductivity on at least portions of the surface by an energy exposure wherein portions of the exposed or exterior surfaces are transformed by the energy exposure to attain the electrical conductivity.	Materials
Carbon nanotube growth method	US11377354B2	MOORE, TERESA A. | BRADY, BRIAN B. | DRISCOLL, ROBERT B.	A process for growing carbon nanotubes includes making carbon nanotubes by flowing methane into a tube. The process also includes increasing pressure to a high predefined pressure for the carbon nanotubes and maintaining temperature at a low predefined temperature for the carbon nanotubes. The high pressure and low temperature produce carbon nanotubes within minutes.	Materials
Circuits and methods for correcting DC bias and suppressing optical carrier frequency in electro-optic modulators	US11442330B1	BORLAUG, DAVID B.	This application relates to circuits and methods for dynamically correcting DC bias and suppressing optical carrier frequency in electro-optic modulators (EOMs). A DC bias voltage for a control path may be determined using a control path DC bias structure. DC bias in a signal path may be corrected by applying the DC bias voltage, or a function thereof, to a signal path DC bias structure. Signal path and control path RF signal structures may be operated for a time period during which their DC biases drift together. An updated DC bias voltage for the control path may be determined using the control path DC bias structure. The drift of DC bias in the signal path may be corrected by applying the updated DC bias voltage, or a function thereof, to the signal path DC bias structure.	Materials
Force diversion apparatus and methods	US8931606B2	HAWKINS, GARY F. | TANG, CHING-YAO	Force diversion apparatus, methods and devices including the same result in rotational motion being imparted to an impacting object.	Materials
Force diversion apparatus and methods	EP1864032B1	HAWKINS, GARY, F. | TANG, CHING-YOA	Force diversion apparatus, methods and devices including the same result in rotational motion being imparted to an impacting object.	Materials

Force diversion apparatus and methods and devices including the same	US9220310B2	HAWKINS, GARY F. | TANG, CHING-YAO	Force diversion apparatus, methods and devices including the same result in rotational motion being imparted to an impacting object. The apparatus, methods and devices may include, or may involve the use of, a force conversion portion, secured to the outer surface of a bumper, and a force spreading portion.	Materials
Force diversion apparatus and methods and devices including the same	EP2511140B1	HAWKINS, GARY, F. | TANG, CHING-YOA	Automobile bumper assembly with force conversion portion for redirecting forces during a collision in order to increase automobile passenger and pedestrian safety.	Materials
Heat-augmented primary battery	US11831044B2	WASZ, MARGOT	An apparatus may include a plurality of cells surrounded by a plurality of heat generating material. The plurality of heat generating material are configured to release heat to each of the plurality of cells causing discharge from each of the plurality of cells in a low temperature environment.	Materials
High power optical fiber laser array holographic couplers	US7469082B1	OKOROGU, ALBERT O.	A transmissive holographic optical element including a chirped grating is used to inject light by side firing laser light from a an array of laser diodes into an optical fiber with a reflective HOE reflecting the injected laser light through and along the optical fiber with the transmissive holographic optical element HOE and reflective HOE sandwiching a portion of an optical fiber for increased laser side firing pumping efficiency in optical fibers.	Materials
High stiffness vibration damping apparatus, methods and systems	US9194452B2	HAWKINS, GARY F. | TANG, CHING-YAO	Vibration damping apparatus, systems, objects including such apparatus and systems, and vibration damping methods. The vibration damping involves amplifying a vibration-induced displacement and damping the amplified displacement.	Materials
Hybrid adhesive	US8551287B2	ZALDIVAR, RAFAEL J. | NOKES, JAMES P.	A hybrid adhesive incorporating cyanate ester and/or epoxy materials and utilizing atmospheric plasma treatment provides stronger, more reliable joints in structural composite parts.	Materials

Integrated electro-magnetically preloaded kinematic joint for on-orbit assembly of modular space vehicles	US12354777B2	DENHAM, DONALD WAYNE | WOODARD, TIMOTHY P.	A payload-bus kinematic interface system includes one or more kinematic devices. Each kinematic device includes a first contacting surface and a second contacting surface. The first contacting surface kinematically interfaces with the second contacting surface, passing loads or forces to the second contacting surface.	Materials
Lattice for structures	US11828325B2	ZEMPEL, CHRISTIAN | DENHAM, DONALD WAYNE	A lattice system for structures includes a lattice joint housing and a plurality of structural joints. Each of the plurality of structural joints have a side entry slot for insertion of keyed features on a mating lattice member. Each of the plurality of structural joints are configured to facilitate rotation of the mating lattice member, semi-permanently holding the mating lattice member in place with an electro-permanent magnetic (EPM) retaining device.	Materials
Leak detection for batteries	US10615460B2	NEMANICK, ERIC JOSEPH	An apparatus for detecting leaks in batteries may include an applicator, and an indicator comprising a chemical configured to detect a trace amount of leakage in the battery.	Materials
Liquid fuel metering in a hybrid rocket-like liquid rocket motor	US10837407B2	FULLER, JEROME KEITH | DESAIN, JOHN D	A hybrid-like liquid fuel motor (the “motor”) may include a port surrounded by a wall. Surrounding the wall are a plurality of chambers and segmented walls to separate the chambers. In some instances, a single helix chamber may surround the wall, and may operate similar to that of a segmental chamber. During operation of the motor, gas flows from one end of the port to another end of the port. As the walls surrounding the port begin to disintegrate, liquid fuel within chambers begins to begin to mix with the flow of gas. As the segmented walls between the chambers begin to disintegrate, liquid from the other chambers begin to mix with the flow of gas, creating a metering of the liquid fuel.	Materials

Method for producing Regishell inflatable environment	US11091929B2	TAYLOR, ALLISON B. | HELVAJIAN, HENRY | VILLAHERMOSA, RANDY M. | WOODS, LAEL F.	A method for constructing an inflatable environment on top of or beneath a surface of an extraterrestrial object includes spraying Regishell onto an airform or piping the Regishell into a sandwich membrane layer of the airform. When performing the spraying of the Regishell, the method further includes combining basalt material with the Regishell and applying the combination of the basalt material and Regishell to a reinforcement layer, the reinforcement layer being internal to the airform to strengthen the inflatable environment. When performing the piping of the Regishell into the sandwich membrane, the method further includes using the sandwich membrane layer as a permeable membrane or drilling one or more holes in the sandwich membrane layer forming vents to create the permeable membrane, and releasing the gas from the sandwich membrane layer from the vents to cure and conform the Regishell as a rigid shape and structurally sound layer.	Materials
Method of forming nanowire connects on (photovoltiac) PV cells	US11527611B2	NEMANICK, ERIC JOSEPH | LAO, YAO Y.	Interconnects may be formed to an electronic device by creating a strong bond between a wire or lead, one or more nanomaterials, and a contacting area on the electronic device. The creating of the strong bond comprises triggering low power air plasma to activate a surface of the one or more nanomaterials forcing the one or more nanomaterials to bond to the surface of the contacting area.	Materials
Method of modifying a 3D-printed polymer structure	US11376782B2	ZALDIVAR, RAFAEL J. | KIM, HYUN I. | GUSTAFSON, SARA M. | MCLOUTH, TAIT DEWITT	A method of modifying a 3D-printed polymer structure is provided. The method can include providing an initial 3D-printed polymer structure having at least one exposed surface; treating the exposed surface of the initial 3D-printed polymer structure with plasma to obtain a treated 3D-printed polymer structure having a treated surface; administering an adhesive to the treated surface of the treated 3D-printed polymer structure; and contacting a complementary 3D-printed polymer structure with the treated surface of the treated 3D-printed polymer structure to obtain a modified 3D-printed polymer structure.	Materials

Object detection and characterization using a LIDAR-based sensor	US11782163B2	MCVEY, JOHN | HELVAJIAN, HENRY | PERDUE, SHAWN | PETERSON, GLENN | SORGE, MARLON | CARDOZA, DAVID | GANGESTAD, JOSEPH	Systems, apparatuses, and methods for identifying and tracking objects (e.g., debris, particles, space vehicles, etc.) using one or more light detection and ranging (LIDAR)-based sensors are disclosed. Such systems, apparatuses, and methods may be particularly beneficial for detecting millimeter scale and/or sub-millimeter scale objects. Such systems, apparatuses, and methods may be used for detection of objects in space, in the atmosphere, or in the ocean, for example.	Materials
Quality control evaluation method of cyanate ester matrix resin material within CFRP composite concerning localized hydrolytic degradation	US12320765B2	ZALDIVAR, RAFAEL J. | KIM, HYUN I. | FERRELLI, GEENA L.	Evaluating the quality of cyanate ester matrix resin material includes inserting a small piece of a deposit extracted from a composite laminate into an epoxy for cross-sectional analysis, and performing cross-sectional polishing on the small piece of the deposit. Evaluating the quality of the cyanate ester matrix resin material also includes performing resolution imaging to study a plurality of plies in the small piece of the deposit to evaluate each ply without causing destruction to each of the plurality of plies.	Materials
Reconfigurable quantum key distribution (QKD) hardware	US12034490B2	PAUDEL, UTTAM | DE LA CRUZ, NOEL | MOLLNER, ANDREW K. | CHRISTIDIS, ALEXANDER	A reconfigurable QKD transceiver capable of transmitting and/or receiving qubits using a single optical hardware platform. This reconfigurable QKD transceiver enables various link scenarios specially for LEO-ground network, where the satellites have limited engagement time with a ground station. The reconfigurable QKD transceiver may reduce the optics SWaP by 50 percent and may allow for new mission scenarios that were otherwise not feasible with a transmitter only architecture or receiver only architecture.	Materials
Sound suppression material and method	US7565950B2	HAWKINS, GARY F. | O'BRIEN, MICHAEL J.	A sound suppression method includes using a passive noise suppression technology to destructively interfere with a sound wave propagating through a structure at portions of the structure that are positioned apart less than half of a wavelength of the sound wave.	Materials

Stable lithium niobate waveguides, and methods of making and using same	US8189981B2	MULLER, HEINRICH G. | KIM, HYUN I. | FORAN, BRENDAN J.	The invention provides stable lithium niobate waveguides, and systems and methods for making same. In accordance with one aspect of the invention, a waveguide includes a lithium niobate substrate having an upper surface; and a soft proton-exchanged layer embedded within the substrate, the soft proton-exchanged layer formed by exposing the lithium niobate substrate to a proton exchange solution including a proton exchange acid and a lithium salt of the proton exchange acid at a temperature of less than an atmospheric boiling point of the solution, followed by annealing the lithium niobate substrate under a vapor pressure of water preselected to inhibit protons in the substrate from forming water and evaporating from the upper surface of the substrate. The preselected water vapor pressure may be between 0.1 atm and about 0.9 atm, for example, between about 0.4 atm and about 0.6 atm, in one embodiment about 0.47 atm.	Materials
System and method for measuring glass transition temperature	US8858070B2	ZALDIVAR, RAFAEL J. | NOKES, JAMES P.	A system and method for measuring a glass transition temperature of a hydrophobic polymer having a surface tagged with an atmospheric plasma.	Materials

Systems and methods for preparing films using sequential ion implantation, and films formed using same	US9048179B2	ABRAHAM, MARGARET H. | TAYLOR, DAVID P.	Systems and methods for preparing films using sequential ion implantation, and films formed using same, are provided herein. A structure prepared using ion implantation may include a substrate; an embedded structure having pre-selected characteristics; and a film within or adjacent to the embedded structure and including ions having a perturbed arrangement arising from the presence of the embedded structure. The perturbed arrangement may include the ions being covalently bonded to each other, to the embedded structure, or to the substrate, whereas the ions instead may be free to diffuse through the substrate in the absence of the embedded structure. The embedded structure may inhibit or impede the ions from diffusing through the substrate, such that the ions instead covalently bond to each other, to the embedded structure, or to the substrate. The film may include, for example, diamond-like carbon, graphene, or SiC having a pre-selected phase.	Materials
Systems and methods for preparing films using sequential ion implantation, and films formed using same	US8269931B2	ABRAHAM, MARGARET H. | TAYLOR, DAVID P.	Systems and methods for preparing films using sequential ion implantation, and films formed using same, are provided herein. A structure prepared using ion implantation may include a substrate; an embedded structure having pre-selected characteristics; and a film within or adjacent to the embedded structure and including ions having a perturbed arrangement arising from the presence of the embedded structure. The perturbed arrangement may include the ions being covalently bonded to each other, to the embedded structure, or to the substrate, whereas the ions instead may be free to diffuse through the substrate in the absence of the embedded structure. The embedded structure may inhibit or impede the ions from diffusing through the substrate, such that the ions instead covalently bond to each other, to the embedded structure, or to the substrate. The film may include, for example, diamond-like carbon, graphene, or SiC having a pre-selected phase.	Materials

Systems and methods for prioritizing funding of projects	US9953284B2	SMITH, PATRICK L. | FERRINGER, MATTHEW PHILLIP	Systems and methods for providing a prioritization of the focus and allocation of available resources and/or funding for due diligence analyses of a variety of candidate projects competing for limited funding are disclosed. Various methods may also determine a confidence level metrics associated with the information and/or estimates associated with the candidate projects. Evolutionary algorithms may be applied to perform multi-objective optimization of objectives based, at least in part, on currently available information and/or estimates associated with the candidate projects. A priority score, for the purpose of allocating due diligence attention and resources to increase confidence levels in assumptions associated with candidate projects, may be determined for a particular project based, at least in part, on the current confidence level associated with that particular project and the percentage of non-dominated projects within which the particular project is included. The optimization may be performed multiple times, such as once for every stakeholder that may have provided information and/or estimates associated with the candidate projects, to identify a plurality of non-dominated solutions to the optimization problem.	Materials
Systems, methods, and apparatus for a quantum key distribution telescope	US9306740B2	BOWES, BENJAMIN THOMAS	Certain embodiments of the invention may include systems, methods and apparatus for a quantum key distribution (QKD) telescope. According to an example embodiment of the invention, a method is provided for receiving a quantum key distribution (QKD) signal. The method can include collecting one or more QKD signals and one or more primary signals with a single telescope.	Materials

Systems, methods, and apparatus for providing a multi-fuel hybrid rocket motor	US9038368B2	FULLER, JEROME K.	Certain embodiments of the invention may include systems, methods, and apparatus for providing a multi-fuel hybrid rocket motor. According to an example embodiment of the invention, a method is provided for producing a multi-fuel hybrid motor. The method can include forming a body, where the body includes one or more intake ports; one or more exit nozzles; one or more channels connecting the one or more intake ports with the one or more exit nozzles; and a plurality of cavities comprising segment walls in communication with the one or more channels. The method also includes depositing a propellant fuel within the plurality of cavities, wherein at least a portion of the propellant fuel is exposed to the one or more channels and wherein the propellant fuel has a higher burn consumption rate than the segment walls.	Materials
Acoustic devices embedded in photostructurable ceramics	US8410660B2	HELVAJIAN, HENRY | HANSEN, WILLIAM W. | STEFFENEY, LEE F.	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Adaptive membrane shape deformation system	US8244066B2	IVES, NEIL A. | SUEN, CHIA-HSIN | LEUNG, MARTIN S. | MARECHAL, NICHOLAS J. | BEKEY, IVAN | STRAW, DAVID C. | MASON, MARIBETH	A system and method determines the shape of a surface that preferably is a deployed space-based adaptive flexible membrane antenna, using patterned projections, image capturing, and membrane shape processing for producing membrane shape data describing the contour of the surface of the membrane with the membrane shape data then preferably used as inputs for a feedback control actuation system for deforming the membrane to a desired shaped so as to maintain the three-dimensional shape of the membrane in the desired shape.	Microelectronics

Amplitude domain circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US10340962B2	UTTER, ALEXANDER C. | DAFESH, PHILIP | HESS, PHILLIP BRIAN	Under one aspect, a method for reducing interference in a received signal can include splitting a received signal into a first portion and a second portion, the received signal comprising a desired signal and an interference signal that spectrally overlaps the desired signal. The method also can include estimating an amplitude A(t) of the first portion as a function of time. The method also can include suppressing at least a portion of the interference signal in the estimated amplitude A(t) to generate an interference suppressed amplitude A'(t). The method also can include delaying the second portion by an amount of time corresponding to the estimation and suppression. The method also can include multiplying the interference suppressed amplitude A'(t) by the delayed second portion to obtain an output having reduced contribution from the interference signal.	Microelectronics
Antenna assembly and methods of assembling same	US9515370B2	ROLLINS, GORDON Z.	An antenna assembly is provided. The antenna assembly includes at least one foam member that is fabricated from a homogenous material, wherein the foam member includes a first surface and a second surface. At least one conductive plate including a first conductive plate is coupled to the foam member first surface. The foam member second surface is configured to couple to a second conductive plate or receive a conductive coating thereon to facilitate at least one electromagnetic wave to be channeled through the antenna assembly in a substantially single direction.	Microelectronics
Apparatus and method for propagating the attitude of a vehicle	US8612068B2	PATERA, RUSSELL P	Apparatus and method is provided for propagating the attitude of a vehicle. A slew rate is computed based on angular rotation increments associated with a time interval. An incremental update is computed for the associated time interval based on an angular rate and the slew rate. An attitude of the vehicle is propagated based on the computed attitude increment and an initial attitude at the start of propagation.	Microelectronics

Apparatus and method for wirelessly measuring battery state of health	US11740298B2	NEMANICK, ERIC JOSEPH | WILL, ROBERT G.	An apparatus for monitoring health of one or more cells in a battery includes a health monitoring system configured to measure voltage on one or more cells when a waveform is injected into the one or more cells. The waveform is measured at an end of a pulse for each current.	Microelectronics
Apparatus and method for wirelessly measuring battery state of health	US11500030B2	NEMANICK, ERIC JOSEPH | WILL, ROBERT G.	An apparatus for monitoring health of one or more cells in a battery includes a health monitoring system configured to measure voltage on one or more cells when a waveform is injected into the one or more cells. The waveform is measured at an end of a pulse for each current.	Microelectronics
Artificial intelligence system that employs windowed cellular automata to create plausible alternatives	US10832180B2	YEOH, TERENCE | DESAI, NEHAL	An artificial intelligence (AI) system is disclosed that employs windowed cellular automata to create plausible alternatives. A cellular automata-based technique may be utilized to perform pattern recognition and assess the best path available (i.e., "instant improv"). Alternative sequences (i.e., "pattern improv") may also be used to determine alternative paths. This instant improv and pattern improv may then be used to create completely new, plausible alternative nodes. The subsequent evaluation of the sentiment further creates new, dynamic capabilities. Through the use of windowed memory learning, recall, and interpolation, new plausible structures are generated that predict dynamic systems.	Microelectronics
Autodynamic flexible circuits	US12200869B2	FULLER, JEROME K. | SHEERIN, TODD FILLMORE	A dynamic flex circuit includes a plurality of hole sets arranged along the dynamic flexible circuit. The dynamic flex circuit also includes a plurality of actuator wires coupled to the dynamic flexible circuit by way of intertwining each of the plurality of actuator wires through each hole set in the plurality of hole sets arrange along the dynamic flexible circuit. Each of the plurality of actuator wires are configured to impart a motion onto the dynamic flexible circuit depending on the amount of heat applied to each of the plurality of actuator wires.	Microelectronics

Automated sectioning tomographic measurement system	US20090088047A1	ZURBUCHEN, MARK A.	A tomographic system includes a reporting device colocated and juxtaposed an object so that both are ground through grinding to various sectioning depths as the reporting device is ground down exposing a reporting marker along a length of the reporting device for indicating the depth of sectioning for accurate precise depth of grinding well suited for precise sectioned tomographic imaging.	Microelectronics
Automatic gain control 16-ary quadrature amplitude modulation subsystem	US7450670B2	LUI, GEE L. | TSAI, KUANG | SUE, MILTON K.	An improved AGC subsystem for preferred use in quadrature amplitude modulation receivers offers improved automatic gain control of received signals in fading channels by generating an error signal only from constellation signal points having large signal-to-noise ratios for increase the signal-to-noise ratio of the gain control error signal for lowering dispersion of symbol signals in the constellation signal space for improving data detection of symbol signals with the improved performance with as much as one dB in the signal-to-noise ratio.	Microelectronics
Automatic system identification and controller synthesis for embedded systems	US11513479B1	HERNANDEZ, DANIEL JOSEPH | CRAUN, MITCHEL JOHN | SPERBER, EVAN NATHAN | CHIANG, RICHARD YINING | OUNE, NICHOLAS AKIRA	A method for automating system identification includes performing a system identification experiment, and performing a system identifying processing by fitting a model to data from the system identification experiment. The method also includes performing model reduction to generate a model numerically suitable for controller synthesis by removing inconsequential states that cause controller optimization methods to fail. The method further includes performing control synthesis using the generated model or reduced models, including disturbance spectrum estimates, to generate a candidate controller design to be used during system operation. The method also includes checking for controller robustness using the identified model to ensure stability of the system while maximizing closed-loop bandwidth and performance.	Microelectronics

Automobile accident mitigation technique	US10416304B2	HELVAJIAN, HENRY	A system for reducing accidents caused by distracted drivers. The system may form an invisible track using material-impregnated grooves and a radar beam, preventing a vehicle from veering away from a road lane. The material-impregnated grooves (MIGs) within one or more road lanes may include scrap metal. The radar beam may be emitted from a transceiver mounted underneath the vehicle such that backscatter from the MIGs is returned to the transceiver.	Microelectronics
Autonomous compliance controlled generic mooring station for an on-orbit system	US11939087B2	DENHAM, DONALD WAYNE	An autonomous compliance controlled generic mooring station includes a pair of mooring systems connected to each other. The pair of mooring systems includes a pair of mooring interfaces, allowing the pair of mooring systems to change between a mooring state and a release state. One of the pair of mooring interfaces includes an electropermanent magnet and the other one of the pair of mooring interfaces includes a ferromagnetic plate. The electropermanent magnet and the ferromagnetic plate are configured to connect the pair of mooring systems together.	Microelectronics
Autonomous Nap-Of-the-Earth (ANOE) flight path planning for manned and unmanned rotorcraft	US9524647B2	KOHN-RICH, SYLVIA	A flight path planning approach may be deterministic and guarantee a safe, quasi-optimal path. A plurality of three-dimensional voxels may be determined as cells of a rectangular grid. The cells may have a predetermined length and width. A shortest safe path through the grid graph may be calculated from a local start to a local goal defined as points on a nominal global path. Geometric smoothing may be performed on the basis line from the local start to the local goal to generate a smooth three-dimensional trajectory that can be followed by a given rotorcraft. Dynamic smoothing may be performed on the three-dimensional trajectory to provide a maximum possible speed profile over a path defined by the dynamic smoothing. The three dimensional path information may be provided to an autopilot, which may then control the rotorcraft to fly along the defined path.	Microelectronics

Autonomous nap-of-the-earth (ANOE) flight path planning for manned and unmanned rotorcraft	US10347139B2	KOHN-RICH, SYLVIA	A flight path planning approach may be deterministic and guarantee a safe, quasi-optimal path. A plurality of three-dimensional voxels may be determined as cells of a rectangular grid. The cells may have a predetermined length and width. A shortest safe path through the grid graph may be calculated from a local start to a local goal defined as points on a nominal global path. Geometric smoothing may be performed on the basis line from the local start to the local goal to generate a smooth three-dimensional trajectory that can be followed by a given rotorcraft. Dynamic smoothing may be performed on the three-dimensional trajectory to provide a maximum possible speed profile over a path defined by the dynamic smoothing. The three dimensional path information may be provided to an autopilot, which may then control the rotorcraft to fly along the defined path.	Microelectronics
Baffled calotte dome observation and/or communications system	US11163149B2	BRITTON, MATTHEW C.	Baffled Calotte dome observation and/or communications systems are disclosed. For instance, a visible or infrared telescope and associated sensor systems, a laser, etc., may be enclosed in a Calotte dome with a baffle mounted on the opening and a window and/or filter mounted on top of the baffle. The Calotte dome steers the baffle in both elevation and azimuth, enabling the system to point and track objects moving on arbitrary trajectories.	Microelectronics

Baseband time-domain communications system	US7321641B2	MOULTHROP, ANDREW ALFRED | MUHA, MICHAEL STEVEN | SILVA, CHRISTOPHER PATRICK	A communications system reduces downconverter inaccuracies in time-domain measurements or samples of received microwave communications I and Q complex signals by converting received signal to baseband taking measurements or samples of the I and Q waveforms at differing phase shifts of a demodulating carrier signal for a local oscillator or carrier tracking loop used during downconversion so that I and Q imbalances may be detected and removed by lowpass equivalent averaging for improved characterization of downconverters or for improved signal reception. In the preferred form, the phase shifts are 0 and π/2 for a conventional measurement, and then at θ, and θ+π/2, with θ=π/4+mπ/2 for an integer m for the second measurement where I and Q imbalances and baseband nonlinearities are indicated by differences between the two measured or sampled signals, where θ provides for optimum error detection for reducing the errors by averaging the measurements.	Microelectronics
Binary offset carrier M-code envelope detector	US7555033B2	LILLO, WALTER E. | WARD, PHLLIP W. | ABBOTT, ANTHONY S.	An M code envelope detector receives an incoming binary offset carrier (BOC) signal, such as the M code signal, and generates inphase BOC and quadraphase BOC signals, separated by an offset, that have respective ambiguous correlation envelopes, that when combined, provide a near unimodal correlation function with respect to code phase error of the BOC signal having an inherent multimodal autocorrelation function, with the near unimodal correlation envelope being tracked by early and late code replicas at broad one chip phases for providing unambiguous but nonlinear code phase error tracking, which detector is then further improved with the use of code replicas having narrow partial chip phases, such as ⅛ chip phases, for providing near linear code phase error tracking for unambiguous and accurate code tracking of the BOC signal.	Microelectronics

Carbonaceous nano-scaled materials having highly functionalized surface	US8916067B2	ZAIDIVAR, RAFAEL J. | NOKES, JAMES P. | KIM, HYUN I.	A method and composition wherein carbonaceous nano-scaled filler material is subjected to atmospheric plasma treatment using carbon monoxide as the active gas. The treatment with carbon monoxide plasma has been found to significantly increase the incorporation of oxygen groups on the surface of the filler material without degrading the surface and thus serves to increase wettability and dispersion throughout the matrix. The composite that incorporates the treated filler material has enhanced mechanical and electrical properties.	Microelectronics
Channel estimation using a chirp signal and the Fractional Fourier Transform	US10972316B1	SUD, SEEMA	Channel estimation using a chirp signal and the Fractional Fourier Transform (FrFT) is disclosed. A relatively short chirp may be transmitted, and its received components may be converted to tones using the FrFT, from which the channel tap magnitudes and delays can readily be computed. This may involve measuring peaks in the rotated spectrum, measuring the time between the peaks, and mapping the time in the rotated plane back to the original time. Such a technique has various advantages over conventional channel estimation techniques, such as providing high accuracy even in very poor multipath environments and requiring relatively few samples of a chirp, which hence can reduce pilot overhead.	Microelectronics
Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US9923598B2	DAFESH, PHILIP | HESS, PHILLIP BRIAN	Under one aspect, a method is provided for processing a received signal, the received signal including a desired signal and an interference signal that spectrally overlaps the desired signal. The method can include obtaining an amplitude of the received signal. The method also can include obtaining an average amplitude of the received signal based on at least one prior amplitude of the received signal. The method also can include subtracting the amplitude from the average amplitude to obtain an amplitude residual. The method also can include, based upon an absolute value of the amplitude residual being less than or equal to a first threshold, inputting the received signal into an interference suppression algorithm so as to generate a first output including the	Microelectronics

			desired signal with reduced contribution from the interference signal.	
Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US9654158B2	DAFESH, PHILIP | HESS, PHILLIP BRIAN	Under one aspect, a method is provided for processing a received signal, the received signal including a desired signal and an interference signal that spectrally overlaps the desired signal. The method can include obtaining an amplitude of the received signal. The method also can include obtaining an average amplitude of the received signal based on at least one prior amplitude of the received signal. The method also can include subtracting the amplitude from the average amplitude to obtain an amplitude residual. The method also can include, based upon an absolute value of the amplitude residual being less than or equal to a first threshold, inputting the received signal into an interference suppression algorithm so as to generate a first output including the desired signal with reduced contribution from the interference signal.	Microelectronics

Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US12149278B2	DAFESH, PHILIP A. | HESS, PHILLIP BRIAN | KHADGE, GOURAV K.	Provided herein are circuits and methods for processing samples of a received in-phase and quadrature (I/Q) domain signal that includes a desired signal and an interference signal that spectrally overlaps the desired signal. In the I/Q domain, a first contribution to the interference signal is removed from the samples using a first algorithm to generate first processed signal samples. Amplitudes and phases of the first processed signal samples are obtained. In an amplitude domain, a second contribution to the interference signal is removed from the amplitudes of the first processed signal samples using a second algorithm to generate second processed signal samples. A signal quality metric of the second processed signal samples is obtained. Based on the signal quality metric of the second processed signal samples, one or more parameters of the first or second algorithm are adjusted to improve the signal quality metric of the second processed signal samples.	Microelectronics
Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US11588516B2	DAFESH, PHILIP A. | HESS, PHILLIP BRIAN	Under one aspect, a method is provided for processing a received signal, the received signal including a desired signal and an interference signal that spectrally overlaps the desired signal. The method can include obtaining an amplitude of the received signal. The method also can include obtaining an average amplitude of the received signal based on at least one prior amplitude of the received signal. The method also can include subtracting the amplitude from the average amplitude to obtain an amplitude residual. The method also can include, based upon an absolute value of the amplitude residual being less than or equal to a first threshold, inputting the received signal into an interference suppression algorithm so as to generate a first output including the desired signal with reduced contribution from the interference signal.	Microelectronics

Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US11133838B2	DAFESH, PHILIP | HESS, PHILLIP BRIAN	Under one aspect, a method is provided for processing a received signal, the received signal including a desired signal and an interference signal that spectrally overlaps the desired signal. The method can include obtaining an amplitude of the received signal. The method also can include obtaining an average amplitude of the received signal based on at least one prior amplitude of the received signal. The method also can include subtracting the amplitude from the average amplitude to obtain an amplitude residual. The method also can include, based upon an absolute value of the amplitude residual being less than or equal to a first threshold, inputting the received signal into an interference suppression algorithm so as to generate a first output including the desired signal with reduced contribution from the interference signal.	Microelectronics
Circuits and methods for reducing an interference signal that spectrally overlaps a desired signal	US10574288B2	DAFESH, PHILIP | HESS, PHILLIP BRIAN	Under one aspect, a method is provided for processing a received signal, the received signal including a desired signal and an interference signal that spectrally overlaps the desired signal. The method can include obtaining an amplitude of the received signal. The method also can include obtaining an average amplitude of the received signal based on at least one prior amplitude of the received signal. The method also can include subtracting the amplitude from the average amplitude to obtain an amplitude residual. The method also can include, based upon an absolute value of the amplitude residual being less than or equal to a first threshold, inputting the received signal into an interference suppression algorithm so as to generate a first output including the desired signal with reduced contribution from the interference signal.	Microelectronics

Circuits and methods for reducing interference that spectrally overlaps a desired signal based on dynamic gain control and/or equalization	US9806747B1	CLARK, CHRISTOPHER J. | DYBDAL, ROBERT B. | WANG, FEI	A system is provided with circuits and methods for dynamically reducing interference to maintain linear system operation and mitigate interference degradation to desired signal components. The system can include a binning subcircuit system configured to divide the digitized input signal into a plurality of spectral bins each having a power level. A power analysis subcircuit can be coupled to the binning subcircuit and configured to compare a collective power level of spectral bins to a threshold level that would produce nonlinear system operation. Based upon the collective power level exceeding the threshold level, outputting a gain control signal to a variable gain amplifier so that the system remains linear. This dynamic gain control can be applied to systems that receive and/or transmit signals. Residual interference components that degrade signal components can be dynamically removed by excision and the distortion introduced by the excision process can be reduced with equalization circuitry.	Microelectronics
Circuits and methods for reducing interference that spectrally overlaps a desired signal based on dynamic gain control and/or equalization	US9628122B1	CLARK, CHRISTOPHER J. | DYBDAL, ROBERT B. | WANG, FEI	A system is provided with circuits and methods for dynamically reducing interference to maintain linear system operation and mitigate interference degradation to desired signal components. The system can include a binning subcircuit system configured to divide the digitized input signal into a plurality of spectral bins each having a power level. A power analysis subcircuit can be coupled to the binning subcircuit and configured to compare a collective power level of spectral bins to a threshold level that would produce nonlinear system operation. Based upon the collective power level exceeding the threshold level, outputting a gain control signal to a variable gain amplifier so that the system remains linear. This dynamic gain control can be applied to systems that receive and/or transmit signals. Residual interference components that degrade signal components can be dynamically removed by excision and the distortion introduced by the excision process can be reduced with equalization circuitry.	Microelectronics

Cognitive anti-jam receiver systems and associated methods	US8515335B2	DAFESH, PHILIP ANTHONY | PRABHU, RAGHAVENDRA S. | VALLES, ESTEBAN LUIS	Cognitive anti-jam receiver systems and associated methods are provided. The systems and methods may include a signal analysis module that processes a baseband signal to determine one or more signal characteristics of the baseband signal, the baseband signal comprising at least a desired signal; a cognitive decision unit that receives the one or more signal characteristics from the signal analysis module, and generates at least one first adaptive parameter; and at least one anti-jam processing module that processes the baseband signal to generate a modified signal that reduces an impact of at least one jammer signal on a quality of reception of the desired signal from the baseband signal, where processing by the at least one anti-jam processing module may be based at least in part on the received at least one first adaptive parameter from the cognitive decision unit.	Microelectronics
Coherently combining antennas	US7602336B2	DYBDAL, ROBERT B. | CURRY, SAMUEL J.	An apparatus includes antenna elements configured to receive a signal including pseudo-random code, and electronics configured to use the pseudo-random code to determine time delays of signals incident upon the antenna elements and to compensate the signals to coherently combine the antenna elements.	Microelectronics
Communications relay satellite with a single-axis gimbal	US10763967B2	WELLE, RICHARD P.	An apparatus for simultaneously receiving and transmitting data in space may include a receiver configured to receive an incoming beam transmitted from a source along a receive vector between the source and the receiver. The apparatus may also include a transmitter to generate a transmitted beam along a transmit vector. The apparatus may further include a single-axis gimbal configured to rotate the transmit vector about an axis substantially perpendicular to the receive vector, and an attitude-control system configured to rotate the apparatus about an axis parallel to the receive vector or the transmit vector.	Microelectronics

Communications relay satellite with a single-axis gimbal	US10484095B2	WELLE, RICHARD P.	An apparatus for simultaneously receiving and transmitting data in space may include a receiver configured to receive an incoming beam transmitted from a source along a receive vector between the source and the receiver. The apparatus may also include a transmitter to generate a transmitted beam along a transmit vector. The apparatus may further include a single-axis gimbal configured to rotate the transmit vector about an axis substantially perpendicular to the receive vector, and an attitude-control system configured to rotate the apparatus about an axis parallel to the receive vector or the transmit vector.	Microelectronics
Compact light dispersion system	US10578488B1	WARREN, DAVID WHEELER | HACKWELL, JOHN A.	Disclosed herein are spectral imaging systems having an internally folded prism, which can have four different refracting surfaces. A first angle defines the spatial relationship between the first and second refracting surfaces. The first angle can have a range between 45-95 degrees. In some embodiments, the first angle can be 70 degrees. The spatial relationship of the third and fourth refracting surfaces can be defined by a second angle, which can be the same as the first angle. Finally, the spatial relationship of the second and third refracting surfaces can be defined by a third angle, which can have a range between 90-145 degrees. The prism index of refraction, the first, second, and third angles are selected such that TIR is achieved at two of the refracting surfaces. Additionally, these prism parameters are selected such that a 180 degrees fold of the optical path is achieved entirely within the prism.	Microelectronics

Compact, high-throughput spectrometer apparatus for hyperspectral remote sensing	US7609381B2	WARREN, DAVID WHEELER	A spectrometer apparatus includes a refractor element, a slit, a detector, a diffraction grating, and a corrector lens. The refractor element includes a rear surface and a front surface. The slit provides an optical path to the rear surface of the refractor element, and is configured to transmit an image incident thereupon along the optical path. The detector is positioned facing the rear surface of the refractor element. The diffraction grating faces the front surface of the refractor element, and is configured to spectrally disperse and reimage the image of the slit toward the front surface of the refractor element. The corrector lens is positioned between the refractor element and the diffraction grating such that the image is provided to the detector corrected for a spherical aberration caused by a separation distance between the detector and the rear surface of the refractor element.	Microelectronics
Computer-implemented systems and methods for detecting electrostatic discharges and determining their origination locations	US8370091B2	REED, C. CHRISTOPHER | NEWBAUER, TOM R. | BRIET, RICHARD	Computer-implemented systems and methods for detecting ESD on a surface and determining an origination location of the ESD. A programmed computer device monitors time-varying current data related to the surface to detect ESD on the surface. The current profile for the surface may be compared to a catalog of ESD current profiles, where each ESD current profile in the catalog corresponds to a different location on the surface. The location on the surface whose corresponding ESD current profile best matches the actual current profile from the ESD may be determined to be the origination location of the ESD. Moderately different processes may be used to determine the ESD origination location depending on whether the surface is symmetrical or irregular, flat or curved, etc.	Microelectronics

Co-orbiting laser communications relay satellite	US10142012B2	WELLE, RICHARD P.	A dedicated satellite to reduce the cost and increase the rate and reliability of data transmission from space to ground is provided. For each client satellite producing data in Earth orbit, a dedicated relay satellite is provided. The relay satellite may fly near the client satellite and receive data from the client satellite by RF communication. The relay satellite may transmit the data to a ground terminal or to another satellite using a laser communication system. Because the relay satellite is not physically connected to the client satellite, the attitude-control requirements of an optical communication system are not imposed on the client satellite. The relay satellite may also be deployed from the client satellite. The relay satellite may allow downlinking large amounts of data for new satellite operators without an existing ground network and for established satellite operators seeking higher data rates, lower latency, or reduced ground system operating costs.	Microelectronics
Counter rotating torque drive for rotary wing vehicle propulsion	US12157579B2	ULRICH, EVAN R. | OBERTO, ROBERT EDWARD	An aircraft for generating torque. The aircraft includes a motor coupling a lifting rotor and a torque rotor, and is configured to spin the lifting rotor in a first direction to generate lift and spin the torque rotor in a second direction to generate drag-torque. The torque rotor and the lifting rotor are coupled or decoupled from one another during flight or on ground.	Microelectronics
Counter rotating torque drive for rotary wing vehicle propulsion	US10864987B2	ULRICH, EVAN ROBERT | OBERTO, ROBERT EDWARD	An aircraft that includes torque rotor and a lifting rotor, and generates torque from the torque rotor. The torque rotor may optimize drag production while the lifting rotor may optimize lift production limiting compromise between drag and lift production rotor.	Microelectronics

Data recovery device for hypersonic vehicles	US10914842B2	AILOR, III, WILLIAM H. | LANG, JEFFREY ARTHUR | HOFFMAN, II, JAMES LAWRENCE | FULLER, JEROME K. | PADIN, JEFFRY | WEAVER, MICHAEL ALAN | BAYUK, FRANKLIN JOHN	A data recovery device configured to store data onboard a hypersonic vehicle travelling at hypersonic speeds. The data recovery device is released from the hypersonic vehicle upon a release command or an anomalous event. Upon release, the data recovery device is configured to receive Global Positioning System (GPS) position data and configured to broadcast the GPS position data in short bursts during decent to a surface of the Earth and upon impact with the surface of the Earth to aid in recovery of the data recovery device.	Microelectronics
Deployment and control algorithms for wheel cluster formations of satellites	US9694917B1	CHAO, CHIA-CHUN | KIRKPATRICK, BRIAN E. | LIN, VICTOR SHIAW-JONG | JANSON, SIEGFRIED W.	A deployment algorithm that populate a group of companion satellites around a center satellite, and a control algorithm for maintaining the companion satellites in close formation around the center satellite.	Microelectronics
Deployment and control algorithms for wheel cluster formations of satellites	US20190300206A9	CHAO, CHIA-CHUN | LIN, VICTOR SHIAW-JONG | JANSON, SIEGFRIED W.	A control algorithm that determines one or more deviations in an orbit of a companion satellite, and control the companion satellite to minimize effects of perturbing forces.	Microelectronics

Deposition assembly and methods for depositing mold release layers on substrates	US10562209B2	KIM, HYUN I. | ZALDIVAR, RAFAEL J. | HELT, JAMES M.	A deposition assembly generally comprises a first deposition apparatus that is configured to receive a substrate, such as a glass mandrel. The first deposition apparatus is further configured to deposit a plurality of first monolayer molecules onto at least a surface of the substrate to generate a first coating structure on the substrate. A second deposition apparatus is coupled to the first deposition apparatus, and wherein the second deposition apparatus is configured to deposit a plurality of second monolayer molecules onto at least the surface of the substrate such that the second monolayer molecules are diffused through the first coating structure and at least one aperture is filled by at least one of the second monolayer molecules to generate at least one mold release layer on at least the surface of the substrate.	Microelectronics
Detection system, controller, and method of detecting a signal of interest	US8676147B1	CURRY, SAMUEL J. | SAYANO, MASAHIRO | SCHWARTZ, DAVID M. | TSAI, KRISTINE Y.	A detection system includes a receiver configured to generate a receiver signal representative of detected electromagnetic energy, and an analog-to-digital converter (ADC) configured to generate a plurality of signal samples based on the receiver signal. The detection system also includes a detection module configured to identify a plurality of sample offsets for the signal samples, and execute a plurality of autocorrelation functions on the signal samples to provide an output of each of the autocorrelation functions, wherein each autocorrelation function is executed on at least a portion of the signal samples identified by a sample offset of the plurality of sample offsets. The detection module is also configured to compute a sum of the autocorrelation function outputs, normalize the sum of the autocorrelation function outputs, and determine whether a signal of interest is present within the electromagnetic energy based on the normalized sum.	Microelectronics

Digital engineering platform configured to support future space systems development and acquisition	US11526335B2	NGUYEN, TIEN M. | GUILLEN, ANDREW T. | DANG, ANH X. | FREEZE, THOMAS O. | SINGH, JAKE T. | CHANG, ALEXANDER K. | ZAHIDI, FAISAL M. | NGUYEN, HUNG H. | LEE, JONATHAN H. | AVEDISSIAN, VAHE Y.	A digital engineering (DE) platform configured to support space system development and acquisition. The DE platform includes a modular reference architecture models module configured to capture key modular system elements of interest using model-based system engineering (MBSE) and digital object oriented requirements system (DOORS) tools. The DE platform also includes a connectivity matrix module defining interface or specifications between one or more modular system elements. The DE platform is also configured to digitize the interface using a behavior model. The behavior model capturing required activity and/or sequence for a particular use case.	Microelectronics

Distributed attitude control system for reconfigurable spacecraft composed of joined entities with compliant coupling	US11321496B2	KANNAPAN, DEEPTI MANDYAM	A process to design an attitude control system (ACS) controller in each of a plurality of joined entities includes identifying a worst case configuration as a design-to configuration as one or more configurations in a given set S of configurations required for a spacecraft. For the design-to configuration, the process includes deriving one or more system equations in a functional form of equations to determine intermediate design parameters that represent effective proportional and derivative gains of the combined controller, Kp and Kd, respectively. The process also includes determining the design parameters of the ACS controller, namely, gains Kq and Kω and stiffness and damping coefficients, Ks and Cd respectively of all the interfaces between each of the plurality of joined entities, from the intermediate design parameters Kp and Kd. The process further includes programming the ACS controller with selected values of the design parameters for matrices Kq and Kω and selecting springs with stiffness Ks and dampers with damping coefficient Cd for all interfaces between each of the plurality of joined entities. The process includes iterating the computer-implemented process after incrementing a convergence requirement parameter σthreshold when the control performance is not acceptable and until the system achieves acceptable performance, and programming the ACS controller for each of the plurality of joined entities.	Microelectronics

Dynamic equalization systems and methods for use with a receiver for a multipath channel	US8804808B1	DYBDAL, ROBERT B. | CLARK, CHRISTOPHER J. | LORENZELLI, FLAVIO	A dynamic equalization system and method for use with a receiver is provided. The receiver may include an antenna for receiving a signal having multipath signal components and a digitizer for obtaining and digitizing the received signal and multipath signal components. The digitized signal segment and multipath signal components may be discretized into signal segments of length n. Channel parameters of each of the discrete signal segments may be analyzed and locked to, and a time-domain representation of the analyzed channel parameters may be output. Each time-domain representation may be Fourier transformed into a frequency-domain representation, based upon which equalization parameters to equalize the multipath signal components for each of the analyzed channel parameters may be determined. The equalization parameters may be applied to corresponding signal segments of the digitized signal and multipath signal components so as to equalize the multipath signal components.	Microelectronics
Electrochemical rocket motor	US12060852B2	NEMANICK, ERIC JOSEPH | HSU, ANDREA | SCHILLING, JOHN | DESAIN, JOHN | BRADY, BRIAN | CORTOPASSI, ANDREW	Solid rocket motors are provided herein. In certain embodiments, a solid rocket motor includes a housing containing thin layers of fuel and thin layers of an inert oxidizer, separated by a thin nonconductive layer. The housing has a nozzle at the end for gas release and channeling. Prior to use, the inert oxidizer is activated by electrochemical oxidation which can generate an active oxidizer and additional fuel. Ignition of the oxidizer and fuel can be triggered whereby the contents of the housing can ignite, generating hot gasses to be channeled out through the nozzle to generate thrust. Replacing current state solid rocket motors with embodiments described herein can improve cost, safety and increase capability. The disclosed embodiments can be safe to transport, store, and handle. Additionally, there can be no moving parts unlike hybrid or liquid rocket motors.	Microelectronics

Embedded antennas in integrated circuits, and methods of making and using the same	US11637359B2	RAO, VIKRAM M. | PETROSYAN, VAHAGN	Embedded antennas in integrated circuits, and methods of making and using the same, are provided herein. An integrated circuit within a semiconductor die may include a control circuit; an antenna configured to wirelessly receive a control signal at a predefined frequency; and an interconnect configured to provide the received control signal from the antenna to the control circuit. The control circuit may be configured to control a function of the integrated circuit responsive to the received control signal.	Microelectronics
Energy generation apparatus and method	US8928169B2	HICKMAN, ROBERT A.	An energy generation apparatus is disclosed. The apparatus includes a base, a sidewall enclosing a perimeter of the base to define a first volume, and a tube having a first end and a second end. The base includes a solar energy collection surface. The first end of the tube is disposed in the first volume adjacent the base, and the second end of the tube is disposed in a second volume outside of the first volume. The apparatus also includes a fluid flow initiator to initiate a flow of a fluid from the first volume to the second volume through the tube when the fluid in the first volume has been heated by the solar energy collection surface to generate a super-adiabatic lapse rate.	Microelectronics
Energy-angular momentum closed-loop guidance for launch vehicles	US8571727B1	PATERA, RUSSELL PAUL	An improved method for launch vehicle guidance is disclosed. A pre-computed energy-angular momentum (E-J) curve to place a launch vehicle into a target orbit is received and stored. An energy, angular momentum, radial distance, velocity magnitude, and flight path angle of the launch vehicle are computed from state vector data while the launch vehicle is traveling to the target orbit. The pre-computed E-J curve and the computed energy, angular momentum, radial distance, velocity magnitude, and flight path angle of the launch vehicle are used to determine pitch and pitch rate of the launch vehicle.	Microelectronics

Energy-angular momentum diagnostic method for launch vehicle performance	US8676407B1	PATERA, RUSSELL, PAUL	Novel diagnostic methods for performance of a launch vehicle are disclosed. A method may include computing energy for a pre-flight trajectory of a vehicle using angular momentum of the vehicle, and comparing a difference in energy between the energy for the pre-flight trajectory of the vehicle and energy for a flight trajectory of the vehicle.	Microelectronics
Execution stack securing process	US9135436B2	LEE, RICHARD M.	An approach to securing an execution stack (or cloud architecture) is provided. For example, an image is separated into a plurality of layers to form a trusted execution stack. Each of the plurality of layers is hardened to secure key cloud components of the trusted execution stack.	Microelectronics
Fabrication assembly and methods for fabricating composite mirror objects	US10022747B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA L. | KIM, HYUN I. | PATEL, DHRUV N.	A fabrication assembly comprises an apparatus that receives a composite substrate and a glass substrate having a surface with a release coating layer. A resin layer is deposited between the composite and glass substrates such that a first portion of the resin layer is positioned adjacent to a surface of the composite substrate and a second portion of the resin layer is positioned adjacent to the surface with the release coating layer to prevent aperture(s) from forming. A curing of the resin layer is conducted using electromagnetic radiation. A post-processing chamber receives the resin layer positioned between the composite substrate and the glass substrate and conducts another curing of the resin layer. The resin layer and the composite substrate are released from the glass substrate. Another deposition apparatus receives the resin layer and the composite substrate. A metallic coating is deposited to form a composite mirror object.	Microelectronics

Fabrication assembly and methods for fabricating composite mirror objects	US9956587B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA L. | KIM, HYUN I. | PATEL, DHRUV N.	A fabrication assembly comprises an apparatus that receives a composite substrate and a glass substrate having a surface with a release coating layer. A resin layer is deposited between the composite and glass substrates such that a first portion of the resin layer is positioned adjacent to a surface of the composite substrate and a second portion of the resin layer is positioned adjacent to the surface with the release coating layer to prevent aperture(s) from forming. A curing of the resin layer is conducted using electromagnetic radiation. A post-processing chamber receives the resin layer positioned between the composite substrate and the glass substrate and conducts another curing of the resin layer. The resin layer and the composite substrate are released from the glass substrate. Another deposition apparatus receives the resin layer and the composite substrate. A metallic coating is deposited to form a composite mirror object.	Microelectronics
Fractional Fourier Transform-based spectrum analyzer	US12352793B2	SUD, SEEMA | JONES, TIMOTHY	Fractional Fourier Transform (FrFT)-based spectrum analyzers and spectrum analysis techniques are disclosed. Rather than using the standard Fast Fourier Transform (FFT), the FrFT may be used to view the signal content contained in a particular bandwidth. Usage of the FrFT in place of the frequency or time domain allows viewing of the signal in different dimensions, where “spectral” features of interest, or signal content, may appear where they were not visible in these domains before. This may allow signals to be identified and viewed in any domain within the continuous time-frequency plane, and may significantly enhance the ability to detect and extract signals that were previously hidden under interference and/or noise, provide or enhance the ability to extract signals from a congested environment, and enable operation in a signal-dense environment.	Microelectronics

Fractional Fourier Transform-based spectrum analyzer	US11726119B2	SUD, SEEMA | JONES, TIMOTHY	Fractional Fourier Transform (FrFT)-based spectrum analyzers and spectrum analysis techniques are disclosed. Rather than using the standard Fast Fourier Transform (FFT), the FrFT may be used to view the signal content contained in a particular bandwidth. Usage of the FrFT in place of the frequency or time domain allows viewing of the signal in different dimensions, where "spectral" features of interest, or signal content, may appear where they were not visible in these domains before. This may allow signals to be identified and viewed in any domain within the continuous time-frequency plane, and may significantly enhance the ability to detect and extract signals that were previously hidden under interference and/or noise, provide or enhance the ability to extract signals from a congested environment, and enable operation in a signal-dense environment.	Microelectronics
Framework for interfacing blockchain-based ground system with flight software and satellite orbit analysis applications	US12325538B2	MOZUMDAR, MOHAMMAD | CHOMSINSAP, PHANITTA | SARWAR, SADIQ	A framework for interfacing a blockchain-based ground system with flight software and satellite orbit analysis applications is disclosed. A blockchain application (e.g., a web application) for secure management of satellites has three components—a client, a server, and a private and permissioned-based blockchain network (e.g., a Hyperledger Fabric™ network). The client allows users to configure satellite parameters. The server facilitates the communication between the client and the blockchain. The blockchain allows the secure management and storage of satellite configuration data on blockchain ledgers. For instance, SECCON provides a blockchain-based framework that can be a potential candidate for next generation ground system applications. SECCON allows secure configuration management of satellites, and has been interfaced with OpenSatKit, a software tool kit that can interact with the cFS. SECCON also provides secure communication of orbital data between trusted organizations and allows the satellite configuration parameters to be exported and viewed in SOAP.	Microelectronics

Free-floating spherical gimbal	US11161630B2	WELLE, RICHARD P.	A free-floating spherical gimbal ("gimbal") that includes a moving portion substantially spherical in shape and partially enclosed within a larger spherical and stationary cavity. The moving portion of the spherical gimbal is maintained in a location without direct mechanical contact with the stationary cavity.	Microelectronics
Fusing output of artificial intelligence networks	US11494613B2	VILA CASADO, ANDRES | BRANCHEVSKY, DONNA | LOGUE, KYLE | VALLES, ESTEBAN | OLSEN, SEBASTIAN	Fusion of trained artificial intelligence (AI) neural networks to produce more accurate classifications is disclosed. Concatenation from each network being merged may be performed. The new set of features, which includes the concatenated layers, is then fed through a new classifier to form a single final classifier that uses the best parts of each input classifier.	Microelectronics
Galvanic isolation interface for high-speed data link for spacecraft electronics, and method of using same	US9143366B2	BOGGAN, GARRY H.	Under one aspect of the present invention, a structure for providing galvanically isolated communication between first and second spacecraft electronic components includes a semi-insulating substrate; an input port disposed on the substrate and configured to receive a signal from the first spacecraft electronic component; a coupling structure disposed on the substrate, coupled to the input port so as to receive the signal, and configured to provide an isolated replica of the received signal as an output; a signal conditioner disposed on the substrate, coupled to the coupling structure so as to receive the isolated replica of the received signal, and configured to condition the isolated replica; and an output port disposed on the substrate, coupled to the signal conditioner so as to receive the conditioned isolated replica, and configured to provide the conditioned isolated replica to the second spacecraft electronic component.	Microelectronics

Grid-tie inverter with active power factor correction	US9853573B2	SIRI, KASEMSAN	A grid-tie inverter (the “inverter”) may include a power converter that receives a direct current (DC) output voltage from a DC input power source, and generates an alternating current (AC) output voltage for transmission to a utility power grid. The inverter may also include a system controller that regulates the AC output voltage to efficiently transfer power to the utility power grid while a system AC load may be terminated across the output of the inverter. The inverter may also provide active power factor correction between the utility grid voltage and current. Furthermore, the inverter may also offer harmonic cancellation, which minimizes or eliminates the harmonic content out of the utility power grid voltage and current.	Microelectronics
High assurance configuration security processor (HACSP) for computing devices	US10402566B2	KIBALO, THOMAS | SCROFANO, RONALD | DEEDS, ANDREW	A High Assurance Configuration Security Processor (HACSP) for a computing device may perform real-time integrity measurements of an actual bitstream run-time performance against what is expected. The HACSP may be self-contained and have a relatively small footprint. The HACSP may be vendor-agnostic, and may be a trusted system application for the computing device. The HACSP may ensure the security of user application bitstream load and update during device configuration, and may implement security mechanisms for independent secure trusted attestation and integrity measurement mechanisms to report and provide reliable evidence about the "trustworthiness" of the system during user bitstream execution.	Microelectronics
Higher-order intermodulation reduction using phase and angle smearing	US7420508B2	KSIENSKI, DAVID A. | MCKAY, JAMES P. | OSOFSKY, SAMUEL S. | MACGOWAN, KEVEN S. | SHAW, GWENDOLYN M.	A method for reducing intermodulation beams includes applying a beam-smearing phase distribution in addition to a beam-steering distribution for scanning to an array of antenna elements such that multiple higher-order intermodulation products are simultaneously reduced.	Microelectronics

High-frequency, hexapod six degree-of-freedom shaker	US8453512B2	SASSO, FELIX T. | CHUNG, WALTER H. | SHISHIDO, JOHN A. L.	A shaker for enabling the testing of gyros and/or other devices for performance under realistic 6DOF motions. The shaker may be implemented as a hexapod, comprising a plate and six individually, simultaneously, and real-time controllable strut assemblies that are capable of extending and contracting linearly. The strut assemblies may comprise high-precision, linear electromagnetic actuators. The strut assemblies may also comprise high-precision non-contact sensors to sense the extension/contraction of the strut assemblies along their stroke length. In addition, the strut assemblies may comprise, at each end thereof, stiff, bendable flexures to attain the repeatable and linear motion required. The controller preferably has a control bandwidth of 1000 Hz or more, so that the motion of the plate can be precisely controlled to realize realistic 6DOF motions.	Microelectronics
High-throughput software-defined convolutional interleavers and de-interleavers	US11722154B2	GRAYVER, EUGENE | KUBIAK, MARK	High-throughput software-defined convolutional interleavers and de-interleavers are provided herein. In some examples, a method for generating convolutionally interleaved samples on a general purpose processor with cache is provided. Memory is represented as a three dimensional array, indexed by block number, row, and column. Input samples may be written to the cache according to an indexing scheme. Output samples may be generated every MN samples by reading out the samples from the cache in a transposed and vectorized order.	Microelectronics

Increased capacity communication links with spectrum sharing	US8767845B2	KUMAR, RAJENDRA	Various embodiments are directed to systems and methods for processing signals comprising a first component and a second component. A bandwidth of the first component may be centered at a center frequency. A bandwidth of the second component may be offset from the center frequency by an offset frequency such that at least a portion of the bandwidth of the second component overlaps a skirt of the first component. In various embodiments, a transmitter may split a single signal to generate the first and second components, shift the frequency of the second component, recombine and transmit the two components. Also, in various embodiments, a receiver may receive the signal and derive the first and second components by correcting for cross-interference.	Microelectronics
In-situ contamination monitoring	US12352686B2	MORALES, ROCKY G. | HUI, AILEEN O. | LIU, DE-LING	A multi-purpose in-situ contamination sampler includes an inner frame surrounded by a plurality of removable or attachable pieces, each of which include of a single witness surface configured to collect both particulate and molecular contamination within an environment on a payload or a spacecraft.	Microelectronics
Integrated lifting wavelet transform	US7552160B2	HOU, HSIEH S.	The integrated lifting transform provides both the lossy and lossless lifting wavelet transforms while sharing the same lifting chain for either lossy data compression or lossless data compression. The lifting steps can provide a lossless compression and a lossy compression directly from lossless compression while the integer-to-integer adaptive four-stage lifting wavelet transform provides the lossless compression with improved performance.	Microelectronics

Intelligent solar cell carrier system for flight and laboratory measurement applications	US10615744B2	MANN, COLIN J. | WALKER, DON | NOCERINO, JOHN C. | LEE, JUSTIN H.	An apparatus for carrying, retrieving, and characterizing temperature and current-voltage properties of a solar cell may include a metal core printed circuit board (PCB). The metal core PCB includes current-voltage and temperature measurement electronics operated by a remote device via a communication unit. The solar cell is embedded onto the metal core PCB by way of a thermally- and electrically-conducting adhesive material. The current-voltage and temperature electronics and the solar cell are thermally connected to the PCB, and are electrically isolated from each other, while residing on the same plane.	Microelectronics
Interactive interfaces and data structures representing physical and/or visual information using smart pins	US11985157B2	LEE, RICHARD M.	Interactive interfaces and data structures representing physical and/or visual information are provided using smart pins (also called “pins” herein). Pins representing vectors of information may be provided. For instance, in the context of cybersecurity, each pin may represent an attack vector that an adversary can use to attack a system. Each pin may have a depth meter and may move up or down according to its value in an operating range. Each pin may also have a color, a number, or both, representing its current value in the operating range. Such pins may provide both a three-dimensional representation of data that is intuitive to users.	Microelectronics
Intercepting vehicle and method	US9222755B2	ZONDERVAN, KEVIN L.	A simpler, smaller, less costly intercepting vehicle is provided. For example, a highly scalable intercepting vehicle may include a single axial rocket motor and a body-fixed, wide field of view (FOV) sensor unit to accommodate attitude changes required to steer the intercepting vehicle. This intercepting vehicle may be much smaller and less costly than conventional intercepting vehicles.	Microelectronics

Interference monitoring in radio communication systems	US20220173818A1	DYBDAL, ROBERT B. | ALLEN, CATHERINE A. | COOPER, JR., LAMONT	Apparatus and methods for monitoring interference in radio communication systems are provided. In certain embodiments, an interference monitor system for a ground terminal detects for interference based on a sum of the power levels of orthogonal polarizations of detected interference, thereby allowing the total and average peak interference power levels to be obtained independent of interference polarization. Further, the interference can be divided into frequency bins over the received signal bandwidth(s), thereby facilitating measurement of interference spectral characteristics. Multiple interference monitors can be included to detect interference over the full angular range over which potential interference has access as well as to determine an angular direction of the interference.	Microelectronics
Interference suppression using machine learning	US11212015B2	HESS, PHILLIP B. | CASADO, ANDRES I. VILA | WILSON, AIDAN	Methods, systems, and computer program products are described for automatically reducing interference within received signals. A first radio frequency (RF) signal having (i) a desired component and (ii) an interference component with a noise component and a jammed component is received. A trained machine learning (ML) model extracts, from the RF signal, the jammed component and a portion of the noise component. The trained ML model generates and outputs a second RF signal comprising the desired component and a reduced noise component. The reduced noise component has the portion of the noise component removed. The jammed component is removed from the second RF signal.	Microelectronics

Interference suppression using repeated reduced rank adaptive filtering in fractional fourier transform (FrFT) domains	US10437664B2	SUD, SEEMA	A signal-of-interest (SOI) may be separated from interference and/or noise using repeated reduced rank minimum mean-square error Fractional Fourier Transform (MMSE-FrFT) filtering and a low rank adaptive multistage Wiener filter (MWF). A number of stages in the MWF, L, may be chosen such that at the Lth stage, the MSE between the SIM estimate and the true SW is less than or equal to an error threshold $\in$ (e.g., $\in$=0.001). By combining these filtering techniques, significant improvement in reducing the mean-square error (MSE) may be realized over single stage MMSE-FrFT, repeated MMSE-FrFT, and MMSE-FFT algorithms—indeed, by an order of magnitude or more.	Microelectronics
Interference suppression using repeated reduced rank adaptive filtering in Fractional Fourier Transform (FrFT) domains	US10838804B2	SUD, SEEMA	A signal-of-interest (SOI) may be separated from interference and/or noise using repeated reduced rank minimum mean-square error Fractional Fourier Transform (MMSE-FrFT) filtering and a low rank adaptive multistage Wiener filter (MWF). A number of stages in the MWF, L, may be chosen such that at the Lth stage, the MSE between the SOI estimate and the true SOI is less than or equal to an error threshold ϵ (e.g., ϵ=0.001). By combining these filtering techniques, significant improvement in reducing the mean-square error (MSE) may be realized over single stage MMSE-FrFT, repeated MMSE-FrFT, and MMSE-FFT algorithms—indeed, by an order of magnitude or more.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	US12378006B2	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual “cells”, which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or “rolling” along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics

Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	US11643225B2	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	NZ760992B	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	A space vehicle 200, comprising a frame 210 comprising a connection mechanism configured to facilitate connection of the cell with at least one other cell to enable assembly of larger structures based on a plurality of conjoined cells, and a number of components housed within and/or attached to the frame 210. The components include a camera, an extendable sensor, a light source, a radio frequency antenna, a laser telemetry transceiver, a transceiver, a thermometer, a radiation detector, a spectrometer, reaction wheels, an attitude determination and control system (ADCS), processing circuitry, a solar array, a single pixel image counter, a photon counter, a payload, or any combination thereof. The vehicle is configured to automatically interlock, unlock, and reconfigure itself with one or more other vehicles to collectively form a reconfigurable ensemble.	Microelectronics

Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	CA3200454A1	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	CA3200452A1	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	CA3070366C	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics

Interlocking, reconfigurable, reconstitutable, reformable cell-based space system	AU2018303551B2	HELVAJIAN, HENRY | VILLAHERMOSA, RANDY	Cell-based systems may interlock in a reconfigurable configuration to support a mission. Space systems, for example, of a relatively large size may be assembled using an ensemble of individual "cells", which are individual space vehicles. The cells may be held together via magnets, electromagnets, mechanical interlocks, etc. The topology or shape of the joined cells may be altered by cells hopping, rotating, or "rolling" along the joint ensemble. The cells may be multifunctional, mass producible units. Rotation of cell faces, or of components within cells, may change the functionality of the cell. The cell maybe collapsible for stowage or during launch.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	US11155366B2	HELVAJIAN, HENRY	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space, on Earth, other celestial bodies, and underwater.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	NZ760993B	HELVAJIAN, HENRY	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple nested rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space or on other celestial bodies.	Microelectronics

Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	CA3206759A1	HENRY HELVAJIAN	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space, on Earth, other celestial bodies, and underwater.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	CA3070389C	HELVAJIAN, HENRY	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space, on Earth, other celestial bodies, and underwater.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	AU2018303552B2	HELVAJIAN, HENRY	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space, on Earth, other celestial bodies, and underwater.	Microelectronics

Ion-based nanoelectric memory	US11056647B2	BUSHMAKER, ADAM W. | WALKER, DON	A carbon nanotube (CNT) single ion memory (or memory device) may include a mobile ion conductor with a CNT on one side and an ion drift electrode (IDE) on the other side. The mobile ion conductor may be used as a transport medium to shuttle ions to and from the CNT and the IDE. The IDE may move the ions towards or away from the CNT.	Microelectronics
Iterative decoding technique system and method for digital selective calling	US20220376821A1	HUNTER, MATTHEW THOMAS	System and methods are disclosed that comprise receiving at least one signal via a receiver. The at least one signal is extracted for data via a processor coupled to the receiver, wherein the data includes at least one message and a set of parameters related to the message. A signal output is generated using the at least one message and the set of parameters such that the signal output includes a first portion and a second portion. At least one error is identified in the signal output and corrected using the first portion and the second portion. An output is generated that is used to perform at least one task related to the at least one signal.	Microelectronics
Kinetic energy storage and transfer (KEST) space launch system	US9260204B2	HICKMAN, ROBERT, ALAN	A Kinetic Energy Storage and Transfer (KEST) vehicle and target vehicle kinetic energy transfer method are provided. The KEST vehicle is configured to transfer kinetic energy to the target vehicle, propelling the target vehicle into a higher orbit or beyond the Earth. This is accomplished by a catching mechanism that contacts the target vehicle. The catching mechanism may also include a braking mechanism configured to accelerate the target vehicle, and thus slow the KEST vehicle, as the catching mechanism and target vehicle travel along one or more tethers of the KEST vehicle. Alternatively, the catching mechanism may be attached to an end of the one or more tethers and be configured to slow the target vehicle as the one or more tethers bend.	Microelectronics

Laser and lamp integrated pulsed optically-pumped physics packages for atomic clocks	US11190195B1	CAMPARO, JAMES | HUANG, MICHAEL | DRISKELL, TRAVIS | MONAHAN, DANIELE | WARREN, ZACHARY	A physics package for an atomic clock is provided herein. The atomic clock may include a resonance cell storing alkali vapor having first and second hyperfine ground states and an excited state, a light source to transmit light through the resonance cell at a frequency corresponding to electronic decay from the excited state to the first ground state, and a photodetector to receive light from the light source. The physics package may include a laser, and controller circuitry to, at a first time, allow light from the laser to optically pump the alkali vapor from the first hyperfine ground state to the excited state; and at a second time, allow the photodetector to receive light source light from the resonance cell while inhibiting light from the laser from optically pumping the alkali vapor in the resonance cell.	Microelectronics
Laser scripted encoding and decoding	US10997377B1	LIVINGSTON, FRANK EDWARD | HELVAJIAN, HENRY	A method of encoding information on a material substrate and a device including the modified material substrate are provided. The method includes providing a material substrate having at least one exposed surface or interior (bulk) location with an initial material state, treating the exposed surface or interior location with an energy source, wherein the energy source encodes encryption information on the exposed surface or interior location to provide a modified material substrate having an exposed surface or interior location with an intermediate material state, and then treating the exposed surface or interior location with an intermediate material state with the energy source to encode decipher information on the exposed surface or interior location to provide a remodified material substrate having an exposed surface or interior location with a final material state.	Microelectronics
Lasercom acquisition and tracking sensor	US11493750B2	LEE, SHINHAK | MILLER, RYAN MICHAEL | CHOW, KEVIN LI | TRAN, TUONG-VI THI | RIZVI, FARHEEN	An acquisition and tracking sensor includes a quad detector with a narrow field of view (NFOV) and a micro-electromechanical system (MEMS) mirror with a wide field of view (WFOV). The quad detector is placed behind the MEMS mirror to produce a WFOV to allow the quad detector to scan a larger area for the incoming laser beam.	Microelectronics

Lithium ion battery de-orbiter	US11713140B2	NEMANICK, ERIC JOSEPH | SCHILLING, JOHN H. | DESAIN, JOHN D. | HSU, ANDREA G. | BRADY, BRIAN B. | CORTOPASSI, ANDREW C.	A de-orbiting system for a space vehicle may include one or more lithium ion (Li-ion) batteries configured to release hot gases to be used for thrusting during de-orbiting of the apparatus. The system may also include one or more heaters surrounding each of the one or more Li-ion batteries, which are configured to send each of the one or more Li-ion batteries into a thermal runaway. The thermal runaway causes the one or more Li-ion batteries to release stored electrochemical energy within each of the one or more Li-ion batteries.	Microelectronics
Long range endurance aero platform system	US11851178B2	BECK, STEVEN | CALDWELL, DAVID | HARTNEY, CHRISTOPHER | JEFFERSON, JR., BERNARD HARRIS | LANG, JEFFREY | MORALES, JOHN | PANEVSKY, MARTIN | SIRI, KASEMSAN | ULRICH, EVAN | WELLE, RICHARD | YARBROUGH, ALLYSON	An unmanned aerial vehicle (UAV) that provides increased operational flight endurance and efficiency. The UAV includes a power generation system, which includes an internal combustion engine and one or more batteries (batteries). The power generation system is configured to generate power for propulsion of the UAV. The internal combustion engine is configured to power a lift propeller, generating vertical lift of the UAV, and the batteries are configured to power a micro-propeller assembly, propelling the UAV in a forward direction or multiple additional directions.	Microelectronics
Low probability transitions and boundary crossing into disallowed states for a more optimal solution	US11308402B2	YEOH, TERENCE | DESAI, NEHAL	Artificial intelligence (AI) techniques that map disallowed states and enable access to those states under certain conditions through a search algorithm are disclosed. In other words, scenario boundaries may be crossed by jumping from one scenario that is less desirable or even has no solution to another scenario that is more desirable.	Microelectronics

Low probability transitions and boundary crossing into disallowed states for a more optimal solution	US10762431B2	YEOH, TERENCE | DESAI, NEHAL	Artificial intelligence (AI) techniques that map disallowed states and enable access to those states under certain conditions through a search algorithm are disclosed. In other words, scenario boundaries may be crossed by jumping from one scenario that is less desirable or even has no solution to another scenario that is more desirable.	Microelectronics
Master/slave ensembling for satellite-system timekeeping	US11493636B2	CAMPARO, JAMES | DRISKELL, TRAVIS	Time-synchronization of a space-system having a plurality of satellites. During a first period, a first satellite of the plurality of satellites is designated as a master satellite. A clock of the master satellite is configured to provide time and frequency to remaining satellites of the plurality of satellites and the remaining satellites are designated as slave satellites. During a second period, a second satellite of the slave satellites is designated as the master satellite based on a performance indicator and the first satellite is designated as a slave satellite. During the first period and the second period, clocks of the slave satellites are crosslinked with a clock of the master satellite using time transfer. At least one satellite during the first period and the second period, delivers time data having the time and the frequency generated by a clock of the at least one satellite.	Microelectronics

Material modification assembly and method for use in the modification of material substrates	US10228666B2	LIVINGSTON, FRANK EDWARD | GANEY, TIMOTHY	A material modification assembly comprises an energy source for generating light beams to modify a substrate. A computing device generates pattern script(s) based on at least one parameter of the modification. The computing device also generates process script(s) including a type of pulse scripts to be used with the light beams and are based on at least one parameter of the interaction between the energy source and the substrate. The computing device combines the pattern script(s) with the process script(s) and generates command signals based on the combination. The computing device transmits the command signals to one or more additional devices of the material modification assembly to facilitate modifying the light beams for the modification to the substrate such that the modification includes a pattern on at least a surface of the substrate having dimensions and includes two or more discrete material alterations or changes spatially overlapped within the pattern.	Microelectronics
Maximum power tracking among distributed power sources	US9960602B2	SIRI, KASEMSAN	Optimum power tracking for distributed power sources may be provided by a family of power system architectures having distributed-input series-output (DISO) converters. The DISO converters may be controlled to achieve uniform input voltages across their respective distributed power sources while also tracking an optimum power point of the power system. Each DISO converter may be operably connected to a corresponding power source to form a power-processing channel. A controller may be operably connected to the plurality of DISO converters to control the operation thereof.	Microelectronics

Metal structures and methods of using same for transporting or gettering materials disposed within semiconductor substrates	US9324579B2	PRESSER, NATHAN | TAYLOR, DAVID P.	Embodiments of the present invention provide metal structures for transporting or gettering materials disposed on or within a semiconductor substrate. A structure for transporting a material disposed on or within a semiconductor substrate may include a metal structure disposed within the semiconductor substrate and at a spaced distance from the material. The metal structure is configured to transport the material through the semiconductor substrate and to concentrate the material at the metal structure. The material may include a contaminant disposed within the semiconductor substrate, e.g., that originates from electronic circuitry on the substrate.	Microelectronics
Method of improving dimensional stability and adhesive strength of bonded structures	US11161333B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA LINN | KIM, HYUN I	A method of accelerating the reduction of residual stress in a bonded structure is provided. The method can include: providing a bonded structure having at least two substructures, wherein the substructures are bonded together with an adhesive; and submitting the bonded structure to a high-humidity environment having a relative humidity of at least 75%. The method can also include a step of submitting the bonded structure to an low-humidity environment having a relative humidity of at most 20%. According to the method, the bonded structure can have a first residual stress at a first time and a second residual stress at a second time, wherein an absolute value of the first residual stress is greater than an absolute value of the second residual stress. According to the method, the residual stress at the second time can be about zero.	Microelectronics
Method of making an embedded electromagnetic device	US8479375B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics

Methods and apparatuses for enabling detection of a modulated optical source	US8433198B2	MCFADDEN, MICHAEL J.	Methods and apparatuses for enabling detection of a modulated optical source involve one or more modulated optical signals shifted, i.e., demodulated optically, to one or more base band signals that are detectable by one or more low-frequency detectors.	Microelectronics
Methods and devices for controlling stem cell function and gene expression	US11932875B2	LIVINGSTON, FRANK EDWARD | GANEY, TIMOTHY	A method of stimulating and controlling stem cell activity and differentiation on a modified material substrate and a device including the modified material substrate are provided. The method includes providing a material substrate configured for medical use. The material substrate includes at least one surface or interior area available for modification, and the at least one surface or interior area is treated with a plurality of pulsed light beams to obtain a modified material substrate with at least one modified surface or interior area. The at least one modified surface or interior area has a biomimetic architecture with surface and bulk (interior) features, properties, and textures configured to accelerate and control stem cell differentiation when the modified material substrate is contacted with stem cells.	Microelectronics
Methods and systems for detecting temporally oscillating sources in video signals using a recursive infinite impulse response (IIR) filter technique	US8532197B2	LAREAU, JONATHAN JOSEPH | GALLAGHER, ANDREW JAMES	A method for detecting a temporally oscillating source in digital video signals includes: using an imaging device to capture a sequence of input images of a scene; generating digital video signals from the sequence of input images; and processing the digital video signals using a recursive Infinite Impulse Response (IIR) filter technique based on a differentiated version of Goertzel's Algorithm to detect a temporally oscillating source in the digital video signals. In various embodiments, the method also includes generating a visual display of the scene including one or more graphical elements at least one of which pertains to a detected temporally oscillating source.	Microelectronics

Methods and systems for increased communication throughput	US8259857B2	DYBDAL, ROBERT B. | LORENZELLI, FLAVIO | CURRY, SAMUEL J.	Systems and methods for increasing communication throughput by superimposing multiple signal components in the same bandwidth are disclosed. Cochannel interference is reduced by using signal separation algorithms. The signal separation algorithms may use both a priori information about the superimposed signals and measured channel parameters. In addition, error correction encoding and interleaving may be used to reduce signal power and obviate the need for ideal signal separation.	Microelectronics
Methods and systems for motion compensation and stereoscopic images generation	US10109070B1	HECHT, JAMES H. | WARREN, DAVID W. | GUTIERREZ, DAVID J.	An image acquisition system with motion compensation is disclosed. Embodiments of the system include: includes a rectilinear lens assembly, a first 2D-image sensor, and a motion compensation module. The rectilinear lens assembly has an optical axis, an object plane, and a focal plane. During an image acquisition cycle, the rectilinear lens assembly is positioned such that the optical axis is orthogonal to the object plane while the first 2D-image sensor is parallel to the object plane. The motion compensation module can determine a motion vector of an image scene in the object plane. In response the determined motion vector, the rectilinear lens assembly and the first 2D-image sensor relative are translated relative to each other in two dimensions to compensate for the motion of the image scene.	Microelectronics
Methods and systems for orbit estimation of a satellite	US20220017239A1	CHEN, DEREK	Disclosed herein are systems and methods for estimating an orbit of a satellite using only images captured by an onboard camera of the satellite. One of the disclosed methods includes: capturing a plurality of images using an onboard camera of the satellite; determining the trajectory, loop closure metrics, and the relative geographic position of the satellite using the plurality of images captured by the onboard camera; and estimating the orbit of the satellite based at least on the determined trajectory, loop closure metrics, and the relative geographic position of the satellite.	Microelectronics

Methods and systems for reducing spherical aberration	US12009605B2	LAU, ANTHONY Y.	Due to its geometry, spherical reflector antenna is inherently diffractive, leading to spherical aberration. Disclosed are example embodiments of methods and systems to minimize or eliminate spherical aberration in a spherical reflector antenna system. One of the systems includes: a main spherical reflecting dish; and a spherical feed having a plurality of antenna elements disposed on a spherical surface. The plurality of antenna elements can be disposed on a convex surface of the spherical surface of the spherical feed facing the main spherical reflecting dish.	Microelectronics
Methods and systems for solid state heat transfer	US8904809B2	YUAN, SIDNEY W. K. | LAM, TUNG T.	Various embodiments are directed to a thermoelectric device comprising a thermoelectric element, a first heat switch and a second heat switch. The thermoelectric element may comprise a first component in electrical contact with a second component at an interface. The first component may comprise a first material and the second component may comprise a second material different from the first material. The first heat switch may comprise a first terminal in thermal contact with the interface and a second terminal in thermal contact with a thermal reservoir. The second heat switch may comprise a first terminal in thermal contact with the interface and a second terminal in thermal contact with a thermal load.	Microelectronics
Methods and systems for solid state heat transfer	US9885502B2	YUAN, SIDNEY W. K. | LAM, TUNG T.	Various embodiments are directed to a thermoelectric device comprising a thermoelectric element, a first heat switch and a second heat switch. The thermoelectric element may comprise a first component in electrical contact with a second component at an interface. The first component may comprise a first material and the second component may comprise a second material different from the first material. The first heat switch may comprise a first terminal in thermal contact with the interface and a second terminal in thermal contact with a thermal reservoir. The second heat switch may comprise a first terminal in thermal contact with the interface and a second terminal in thermal contact with a thermal load.	Microelectronics

Methods for making photostructured acoustic devices	US9073258B2	HELVAJIAN, HENRY | HANSEN, WILLIAM W. | STEFFENEY, LEE F.	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Methods of accelerating a target vehicle to a higher orbit via a kinetic energy storage and transfer (KEST) space vehicle	US9938027B2	HICKMAN, ROBERT ALAN	Methods of accelerating a target vehicle to a higher orbit via a Kinetic Energy Storage and Transfer (KEST) vehicle are provided. The KEST vehicle is configured to transfer kinetic energy to the target vehicle by way of a catching mechanism using one or more brakes on one or more associated tethers along which the braking mechanism traverses, accelerating the target vehicle into a higher orbit, potentially even beyond the Earth.	Microelectronics
Mixed media ethernet switch	US11055254B2	UTTER, ALEXANDER CLIFTON	A mixed-media Ethernet switch (the “switch”) is configured to allow a variety of devices to communicate on a given network. The switch includes a plurality of ports. Each of the plurality of ports are configured to connect with, and communicate with, a corresponding traditional medium or non-traditional medium.	Microelectronics
Modified polyimides and moisture interactive materials and products including the same	US9156600B2	SCHARF, SARA R. | VILLAHERMOSA, RANDY M.	Moisture interactive materials and products formed with a polyimide material that includes metal salt (e.g., cobalt salt) portions imbedded therein such that the polyimide material is capable of absorbing, permeating, and desorbing moisture and such that the polyimide material changes in color depending upon how much moisture is currently retained by the polyimide material, the polyimide material being substantially free of oxide.	Microelectronics

Modular solar cell and solar cell array	US12027911B2	MANN, COLIN J. | WALKER, DON	Embodiments of the present invention include modular solar power cells, arrays, and power management systems for use in satellite systems and constellations. In one embodiment, a solar cell module can include: a module substrate including a high-emissivity side and a mounting side; a power management circuit mounted to the mounting side of the module substrate; a battery arranged adjacent to the power management circuit; a solar cell substrate arranged adjacent the battery and including an embedded battery heater; and a solar cell mounted directly to the solar cell substrate and connected to the battery.	Microelectronics
Monitoring during additive manufacturing process using thermocouples	US11396045B2	KENDERIAN, SHANT | MCLOUTH, TAIT DEWITT | CASE, JOSEPH T. | PATEL, DHRUV N.	A build plate may include one or more thermocouples placed on an underside of the build plate. The one or more thermocouples output temperature fluctuation to assist in monitoring for build plate separation of a product located on top of the build plate.	Microelectronics
Monitoring during additive manufacturing process using thermocouples	US11926104B2	KENDERIAN, SHANT | CASE, JOSEPH T.	A build plate may include one or more thermocouples placed on an underside of the build plate. The one or more thermocouples output temperature fluctuation to assist in monitoring for build plate separation of a product located on top of the build plate.	Microelectronics
Monitoring the integrity of a space vehicle	US11425155B2	JONES, ADAM NEAL | COHEN, NICHOLAS CAMERON | LIN, JONATHAN | WOODWARD, DOUGLAS ROBERT | ANDRADE, JACQUELYN CHRISTINA | MCDONALD, ERIC JOHN |	Space system TT&C monitoring includes analyzing network traffic comprising of data packets between a front-end processor (FEP) and a cryptographic unit. A JavaScript Object Notation (JSON) object is created when the network traffic containing a vehicle command is detected. The JSON object is transmitted, by way of a data transport mechanism, to either a cyber defense module or a security information and event management (SIEM) module for further ingestions and visualization. The JSON object is analyzed using machine learning (ML) module or a rule-based intrusion detection system (IDS) module to generate an anomaly score for the SIEM module for further ingestions and visualization.	Microelectronics

		COLE, MICHAEL HARVEY		
Monolithic sun sensors assemblies thereof	US9041135B2	JANSON, SIEGFRIED W.	Under one aspect of the present invention, a monolithic sun sensor includes a photosensor; a spacer material disposed over the photosensor; and a patterned mask disposed over the spacer material and defining an aperture over the photosensor. The spacer material has a thickness selected such that the patterned mask casts a shadow onto the photosensor that varies as a function of the monolithic sun sensor's angle relative to the sun. The sun sensor may further include a substrate in which the photosensor is embedded or on which the photosensor is disposed. The spacer material may be transparent, and may include a layer of inorganic oxide, or a plurality of layers of inorganic oxide. The patterned mask may include a conductive material, such as a metal. The aperture may be lithographically defined, and may be square. The sun sensor may further include a transparent overlayer disposed over the patterned mask.	Microelectronics

Multi-layer substrate apparatus, systems and methods of assembling same	US10888426B2	LIVINGSTON, FRANK EDWARD | GANEY, TIMOTHY	A multi-layer substrate apparatus includes a first layer configured to provide at least one electrical-based property. A second layer proximate to the first layer is configured to provide at least one mechanical-based property. A third proximate to the second layer includes at least one chemical component such that the third layer is enabled to regulate the multi-layer substrate apparatus based on a system that the multi-layer substrate apparatus is being used with. A fourth layer proximate to the third layer is configured to provide at least one magnetic-based property. A fifth layer proximate to the fourth layer is configured to provide support based on the system that the multi-layer substrate apparatus is being used with. The fifth layer includes a geometric portion that is configured to facilitate at least one process therein.	Microelectronics
Multisource power system	US9013061B2	SIRI, KASEMSAN	A multisource power system utilizing output isolated DC-DC converters in a serial input, parallel output arrangement provides uniform input voltage distribution and selective maximum power tracking wherein embodiments include maximum power tracking (“MPT”) with a single MPT controller, a battery dominated output voltage bus, and a regulated output voltage bus.	Microelectronics

Multistage pulse tube coolers	US10126023B2	YUAN, SIDNEY W. K.	Various embodiments are directed to a pulse tube cooler. The pulse tube cooler may comprise a fluid compressor, a first regenerator, a first pulse tube, a first reservoir, a second regenerator, a second pulse tube, and a second reservoir. The first end of the first regenerator may be in fluid communication with the fluid compressor. The cold end of the first pulse tube may be in fluid communication with the second end of the first regenerator. The first reservoir may be in fluid communication with the hot end of the first pulse tube. The first end of the second regenerator may be in fluid communication with the cold end of the first regenerator. The cold end of the second pulse tube may be in fluid communication with the second end of the second regenerator. The cold end of the first pulse tube and the hot end of the second pulse tube may be in fluid communication with one another through the second reservoir.	Microelectronics
Multitarget tracking antispoofing receiver	US7471238B2	LILLO, WALTER E. | SCULLY, KEVIN J. | NEALY, CARLTON D.	A multitarget tracking antispoofing receiver utilizes multitarget tracking algorithms and multiple correlators for tracking signals of interest in a field of view about a nominal trajectory of a desired true signal for tracking targets within the code phase and carrier frequency signal space so as to predict when true and spoof signals will cross paths in the signal space without spoofing with loss of tracking of the desired signal so that true tracking of a desired target is maintained in the presence of a spoofing signal moving along a spoofing signal track and crossing a true path of the true signal.	Microelectronics

Nanosatellite photovoltaic regulator	US8866465B2	SIMBURGER, EDWARD J. | RUMSEY, DANIEL L. | CARIAN, PETER J. | SWENSON, JR., JAMES S.	A solar cell regulator in a nanosatellite includes a pulse width modulated DC-DC boost converter and a peak power tracking controller for converting solar cell power to bus power for charging of system batteries and powering loads while the controller controls the pulse width modulation operation of the converter for sensing solar cell currents and voltages along a power characteristic curve of the solar cell for peak power tracking, for determining any power data point, including a peak power point, an open circuit voltage point, and a short circuit current point along the power characteristic curve of the solar cell, and for communicating the power data to a satellite processor for monitoring the performance of the solar cell during operational use of the satellite.	Microelectronics
Narrowband antijam signaling system (NASS) and device	US11828869B2	DAFESH, PHILIP A	A narrowband AJ signaling system includes an AJ processor placed between a high precision analog-to-digital (ADC) converter and a narrowband digital receiver. In another example, the AJ processor is placed between the high precision ADC and a digital-to-analog converter (DAC). The AJ processor of either example may suppress the jammer power down to the level of the noise floor of the system.	Microelectronics
Network coding for satellite communications	US9007984B1	TAN, HARRY H | LIANG, ROBERT M | HAN, JOSEPH	A physical layer network coding architecture is provided to increase downlink capacity for satellite network architectures. For instance, a network coding controller may perform a XOR network coding operation on FEC encoded information received from a first terminal and second terminal, and broadcast a single downlink message containing the XOR network coded information to the first and second terminal.	Microelectronics
Non-contacting angular motion measuring device	US12228398B2	PRICE, KENNETH D. | SASSO, FELIX T.	A non-contact angular motion measuring device includes a mirror configured to move or rotate about a pivot axis. The device also includes a curved target, circularly symmetric around an axis normal to the mirror. The device further includes at least one pair of sensors configured to emit fields towards the curved target rather than the mirror.	Microelectronics

Object detection and characterization using a LIDAR-based sensor	US11782163B2	MCVEY, JOHN | HELVAJIAN, HENRY | PERDUE, SHAWN | PETERSON, GLENN | SORGE, MARLON | CARDOZA, DAVID | GANGESTAD, JOSEPH	Systems, apparatuses, and methods for identifying and tracking objects (e.g., debris, particles, space vehicles, etc.) using one or more light detection and ranging (LIDAR)-based sensors are disclosed. Such systems, apparatuses, and methods may be particularly beneficial for detecting millimeter scale and/or sub-millimeter scale objects. Such systems, apparatuses, and methods may be used for detection of objects in space, in the atmosphere, or in the ocean, for example.	Microelectronics
Onboard structure convertible into a propellant for electric propulsion	US11542926B2	DRAGNEA, HORATIU C. | HELVAJIAN, HENRY | PATEL, KUSHAL	A vehicle comprising a structure, a plurality of heating sources, and a transport mechanism. The structure is comprised of multiple materials, a composite such that some of the material constituents can be extracted leaving behind others via application of energy (such as de-alloying). The extracted material or materials are configured to be re-purposed into a propellant. The plurality of heating elements surrounds or is embedded within the structure configured to convert the material into the propellant. The transport mechanism is configured to transport the propellant from the structure to a reservoir or to the propulsion system.	Microelectronics
Periodically varying frequencies for assured time transfer	US12061271B2	ALLEN, DAVID W.	A system and method for periodically varying a center frequency for assured time transfer in order to securely transfer a signal from a source to a receiver, without adding additional encryption to signal.	Microelectronics
Phased array antenna system with intermodulation beam nulling	US8643543B2	MCKAY, JAMES P. | KSIENSKI, DAVID A.	A phased array antenna system with intermodulation beam nulling device includes nulling phase shifters.	Microelectronics

Phase-optimized constant envelope transmission (POCET) method, apparatus and system	US9413419B2	CAHN, CHARLES ROBERT | DAFESH, PHILIP A.	An apparatus and method for generating a composite signal includes electronics configured to modulate a carrier utilizing a finite set of composite signal phases to generate a composite signal, the finite set of composite signal phases being determined through an optimization process that minimizes a constant envelope for the phase modulated carrier, subject to constraints on desired signal power levels of the signals to be combined and either zero or one or more relative phase relationships between the signals. The apparatus and method can be extended to generating an optimized composite signal of different frequencies.	Microelectronics
Phase-optimized constant envelope transmission (POCET) method, apparatus and system	US8774315B2	CAHN, CHARLES ROBERT | DAFESH, PHILIP A.	An apparatus and method for generating a composite signal includes electronics configured to modulate a carrier utilizing a finite set of composite signal phases to generate a composite signal, the finite set of composite signal phases being determined through an optimization process that minimizes a constant envelope for the phase modulated carrier, subject to constraints on desired signal power levels of the signals to be combined and either zero or one or more relative phase relationships between the signals. The apparatus and method can be extended to generating an optimized composite signal of different frequencies.	Microelectronics
Phase-optimized constant envelope transmission (POCET) method, apparatus and system	US9197282B2	CAHN, CHARLES ROBERT | DAFESH, PHILIP A.	An apparatus and method for generating a composite signal includes electronics configured to modulate a carrier utilizing a finite set of composite signal phases to generate a composite signal, the finite set of composite signal phases being determined through an optimization process that minimizes a constant envelope for the phase modulated carrier, subject to constraints on desired signal power levels of the signals to be combined and either zero or one or more relative phase relationships between the signals. The apparatus and method can be extended to generating an optimized composite signal of different frequencies.	Microelectronics

Photographic silver emulsion-based digital archival storage	US8085304B2	ZURBUCHEN, MARK ALAN | HOSKINSON, CHARLES THOMAS	A photographic digital data archival apparatus includes an article of media that includes a substrate and one or more layers of silver-emulsion based light-sensitive material, the article of media being configured to store digital data in the one or more layers and including a human-readable portion that provides instructions on reading and interpreting the digital data using basic imaging and computing technologies that do not require a person reading the instructions to previously possess or first acquire, as a prerequisite, knowledge of a format or encoding scheme associated with the digital data.	Microelectronics
Photostructured chemical devices and methods for making same	US9481571B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Photostructured chemical devices and methods for making same	US8940241B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics

Photostructured chemical devices and methods for making same	US10099918B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Photostructured electronic devices and methods for making same	US8369070B2	HELVAJIAN, HENRY | HANSEN, WILLIAM W. | STEFFENEY, LEE F.	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices may include one or more of chemical, mechanical, electrical, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Photostructured optical devices and methods for making same	US9146377B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices including chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics

Photostructured optical devices and methods for making same	US10228568B2	HELVAJIAN, HENRY	A photostructurable ceramic is processed using photostructuring process steps for embedding devices within a photostructurable ceramic volume, the devices including chemical, mechanical, electronic, electromagnetic, optical, and acoustic devices, all made in part by creating device material within the ceramic or by disposing a device material through surface ports of the ceramic volume, with the devices being interconnected using internal connections and surface interfaces.	Microelectronics
Polyaniline nanofiber-amine composite materials for phosgene detection	US8961880B2	VIRJI, SHABNAM | KOJIMA, ROBERT | KANER, RICHARD B. | WEILLER, BRUCE H.	A sensor for detecting phosgene includes a pair of electrodes separated by an electrode gap, and a layer of conducting polymer material positioned over and making electrical contact with the pair of electrodes, the layer of conducting polymer material being modified with an amine such that the electrical resistance of the conducting polymer material measured across the electrodes is responsive to changes in an amount of phosgene to which the conducting polymer material is exposed.	Microelectronics
Portable x-ray computed tomography	US20180315236A1	CASE, JOSEPH T. | KENDERIAN, SHANT | JOHNSON, ERIC C.	A portable x-ray computed tomography (CT) system may utilize algebraic reconstruction techniques (ART) to produce 3D volume images from tens of shots or less. The system may be deployed as desired where x-ray source and detector positions are not known beforehand. A fast, accurate matrix may be formed relating voxels to detector pixels via a modified ray tracing algorithm, eliminating artifacts caused by approaches using rough approximations. Masking or recombination may be performed to remove detector pixels that are not part of a region of interest (ROI) or lump the pixels together as one unknown, significantly reducing matrix size, and hence, computation time. The positions and orientations of the x-ray source and detector may be treated as unknowns and refined to optimize a volume image metric. For example, the optimized metric could be image contrast, image sparsity, or total variation.	Microelectronics

Process for rapidly measuring coefficient of moisture expansion (CME) values for materials	US11940266B2	FERRELLI, GEENA L. | KIM, HYUN I. | ZALDIVAR, RAFAEL J.	Processes for rapidly and accurately measuring the coefficient of moisture expansion for materials, such as adhesives, are disclosed. A replication technique may be used to manufacture highly flat and smooth adhesive samples. Moisture is introduced in a controlled humidity atmosphere, distortion is monitored with an accurate laser interferometer (e.g., ˜1 nanometer (nm) accuracy), and measurements are correlated with moisture content change. Such processes decrease sample size by three orders of magnitude as compared with conventional techniques and have a smaller adhesive mass requirement, which enables measurement of expensive microelectronic adhesives that were previously cost-prohibitive to measure. Also, thinner films allow CME measurements of ultraviolet (UV) cured adhesives that would otherwise have depth of penetration issues. Furthermore, saturation occurs quickly, allowing pre-stabilization at room temperature, which enabled parametric studies as a function of processing or cure state. Additionally, testing occurs within hours versus months, enabling short lead times for root-cause investigations.	Microelectronics
Programmable cellular automata for memory search, recall, simulation, and improvisation	US10740646B2	YEOH, TERENCE S. | DESAI, NEHAL	An architecture and process are provided that encodes information into a cellular automata memory structure such that it can be recalled utilizing unique memory anchors (engrams) in a manner that both identifies and relates each piece of information relative to other data points. The automata may be individually programmable with a limited, local ruleset that activates other cellular automata based on prior patterns that were fed into the array. Deep Learning Neural Network (DLNN) systems may be probed to understand what discriminators are being used to classify the data, which is not possible with conventional DLNN techniques.	Microelectronics

Progressive objective addition in multi-objective heuristic systems and methods	US11829887B2	THOMPSON, TIMOTHY GUY | CLIFTON, RONALD SCOTT	Systems and methods are provided for performing multi-objective optimizations with a relatively large number of objectives to which optimization is to be performed. The objectives of the optimization problem may be partitioned to two or more subsets (e.g., overlapping or non-overlapping subsets) of objectives, and partial optimization(s) may be performed using a subset or combination of subsets of the objectives. One or more of the partial optimizations may use one or more pareto-optimized chromosomes from a prior partial optimization. A final full optimization may be performed according to all of the objectives of the optimization problem and may use one or more chromosomes of any preceding partial optimization as a starting point for finding a final solution to the optimization problem. Any variety of processes may be employed to mitigate archive explosion that may be associated with relatively large objective sets.	Microelectronics
Progressive objective addition in multi-objective heuristic systems and methods	US11379730B2	THOMPSON, TIMOTHY GUY | CLIFTON, RONALD SCOTT	Systems and methods are provided for performing multi-objective optimizations with a relatively large number of objectives to which optimization is to be performed. The objectives of the optimization problem may be partitioned to two or more subsets (e.g., overlapping or non-overlapping subsets) of objectives, and partial optimization(s) may be performed using a subset or combination of subsets of the objectives. One or more of the partial optimizations may use one or more pareto-optimized chromosomes from a prior partial optimization. A final full optimization may be performed according to all of the objectives of the optimization problem and may use one or more chromosomes of any preceding partial optimization as a starting point for finding a final solution to the optimization problem. Any variety of processes may be employed to mitigate archive explosion that may be associated with relatively large objective sets.	Microelectronics

Pulse modulation laser writing system	US7526357B2	LIVINGSTON, FRANK EDWARD | HELVAJIAN, HENRY	A pulse modulation laser writing system generates a motion control file for controlled motion of a sample under modulated laser beam exposure and generates a laser script file for generating a sequence of laser writing processes, such as, ablation, welding, texturing, and dosing, the sample while under motion control. The system enables laser writing processing of complex multimaterial samples in a single manufacturing process.	Microelectronics
Quaternary precoded continuous phase modulation soft bit metric demodulator	US7529323B2	LUI, GEE L. | TSAI, KUANG	A receiver generates log-likelihood-ratio-based soft bit metrics of precoded quaternary continuous phase modulation signals using four state-constrained trellises and a streamlined maximum likelihood sequence estimation Viterbi algorithm requiring no survivor state storage elements for a preferred error correction-coded quaternary Gaussian minimum shift keying communication system employing reduced-complexity pulse-amplitude modulation matched-filtering and soft-decision decoding.	Microelectronics
Quickdart: operational space debris visualization, characterization, and volume modeling	US10540459B2	MCKENNON-KELLY, RYAN EDWARD GEORGE | HOOTS, JR., FELIX R | HANSEN, BRIAN WHITELAW | STODDEN, DAVID YENGLE	A computer-implemented method for generating a 3-dimensional (3D) model to characterize and visualize debris. The computer-implemented method includes defining a bounding surface for one or more debris fields generated by an on-orbit breakup event. The bounding surface is defined by using an upper limit fragment spreading speed predicted by a breakup model and applying the upper limit fragment spreading speed in different directions to generate points on the bounding surface. The computer-implemented method also includes connecting one or more points on the bounding surface to maintain a single bounded 3D mesh. The computer-implemented method further includes applying color and/or transparency to the 3D model.	Microelectronics

Radio frequency transparent thermal window	US8904887B2	TOCKSTEIN, MICHAEL A. | NOKES, JAMES P. | OSBORN, JON V. | PATEL, DHRUV N. | HOPKINS, ALAN R. | WILLIAMS, JOHN S. | HARPER, GARY N.	A radio-frequency transparent window having internal conduits for the passage of cooling fluid is configured for simulating a highly uniform thermal environment for testing a device intended for use in space. The device to be tested is placed within a chamber in which a vacuum condition is maintained by a radio-frequency transparent pressure window under a pressure seal. Within the chamber, the thermal window is positioned adjacent, but not in contact with, the pressure window. A radio frequency signal is capable of passing directly through both the thermal window and the pressure window to permit communication with the device being tested within the housing. The thermal window is not in contact with the device so there in no conduction of heat from the device. Radiant heat transfer may occur from the device to the thermal window.	Microelectronics
Radioisotope thermoelectric battery (RTB) system	US11289757B2	NEMANICK, ERIC JOSEPH | HELVAJIAN, HENRY | SHEN, BRIAN	Describe herein is an energy storage system that includes a battery and a heat source. The battery harvests waste heat from the heat source to keep itself warm while storing electrical energy generated from a heat to energy transforming source. If the heat source is radioactive (e.g. radioisotope decay) a radiation hard battery is intimately connected to a waste heat source. The radiation hard battery harvests waste heat from the heat source to warm itself and to shield the radiation.	Microelectronics

Reducing user multipath error and acquisition time in satellite navigation receivers	US10838071B1	DYBDAL, ROBERT B.	Satellite navigation receivers are provided herein. In certain embodiments, a satellite navigation receiver correlates a received RF navigational signal from a satellite with a replica code generated by the receiver. Additionally, errors due to multipath are mitigated by identifying the location of the peak values of the correlation function obtained when the replica code is aligned with the received RF navigational signal. Thus, the peak correlation value is detected by sweeping the user replica code in delay in place of a closed loop early/late discriminator. Moreover, multiple copies of the receiver generated replica codes with different time offsets can be used to perform the acquisition in parallel. This advantageously reduces the amount of acquisition time to align the replica code and provides averaging to improve the accuracy in detecting the delay location of the peak correlation value.	Microelectronics
Refraction assisted illumination for imaging	US8138476B2	LA LUMONDIERE, STEPHEN | YEOH, TERENCE	Various embodiments are directed to systems and methods of imaging subsurface features of objects. An illumination source may be directed towards a surface of an object comprising subsurface features at a first angle relative to the normal of the surface. The object may have a portion between the subsurface features and the surface that has an index of refraction that is greater than the index of refraction of a surrounding medium. An imaging device may be placed with an objective lens oriented substantially normal to the surface. The first angle may be larger than an acceptance angle of the objective lens.	Microelectronics

Release apparatus and methods of assembling same	US10683107B2	FULLER, JEROME K. | AUGUST-SCHMIDT, ALEXANDER | MAUL, GEOFFREY A. | SHAW, CODY L.	A release apparatus includes a base member and a channel having a first portion and a second portion. A first rod positioned within the first portion includes a first end portion having a first coupling device and a second end portion coupled to a first portion of a panel assembly. A second rod positioned within the channel's second portion includes a first end portion having a second coupling device such that the second coupling device is positioned proximate to the first coupling device. The second rod includes a second end portion coupled to a second portion of the panel assembly. First and second coupling devices rotate such that a linear force is generated between the first and second rods, enabling the first rod second end portion and the second rod second end portion to simultaneously release the first and second portions of the panel assembly, respectively.	Microelectronics
Reservoir computing operations using multi-mode photonic integrated circuits	US10627849B1	SCOFIELD, ADAM C. | SHAW, THOMAS JUSTIN | VALLEY, GEORGE C.	Under one aspect, a method for performing an operation is provided. The method can include receiving, by different physical locations of a multi-mode waveguide, an input signal and a plurality of coefficients imposed on laser light. The method also can include generating, by the multi-mode waveguide, a speckle pattern based on the different physical locations, the input signal, and the plurality of coefficients. The method also can include adjusting at least one of the coefficients based on the speckle pattern.	Microelectronics

Reservoir computing operations using multiple propagations through a multi-mode waveguide	US11378746B2	PAUDEL, UTTAM | VALLEY, GEORGE C. | LUENGO-KOVAC, MARTA | SHAW, THOMAS JUSTIN | ASHNER, MATTHEW N.	A method for performing an operation on an input signal includes receiving, by a multi-mode waveguide, the input signal imposed on laser light. The received input signal imposed on the laser light is propagated through the waveguide a plurality of times in a plurality of modes, the modes interfering each time they propagate through the waveguide to generate an interference pattern of the plurality of modes. Portions of the interference pattern of the plurality of modes are nonlinearly activated each time those modes propagate through the multi-mode waveguide. Portions of the activated interference pattern of the plurality of modes are output to an optical detector array in parallel with one another each time those modes propagate through the multi-mode waveguide.	Microelectronics
Resolving co-channel interference between overlapping users using rank selection	US8824272B2	SUD, SEEMA	An improved method for resolving interference between co-channel users is disclosed. A peak in a spectrum generated by a MUSIC algorithm is determined for a signal of interest ("SOI") using a noise subspace. Also, an estimated carrier frequency offset ("CFO") is determined for the SOI based on the determined peak in the spectrum.	Microelectronics
Retroreflector with load-biased hinges	US11119256B2	FULLER, JEROME K.	Many in the space weather community consider our understanding of the buoyancy of the thermosphere and its effects on the orbits of satellites in Low Earth Orbit (LEO) to be insufficient during short time frames. Disclosed herein is an approach for making on-demand thermosphere buoyancy measurements using a deployable low mass retroreflector with CubeSat-like dimensions. A CubeSat storing many retroreflectors can dispense one or more of these passive satellites according to a predetermined schedule or on-command, in response to an observed space weather phenomenon like a coronal mass ejection. With measurements of the orbit decay from these passive satellites, a better understanding of the relationship between space weather and orbital decay can be established with relatively low cost.	Microelectronics

Ring constellations for decreased data latency and increased download rates	US9998206B2	JANSON, SIEGFRIED W.	A plurality of spacecraft may be dispersed into a ring constellation or structure. Data may be wirelessly relayed between spacecraft similar to data flowing in a ring network. The ring structure minimizes inter-spacecraft velocities and tracking angle motion to allow use of fixed high-gain radio frequency (RF) antennas or medium-divergence lasers for crosslinks. Data may flow between spacecraft to be downloaded by the next spacecraft that will be passing over a ground station. This reduces data latency when a single ground station is used, and significantly reduces data latency when more than one ground station is used.	Microelectronics
Rotary positioning apparatus for an aimed device	US10830322B1	SASSO, FELIX T.	A rotary positioning apparatus can adjust the rotational position of a device to be aimed about a desired axis. It can include an device mount that includes the aimed device. A motor can be coupled to the device mount or a shaft extending from the device mount to generate a rotational force to rotate the device mount. Primary mechanical flexures can be positioned along opposing ends of the device mount to provide a mechanical resistance to the rotation imparted on the device mount by the motor. A brake system can be included to stop rotation of the device mount with or without the motor engaged. Secondary mechanical flexures can be coupled to each of the primary mechanical flexures and constructed of materials that give it a lower torque resistance so that the secondary mechanical flexures can begin rotating before the primary mechanical flexures to provide small angle adjustability.	Microelectronics

Satellite laser communications relay network	US9941967B2	WELLE, RICHARD P. | JANSON, SIEGFRIED W. | YANG, ROGER | SERAFINI, JOHN	A system for reducing the cost and increasing the rate and reliability of data transmission from space to ground includes a network of relay satellites in low Earth orbit (LEO). Each relay satellite is configured to receive data from one or more client satellites, and configured to transmit data from LEO to ground using optical communications. The system may also include multiple optical ground stations configured to receive the data and transmit the received data using terrestrial networks to client locations. The network may provide an alternative to downlinking large amounts of data for new satellite operators without an existing ground network and for established satellite operators seeking higher data rates, lower latency, or reduced ground system operating costs.	Microelectronics
Satellite orientation system	US11784710B2	GE, HOWARD H. | HONG, ERIN Y. | CHIANG, RICHARD Y. | FEASTER, DEVON | TRAN, TUONG-VI THI | ANDONIAN, MICHAEL	Embodiments of the present invention include a two-stage blending filter that blends the measurements from two angular sensors to form a single superior high bandwidth measurement for improved disturbance rejection in a satellite systems for increased accuracy in satellite pointing, orientation, and attitude control. Embodiments of the present invention can include a satellite system including a first sensor including or defining a first measurement bandwidth; a first filter connected to the first sensor; a second sensor including or defining a second measurement bandwidth; a second filter connected to the second sensor; and a third filter connected to the first filter and the second filter. The third filter blend the first signal and the second signal into a third signal; and transmit the third signal to a flight controller configured to adjust an orientation of the satellite, a satellite subsystem, or both, relative to a target in response to the third signal.	Microelectronics

Scalable radioisotope power tiles	US12327650B2	NEMANICK, ERIC JOSEPH | HELVAJIAN, HENRY | DELGADO, JR., ADON | FERRONE, KRISTINE L.	Scalable radioisotope power tiles that can provide heat, electrical power, or both, are disclosed. Unlike conventional radioisotope thermoelectric generator (RTG) designs, the scalable radioisotope power tiles do not necessarily seek to minimize the RTG surface area. Rather, a planar design may be used to maximize the radiative surface to increase the temperature difference (ΔT) and increase system heat to electricity conversion efficiency where electrical power generation is desired. In addition, such a planar design can be one-sided or two-sided, allowing for flexibility in design. For instance, such power tiles may be deployed in a material like a solar sail, on the surface of a vehicle, in terrestrial systems, etc.	Microelectronics
Seamless fluid storage and transport module	US8820359B2	HINKLEY, DAVID, A.	A fluid storage and transport module includes complex plumbing features such as fluid reservoirs, filters, heat exchangers, three-dimensionally routed tubing, valves, mixing chambers, and exit apertures formed in and on a monolithic common bulk material using an additive rapid prototyping process of depositing multiple layers of rapid prototyping materials without welds, adhesives or compression fittings, being made by a method that minimizes leaks, maximizes packing density of the functional components, and increases the plumbing robustness to leaks.	Microelectronics

Self regulating modular battery	US11784358B2	NEMANICK, ERIC JOSEPH | CHERVENAK, ANN L. | FUERST, JOSEPH Z. | BRETHORST, ANDREW | HALE, MICHAEL R. | MACDOUGALL, KEVIN | STOCKER, JUSTIN	A self-regulating battery may generate a basis state for one or more modules using one or more system inputs. The system inputs comprise current, voltage, and battery degradation. The battery generates a family of weighted forecasts for future bus demands using usage and performance based weights. The battery generates one or more plans to support demand from the battery using the weighted forecasts. The battery scores the one or more plans based on efficiency of power extraction from the battery, and combines the scored one or more plans with an updated SoH value based on induced degradation from a usage plan. The battery generates the combined scored for each of the one or more plans, and transmits one of the combined scored to the battery management unit for execution.	Microelectronics
Self-determined shot geometry for open-configuration portable x-ray computed tomography (CT)	US12327378B2	CASE, JOSEPH T. | KENDERIAN, SHANT	A method for self-determination of shot geometry for use in open-configuration portable x-ray computed tomography (CT) includes inputting one or more x-ray shot images into a computing system. The method also include determining, by the computing system, one or more shot geometries from the one or more inputted x-ray shot images. The method further includes reconstructing, by the computing system, a volume image from the one or more inputted x-ray shot images and the one or more shot geometries. The method also includes outputting, by the computing system, a reconstructed volume image.	Microelectronics
Separating weak and strong moving targets using the fractional fourier transform	US10180495B2	SUD, SEEMA	The Fractional Fourier Transform (FrFT) may be used to extract multiple radar targets in clutter where some targets may be relatively weak. To do this, stronger targets may be removed by rotating to the proper axis ta using rotational parameter a, in which the target signal becomes a strong tone. By searching for the maximum peak over all values of a, stronger moving target echoes can be found and notched out, and weaker targets can then be extracted.	Microelectronics

Sequentially-controlled solar array power system with maximum power tracking	US7564149B2	SIRI, KASEMSAN | WEINBRENNER, RICHARD L.	A power and control architecture employing circuitry that sequentially regulate power flows from independent solar-array sources or a mixture of power sources providing power to a common load. The device may be used on a satellite with solar-array sources; however it may also be used on ground based systems. Stiff bus voltage regulation is obtained by tightly controlling the most recently activated power-processing channel while keeping the previously activated power-processing channels in the Maximum Power Tracking mode to supply maximum power to a common load. The remaining power-processing channels are turned off or operated in stand-by mode. In an alternative system, with primary design goal of uniform power sharing among solar-array sources, all solar array sources are activated with uniform power sharing at light load and, as load demand increases, sequentially controlled to operate in the Maximum Power Tracking mode one solar array source at a time as necessary.	Microelectronics
Signal testing apparatus and methods for verifying signals in satellite systems	US9762312B2	HSU, JASON | BOW, ROUH T.	A signal testing apparatus is provided. The signal testing apparatus generally comprises a recording device that is configured to receive a plurality of signals representative of a plurality of electromagnetic waves that correspond to a pre-defined period of time. The recording device is further configured to record a plurality of digital representations of the signals such that each digital representation corresponds to a separate signal. A processing device is coupled to the recording device, wherein the processing device is configured to introduce at least one operational parameter to each of the digital representations. A play-back assembly is coupled to the recording device and to the processing device, wherein the play-back device is configured to play each of the digital representations simultaneously in real-time to facilitate verification of each of the signals.	Microelectronics

Signal/noise separation using FrFT rotational parameter obtained in relation to Wigner Distribution	US9804999B2	SUD, SEEMA	A novel approach provides accurate estimation of the parameter a of a Fractional Fourier Transform (FrFT). A value of a may be selected for which the Wigner Distributions (WDs) of a signal-of-interest (SOI) and interference overlap as little as possible. However, instead of computing the WD for each signal, the FrFT may be computed for each WD, recognizing that the projection of the WD of a signal onto an axis ta is the energy of the FrFT along the same axis. Since the technique computes a using the SOI and a measure of the interference separately, significant improvements can be made in the estimate, especially at low signal-to-noise ratio (SNR). Once the estimate is obtained, a reduced rank filter may be applied to remove the interference, since minimum mean-square error (MMSE) approaches will again fail when using the low sample support required of non-stationary environments. The technique is not only computationally more efficient than MMSE, but far more robust as well.	Microelectronics
Single space optical platform for determining the range and/or velocity of space objects	US11287522B2	VAZQUEZ, GEORGE | BASS, CHRISTOPHER	A single space platform with an optical telescope, a spectrometer, and/or a database of stored spectral information may be used to determine the range and/or velocity of natural or artificial resident space objects (RSOs). Relativistic Doppler shift measured from reflected solar photons and/or photons from other emitting source(s) provides information that the space platform can use to determine the relative velocity and the range rate. This information can then be used in combination with the right ascension and declination angles to perform differential correction and obtain an updated orbit.	Microelectronics

Single-event burnout (SEB) hardened power schottky diodes, and methods of making and using the same	US9859448B2	SCARPULLA, JOHN R.	Under one aspect, a power Schottky diode includes a cathode; a semiconductor disposed over the cathode, the semiconductor including at least a first region and a second region, the second region defining a guard ring; an anode disposed over the first region and at least a portion of the guard ring, the anode including a metal, a junction between the anode and the first region defining a Schottky barrier; and an oxide disposed over the guard ring. Additionally, the power Schottky diode can include a resistive material disposed over at least a portion of the guard ring and at least a portion of the oxide. The resistive material can inhibit a flow of holes from the guard ring to the anode following a heavy ion strike to the guard ring. The anode further can be disposed over at least a portion of, or the entirety of, the resistive material.	Microelectronics
Smart phone server sleeve	US9451456B2	LEE, RICHARD M	A sleeve that acts as a server is provided. In one embodiment, the sleeve may be configured to attach to a mobile device. The sleeve may include a server configured to wirelessly connect to the mobile device.	Microelectronics
Solar and/or wind inverter	US10916944B2	SIMBURGER, EDWARD J	A solar and/or wind inverter that uses an ultracapacitor for grid stabilization. The ultracapacitor may be directly tied to, and placed between, a power source and an inverter. The ultracapacitor may supply power to a grid via the inverter during a reduction of power or a loss in power from the grid.	Microelectronics
Solar and/or wind inverter	US10074985B2	SIMBURGER, EDWARD J	A solar and/or wind inverter that uses an ultracapacitor for grid stabilization. The ultracapacitor may be directly tied to, and placed between, a power source and an inverter. The ultracapacitor may supply power to a grid via the inverter during a reduction of power or a loss in power from the grid.	Microelectronics

Space debris visualization	US8749545B2	KELLY, RYAN EDWARD GEORGE | HOOTS, JR., FELIX ROACH	Certain embodiments of the invention may include systems and methods visualizing space debris events. According to an example embodiment of the invention, a method is provided for visualizing positional probability of objects in space. The method includes receiving initial conditions of the objects, determining projected positions of the objects based, at least in part, on the initial conditions, determining a plurality of 2-dimensional (2D) boundaries around the projected positions; and assembling the plurality of 2D boundaries into a 3-dimensional (3D) representation of the positional probability of objects in space.	Microelectronics
Spacecraft hardware tracker	US7557753B2	AILOR, III, WILLIAM H.	A GPS tracker is disposed on launch hardware that separates from a spacecraft launch vehicle during ascent to orbit with the launch hardware having a suborbital trajectory from launch to impact while being tracked so as to track the launch hardware during suborbital flight, such as for tracking separated fuel stages, external tanks, external boosters, and payload fairings that return to earth.	Microelectronics
Speckle enhanced spatial-domain spectrometer	US10837833B1	PAUDEL, UTTAM | ROSE, TODD S.	A speckle-enhanced discrete Fourier transform spectrometer can include waveguides configured to combine speckle spectroscopy techniques with discrete Fourier transform spectroscopy techniques. A discrete Fourier transform spectrometer section can be a compact, passive, chip-scale optical spectrometer. A speckle spectrometer section can include a multi-mode wave guide. An interference region can be in optical communication with both the discrete Fourier transform spectrometer section and the speckle spectrometer section such that light from both sections interfere in the interference region. A detector can be used to detect light from the interference region for detecting spectral content of light over a large bandwidth at a high resolution.	Microelectronics

Spin stabilized aerial aircraft	US9764828B2	ULRICH, EVAN R. | SUTTON, STEWART | PANEVSKY, MARTIN | DUNBAR, CHRISTOPHER B | JYOTHINDRAN, VISHNU	A spin stabilized aircraft may include a plurality of wings that passively spin stabilize the aircraft, causing the apparatus to move in a direction opposite that of a wind source. The aircraft may also include two or more propulsive arms that actively stabilize the aircraft in absence of wind or a decrease in altitude.	Microelectronics
Stable lithium niobate waveguide devices, and methods of making and using same	US9020306B2	MULLER, HEINRICH G. | STAPLETON, ANDREW D.	Embodiments of the present invention provide stable lithium niobate waveguide devices, and methods of making and using the same. A lithium niobate-based waveguide device may include a Z-cut lithium niobate substrate having upper and lower surfaces, an optical waveguide embedded within the lithium niobate substrate, a signal electrode disposed on the upper surface of lithium niobate substrate and parallel to the optical waveguide, guard electrodes disposed on the upper surface of the lithium niobate substrate and flanking but spaced apart from the signal electrode, and a conductive layer on the lower surface of the lithium niobate substrate, wherein the conductive layer serves as a common ground reference for the signal and guard electrodes.	Microelectronics
Stackable satellite structure and deployment method	US11492147B2	WELLE, RICHARD P.	An apparatus includes a satellite in the form of a plate having a thickness being smaller than a width of the satellite. The apparatus also includes a plurality of contact points distributed on a face of the satellite, allowing for one or more additional satellites to be stacked upon the satellite.	Microelectronics
Sub-Nyquist broadband time-delayed phased array	US10914809B2	NELSON, ROBERT H. | SHAW, THOMAS JUSTIN	An apparatus that includes a phased array configured to monitor a broad bandwidth with low rate ADC achieving sub-Nyquist rate sampling with 100 percent duty cycle. The phased array includes a plurality of phased array elements. Each of the phased array elements are inserted with a non-uniform true time delay to enable simultaneous measurement of an AOA and a frequency of an incident RF signal.	Microelectronics

Super delta monopulse beamformer	US9146309B2	SHAW, THOMAS JUSTIN	An improved approach to direction finding using a super delta monopulse beamformer is disclosed. A super delta channel signal that includes direction finding information from two circular delta channels is formed and output by the super delta monopulse beamformer. This super delta channel signal uses only two channels, but is able to realize the accuracy of conventional three channel systems.	Microelectronics
Suppressing interference in binary offset carrier modulated signals	US10491251B1	DAFESH, PHILIP A. | HESS, PHILLIP B.	Circuits and methods are described herein for suppressing interference in binary offset carrier (BOC) modulated signals The BOC signal includes an upper sideband (USB) and a lower sideband (LSB). The LSB or the USB of the BOC signal is rotated from a first frequency to a second frequency. Interference in the rotated LSB or USB is reduced. An output BOC signal with reduced interference is generated based on the rotated LSB or USB from which interference has been reduced.	Microelectronics
Switched combiner GPS receiver system	US7663548B2	MCKAY, JAMES P. | TSENG, GAN-TAI	A receiving system includes a combiner configured to receive signals from two or more antenna elements and to generate sum and difference outputs, and a switch configured to sequentially provide the sum and difference outputs as inputs to a receiver.	Microelectronics
System and apparatus for monitoring concentration of greenhouse gas	US8614794B2	SMITH, PATRICK L | BECK, STEVEN M	One or more embodiments of the present invention pertain to a system, method, and apparatus that accurately measures concentration of a greenhouse gas in narrow atmospheric columns above multiple sites utilizing a network of autonomous low-cost beacons that turn on for short unannounced time intervals and point to a receiving satellite. For example, each beacon can activate for short time intervals and transmit a laser beam at eye-safe low transmission power levels to a receiving satellite. The receiving satellite includes a sensor configured to receive the laser beam from one or more activated beacon and generate raw greenhouse gas concentration data based on measurement of the received laser beam intensity at selected wavelengths.	Microelectronics

System and method for detecting and identifying unmanned aircraft systems	US10181332B1	LAAG, EDWARD ARIC | YEAKEL, KILEY LAUREN | WENDOLOSKI, ERIC BERNARD | TICHY, JASON LAURENCE	Systems, methods, and apparatuses are presented herein for detecting and identifying unmanned aircraft systems (UAS) or drones. The system can include one or more UAS sensor nodes distributed about an area to be monitored. Each UAS sensor node can be communicably coupled to a central server but is able to conduct detection and identification procedures separate from the central server. The UAS sensor node can include a microphone that detects an audio signal generated within the area to be monitored. The node can convert the audio signal into a digital signal, can segment the audio signal, and can pass the signal through a bandpass filter. The node can also conduct a Fourier transform and smooth filtering on the digital audio signal before comparing the signal to multiple stored sample UAS audio signals for known UAS vehicles and motor stresses to determine a likelihood of a match.	Microelectronics
System and method for detecting defects	US8466687B2	REED, C. CHRISTOPHER | NEWBAUER, TOM R. | BRIET, RICHARD	A system including a charge source and at least one voltage measurement device is disclosed. The charge source is for generating a charging environment to produce at least one of a voltage profile and a current on an area of dielectric material disposed over a conductive substrate. The area of dielectric material includes a first area containing a subsurface defect. The area of dielectric material also includes a second area that is defect-free. The at least one voltage measurement device is for outputting voltage measurements at different positions over the area of dielectric material. The voltage measurements over the first area differ from voltage measurements over the second area to define a voltage differential.	Microelectronics
System and method for super-resolution digital time delay and integrate (TDI) image processing	US8558899B2	GRYCEWICZ, THOMAS J.	Super-resolution time delay and integrate (TDI) imaging processing and systems for providing same utilize imaging geometry configured such that a predictable sub-pixel component of the frame-to-frame image motion can be used to construct a high-resolution output image from multiple under-sampled low-resolution input images.	Microelectronics

System and method for timing recovery in high bandwidth communications	US12206755B2	UTTER, ALEXANDER CLIFTON	Systems and methods for extracting and identifying timing information from wireless signals can include a signal receiver configured to receive a communications signal; a finite impulse response (FIR) filter coupled to the signal receiver and configured to identify a set of transitions in the communications signal; an absolute value operation module coupled to the FIR filter and configured to detect energy in each of the set of transitions within the communications signal; and a comb filter coupled to the absolute value operation module and configured to combine the detected energy in each of the set of transitions within the communications signal. Exemplary systems can also include a cyclic accumulator coupled to the comb filter and a signal processor.	Microelectronics
System and methods for preparing freestanding films using laser-assisted chemical etch, and freestanding films formed using same	US8866240B2	ABRAHAM, MARGARET H. | TAYLOR, DAVID P.	Systems and methods for preparing freestanding films using laser-assisted chemical etch (LACE), and freestanding films formed using same, are provided. In accordance with one aspect a substrate has a surface and a portion defining an isotropically defined cavity; and a substantially continuous film is disposed at the substrate surface and spans the isotropically defined cavity. In accordance with another aspect, a substrate has a surface and a portion defining an isotropically defined cavity; and a film is disposed at the substrate surface and spans the isotropically defined cavity, the film including at least one of hafnium oxide (HfO2), diamond-like carbon, graphene, and silicon carbide (SiC) of a predetermined phase. In accordance with still another aspect, a substrate has a surface and a portion defining an isotropically defined cavity; and a multi-layer film is disposed at the substrate surface and spans the isotropically defined cavity.	Microelectronics

System for imparting linear momentum transfer for higher orbital insertion	US10696425B2	HICKMAN, ROBERT ALAN	A system for imparting linear momentum transfer may include a catching mechanism of a target space vehicle and a tether that is configured to impart a linear momentum transfer from the tether to the target space vehicle. The tether may be fixedly or detachably connected to a Kinetic Energy Storage and Transfer (KEST) vehicle that maneuvers and potentially retrieves the tether. Alternatively, the tether may be separate from the KEST vehicle and may be retrieved by a suitable retrieving mechanism, such as a robotic arm.	Microelectronics
System linearization assembly and method for use in modifying distortion components	US9467103B2	BUSHMAKER, ADAM WAYNE	A system linearization assembly generally includes a delay device that receives an input signal from a signal source and delays the input signal by a predetermined delay function. An attenuation device receives a modified output signal from a signal modifying device, wherein the output signal is based on the input signal and includes a time varying parameter representing a plurality of frequency components including at least one component caused by non-linear intermodulation distortion. The attenuation device attenuates the output signal by a factor that is equal to at least one parameter of the modifying device. A computing device compares the attenuated output signal with the delayed input signal to obtain a resultant signal that includes the component caused by non-linear intermodulation distortion. A detection device detects at least one parameter of the resultant signal. Based on the detected parameter, a controller facilitates a modification of the component.	Microelectronics

System linearization assembly and method for use in modifying distortion components	US9425751B2	BUSHMAKER, ADAM WAYNE	A system linearization assembly generally includes a filter that is coupled to a measuring device. The filter is configured to receive a signal that includes a time varying parameter representing a plurality of frequency components including at least one component caused by non-linear intermodulation distortion, such as an odd-order intermodulation distortion component. The filter is also configured to isolate at least one harmonic of the frequency components with the same order as the component caused by non-linear intermodulation distortion. The measuring device is configured to measure at least one parameter of the isolated harmonic. The system linearization assembly also includes a controller coupled to the measuring device. The controller is configured to modify, for example by minimizing, the signal from the determined measurement to facilitate a modification, such as a reduction, of the component caused by non-linear intermodulation distortion.	Microelectronics
System, apparatus, and method for active debris removal	US9187189B2	GRIFFITH, SR., ANTHONY D. | KOHLI, RAJIV | BURNS, SUSAN H. | DAMICO, STEPHEN J. | GRUBER, DAVID J. | HICKEY, CHRISTSOPHER J. | LEE, DAVID E. | ROBINSON, TRAVIS M. | SMITH, JASON T. | SPEHAR, PETER T. | ADLIS, DAVID S. | KENT, BRIAN M.	Systems, apparatuses, and methods for removal of orbital debris are provided. In one embodiment, an apparatus includes a spacecraft control unit configured to guide and navigate the apparatus to a target. The apparatus also includes a dynamic object characterization unit configured to characterize movement, and a capture feature, of the target. The apparatus further includes a capture and release unit configured to capture a target and deorbit or release the target. The collection of these apparatuses is then employed as multiple, independent and individually operated vehicles launched from a single launch vehicle for the purpose of disposing of multiple debris objects.	Microelectronics

System, apparatus, and method for active debris removal	US9555905B2	GRIFFITH, SR., ANTHONY D. | KOHLI, RAJIV | BURNS, SUSAN H. | DAMICO, STEPHEN J. | GRUBER, DAVID J. | HICKEY, CHRISTOPHER J. | LEE, DAVID E. | ROBINSON, TRAVIS M. | SMITH, JASON T. | SPEHAR, PETER T. | ADLIS, DAVID S. | KENT, BRIAN M.	Systems, apparatuses, and methods for removal of orbital debris are provided. In one embodiment, an apparatus includes a spacecraft control unit configured to guide and navigate the apparatus to a target. The apparatus also includes a dynamic object characterization unit configured to characterize movement, and a capture feature, of the target. The apparatus further includes a capture and release unit configured to capture a target and deorbit or release the target. The collection of these apparatuses is then employed as multiple, independent and individually operated vehicles launched from a single launch vehicle for the purpose of disposing of multiple debris objects.	Microelectronics
System, apparatus, and method for MIL-STD-1553B communication enforcement	US9582447B2	AREHART, ALAN B | HERNANDEZ, MICHAEL P | NILLES, JOHN C	A switch configured to enforce MIL-STD-1553B communication protocol is provided. The protocol is a request-response protocol allowing a bus controller to send a request and a remote terminal to send a response. In one embodiment, the switch is configured to isolate communication between a bus controller and each remote terminal by blocking non-compliant communications issued from any remote terminal. The switch may also isolate communication preventing a first remote terminal from receiving communication from a second remote terminal when the communication is not addressed to the first remote terminal. In another embodiment, a system provides isolation for bus controller to remote terminal communications by using one-to-one pairings of bus controller terminals to remote terminals. The switch may select a particular bus-controller-terminal-to-remote-terminal pairing from amongst a plurality of bus-controller-terminal-to-remote-terminal pairings. In certain embodiments, the switch records and reports information regarding communications from remote terminals not complying with the MIL-STD-1553B protocol.	Microelectronics

System, apparatus, and method for tracking atmospheric differential absorption	US8823938B2	BECK, STEVEN M | LOPER, GARY L	A system, apparatus, and method is provided to remotely measure atmospheric species using a long path differential absorption technique. In one embodiment, a source and a detector are collocated and at the far end of the absorption path a retro-reflector is mounted on a vehicle. The source generates an outgoing laser beam that is transmitted to the retro-reflector and reflected towards the detector as an incoming laser beam, and the detector receives the incoming laser beam that was reflected by the retro-reflector.	Microelectronics
Systems and methods for a core management system for parallel processing of an evolutionary algorithm	US8433662B2	FERRINGER, MATTHEW PHILLIP | CLIFTON, RONALD SCOTT | THOMPSON, TIMOTHY GUY	Systems and methods are provided for a core management system for parallel processing of an evolutionary algorithm. The systems and methods may include identifying, for a processing environment, a plurality of arriving processors available for utilization; configuring a first number of the plurality of arriving processors as master processors for the processing environment; configuring a respective second number of the plurality of arriving processors as slave processors, where each master processor is assigned one or more of the slave processors for the processing environment, where each master processor maintains timing data associated with available processing resources at the respective master processor, where each master processor is operative to calculate a respective target number of slaves based upon the respective timing data; and reconfiguring a current number of slave processors assigned to one or more respective master processors based upon the respective timing data calculated for the one or more respective master processors.	Microelectronics

Systems and methods for a self-deploying vehicle drag device	US8616496B2	HARDY, BRIAN S. | FULLER, JEROME K.	Embodiments of the invention relate to systems and methods for a self-deploying vehicle drag device. In one embodiment, a drag device for a vehicle can be provided. The drag device can include a chute body, wherein the chute body is connected to the vehicle. The drag device can also include at least one collapsible member mounted to the chute body, wherein the at least one collapsible member and chute body are maintained in respective compressed configurations until deployed. Furthermore, the drag device can include at least one device adapted to release the chute body from the vehicle, wherein the chute body and the at least one collapsible member are deployed in expanded configurations with respect to the vehicle.	Microelectronics
Systems and methods for an application program interface to an evolutionary software program	US8504496B2	FERRINGER, MATTHEW PHILLIP | CLIFTON, RONALD SCOTT | THOMPSON, TIMOTHY GUY	Systems and methods may include an application program interface that enables a user to: specify parameters associated with an evolutionary algorithm, where an execution of the evolutionary algorithm is in accordance with the specified parameters; define a chromosome data structure that includes a plurality of variables that are permitted to evolve in value in accordance with the execution of the evolutionary algorithm in order to generate one or more child chromosome data structures; identify one or more objective functions for evaluating chromosome data structures, including the generated one or more child chromosome data structures; and define an output format for providing one or more optimal chromosome data structures of the evaluated generated child chromosome data structures as designs to the identified objective functions.	Microelectronics

Systems and methods for auto-adaptive control over converged results for multi-dimensional optimization	US8862627B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY	Systems and methods may include identifying an input population of parent epsilon chromosome data structures; combining genes of each selected pair of parent epsilon chromosome data structures according to at least one evolutionary operator to generate a plurality of child epsilon chromosome data structures, each child epsilon chromosome data structure providing one or more genes each having a respective candidate epsilon value representing a respective step size or spacing for the respective problem objective; and evaluating each of the plurality of child epsilon chromosome data structures according to one or more epsilon objective functions to generate respective epsilon objective function values for each child epsilon chromosome data structure, where each epsilon objective function is associated with a respective goal associated with at least one a priori criterion, where each respective epsilon objective function value indicates an extent to which each respective goal can be achieved.	Microelectronics
Systems and methods for box fitness termination of a job of an evolutionary software program	US8498952B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY	Systems and methods may include receiving a respective plurality of objective function values for each chromosome data structure of a population, where the respective plurality of objective function values are obtained based upon an evaluation of each chromosome data structure; mapping the respective objective function values to respective epsilon values, where the respective epsilon values define a respective address associated with the plurality of objective functions; and performing non-domination sorting of the population to generate a reduced population of chromosome data structures; and performing epsilon non-dominated sorting to identify an elite set of addresses, where the prior steps are performed for a current generation, where the elite set of addresses are compared to a prior elite set of addresses for a predetermined number of prior generations to determine one or more variance values, where the one or more variance values are utilized to determine whether a current job of an evolutionary algorithm is to be halted.	Microelectronics

Systems and methods for converting radio frequency signals into the digital domain using multi-mode optics	US9413372B1	VALLEY, GEORGE C. | SEFLER, GEORGE A.	A multi-mode optic can receive as input a radio-frequency (RF) signal imposed on an optical carrier, and can output a speckle pattern. A digital representation of the radio-frequency signal can be obtained based on the speckle pattern. An optical sensor can be irradiated with a first portion of the speckle pattern, the first portion of the speckle pattern including an optical intensity profile that is different than an optical intensity profile of a second, spatially separated, portion of the speckle pattern. The multi-mode optic can impose the optical intensity profile on the first portion of the speckle pattern as a function of wavelength of the optical carrier. The optical intensity profiles of portions of the speckle pattern can define a mixing matrix. The digital representation of the RF signal can be obtained based on an output of the optical sensor and the mixing matrix.	Microelectronics
Systems and methods for converting wideband signals into the digital domain using electronics or guided-wave optics	US8902096B2	VALLEY, GEORGE C. | SEFLER, GEORGE | SHAW, THOMAS JUSTIN	Systems and methods for converting wideband signals into the digital domain are provided herein. The system may include an electronic or guided-wave optic based replicator configured to obtain at least M replicas of a signal applied thereto, and an electronic or guided-wave optic based segmenter configured to segment a signal applied thereto into at least N segments based on time or wavelength. Together, the replicator and the segmenter obtain M×N segment replicas of the received signal. An electronic or guided-wave optic based mixer is configured to multiply the M×N segment replicas by a mixing matrix having dimension M×N and then to form M integrations each of N segment replicas so as to obtain a measurement vector of length M. A signal recovery processor is configured to obtain a digital representation of the received signal based on the measurement vector and the mixing matrix.	Microelectronics

Systems and methods for cylindrical hall thrusters with independently controllable ionization and acceleration stages	US8723422B2	DIAMANT, KEVIN DAVID | RAITSES, YEVGENY | FISCH, NATHANIEL JOSEPH	Systems and methods may be provided for cylindrical Hall thrusters with independently controllable ionization and acceleration stages. The systems and methods may include a cylindrical channel having a center axial direction, a gas inlet for directing ionizable gas to an ionization section of the cylindrical channel, an ionization device that ionizes at least a portion of the ionizable gas within the ionization section to generate ionized gas, and an acceleration device distinct from the ionization device. The acceleration device may provide an axial electric field for an acceleration section of the cylindrical channel to accelerate the ionized gas through the acceleration section, where the axial electric field has an axial direction in relation to the center axial direction. The ionization section and the acceleration section of the cylindrical channel may be substantially non-overlapping.	Microelectronics
Systems and methods for deploying a deorbiting device	US11420775B2	FULLER, JEROME K.	To reduce space debris and decrease risks for future space flights and currently operating satellites, NASA requires all satellites to have an end of life deorbiting plan to prevent satellites from having long and indefinite orbit lifespan. Accordingly, disclosed herein are systems and methods for deploying a deorbiting drag device to dramatically decrease the orbit lifespan of satellites. One of the methods comprises: providing power, using a photovoltaic panel, to a central processing unit (CPU) of the satellite; determining, using a health sensor, a health status of the satellite by monitoring activities of the CPU; and releasing a deorbiting drag device based on the health status by diverting power from the photovoltaic panel to a release actuator.	Microelectronics

Systems and methods for depositing materials on either side of a freestanding film using laser-assisted chemical vapor deposition (LA-CVD), and structures formed using same	US9583354B2	ABRAHAM, MARGARET H. | TAYLOR, DAVID P.	Embodiments of the present invention provide systems and methods for depositing materials on either side of a freestanding film using laser-assisted chemical vapor deposition (LA-CVD), and structures formed using same. A freestanding film, which is suspended over a cavity defined in a substrate, is exposed to a fluidic CVD precursor that reacts to form a solid material when exposed to light and/or heat. The freestanding film is then exposed to a laser beam in the presence of the precursor. The CVD precursor preferentially deposits on the surface(s) of the freestanding film.	Microelectronics
Systems and methods for depositing materials on either side of a freestanding film using selective thermally-assisted chemical vapor deposition (STA-CVD), and structures formed using same	US9679779B2	TAYLOR, DAVID P. | ABRAHAM, MARGARET H.	Embodiments of the present invention provide systems and methods for depositing materials on either side of a freestanding film using selectively thermally-assisted chemical vapor deposition (STA-CVD), and structures formed using same. A freestanding film, which is suspended over a cavity defined in a substrate, is exposed to a fluidic CVD precursor that reacts to form a solid material when exposed to heat. The freestanding film is then selectively heated in the presence of the precursor. The CVD precursor preferentially deposits on the surface(s) of the freestanding film.	Microelectronics
Systems and methods for detecting a communication anomaly	US11700270B2	MOZUMDAR, MOHAMMAD | DAFESH, PHILIP A.	Cyberattacks are rampant and can play a major role in modern warfare, particularly on a widely adopted platforms such as the MIL-STD-1553 standard. To protect a 1553 communication bus system from attacks, a trained statistical or machine learning model can be used to monitor commands from a bus controller of the 1553 communication bus system. The statistical and/or machine learning model can be trained to recognize communication anomalies based at least on the probability distribution of patterns of one or more commands. The statistical model can be stochastic model such as a Markov chain that describes a sequence of possible commands in which the probability of each command depends on the occurrence of a group of one or more commands.	Microelectronics

Systems and methods for detecting current using a kinetic inductance magnetic current imager	US10310027B2	NELSON, ROBERT H.	Under one aspect, a method for characterizing current of an operating device under test (DUT) includes injecting a signal into a superconducting sensor; determining a property of the superconducting sensor based on the injected signal; disposing the superconducting sensor in spaced relationship to the operating DUT; inducing a magnetic field in the superconducting sensor based on the spaced relationship, the current of the operating DUT, and the injected signal; determining a change in the property of the superconducting sensor resulting from the induced magnetic field; and estimating current of the operating DUT based on the change in the property of the superconducting sensor.	Microelectronics
Systems and methods for detecting events that are sparse in time	US10673457B2	NELSON, ROBERT H. | VALLEY, GEORGE C. | CRAIN, SUSAN H.	Under one aspect, a method is provided for detecting events that are sparse in time. The method can include (a) receiving N analog input signals that are continuous and are independent from one another, wherein each one of the events causes a change in a corresponding one of the analog input signals, and N is 2 or greater. The method also can include (b) by a first analog circuit, for each of the N analog input signals, outputting products of that analog input signal and a plurality of gain factors. The method also can include (c) by a second analog circuit, outputting M sums of the products, wherein M is 2 or greater and is less than or equal to N. The method also can include (d) detecting a first one of the events based on the M sums of the products.	Microelectronics

Systems and methods for enhancing mobility of atomic or molecular species on a substrate at reduced bulk temperature using acoustic waves, and structures formed using same	US9303309B2	HELVAJIAN, HENRY	Under one aspect of the present invention, a method for enhancing mobility of an atomic or molecular species on a substrate may include exposing a first region of a substrate to an atomic or molecular species that forms a molecular bond with the substrate in the first region; directing a laser pulse to a second region of the substrate so as to generate an acoustic wave in the second region, the acoustic wave having spatial and temporal characteristics selected to alter the molecular bond; and transmitting the acoustic wave from the second region to the first region, the acoustic wave altering the molecular bond between the substrate and the atomic or molecular species to enhance mobility of the atomic or molecular species on the substrate in the first region.	Microelectronics
Systems and methods for enhancing mobility of atomic or molecular species on a substrate at reduced bulk temperature using acoustic waves, and structures formed using same	US9945032B2	HELVAJIAN, HENRY	Under one aspect, a structure is provided that includes a substrate including a first material having a threshold temperature above which the first material is damaged and a layer consisting essentially of a second material molecularly bonded to the first material of the substrate. The second material is formed on the substrate at a reaction temperature that is higher than the threshold temperature of the first material. An interface between the substrate and the second material is a substantially defect-free surface.	Microelectronics

Systems and methods for establishing and managing communication in a mobile ad-hoc network	US10785697B2	HUNG, GEORGE W.	In conventional MANETs, the functions of network discovery, route generation, and packets forwarding are performed at each node of the network. As a result, achieving routing convergence between all of the devices can be very time and resource intensive as no single node has a complete topology of the network. In contrast, the disclosed MANET with SDN architecture performs network discovery and route generation at centralized location, and packets forwarding is done separately at the node level. This new architecture allows the disclosed MANET to quickly adjust network operating characteristics whenever there is a change in the network topology. Additionally, since all network discovery and routing determination are performed centrally at a single controller, the disclosed MANET can generate a complete topology of the network and as such can perform channel provisioning between all devices such that co-channel interference, transmission delay, inefficient bandwidth allocation, and excessive retransmission are substantially reduced.	Microelectronics
Systems and methods for estimating parameters of a spacecraft based on emission from an atomic or molecular product of a plume from the spacecraft	US9963251B2	DIMPFL, WILLIAM L.	A parameter of an actual spacecraft can be estimated based on a spectroscopic image of an emission from an atomic or molecular product of an interaction between an atmospheric gas and an atomic or molecular species in a plume from the actual spacecraft. The actual spacecraft can be characterized by a set of values of at least N parameters. An N-dimensional lookup table can store information about a plurality of simulated emissions, each being from the atomic or molecular product of a simulated interaction between the atmospheric gas and the atomic or molecular species in a plume from a simulated spacecraft characterized by a corresponding set of values of the N parameters. A simulated emission can be selected based on comparisons between the information about the simulated emissions and the spectroscopic image. A value of at least one of the N parameters of the actual spacecraft can be estimated based on the selected simulated emission.	Microelectronics

Systems and methods for fast and precise frequency estimation	US9166857B2	KUMAR, RAJENDRA	Systems and methods are provided for fast and precise estimation of frequency with relatively minimal sampling and relatively high tolerance to noise.	Microelectronics
Systems and methods for gamma radiation based stabilization of replicated mirror structures at the nanometer-scale	US11762301B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA L. | KIM, HYUN I.	An assembly comprises an exposure chamber configured to receive a structure and identify at least one portion of the structure for further processing. The exposure chamber is further configured to expose the at least one portion of the structure to radiation such that a high cure state and a low residual stress are achieved for the structure. A dosage level of the radiation is determined based, at least in part, on the composition of the structure.	Microelectronics
Systems and methods for gamma radiation based stabilization of replicated mirror structures at the nanometer-scale	US11525763B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA L. | KIM, HYUN I.	A system includes a curing assembly for low temperature curing and residual stress relief of material substrates. The curing assembly includes a first exposure chamber configured to expose the material substrate to UV radiation, and a second exposure chamber configured to expose the material substrate to Gamma radiation. In some embodiments, a mixing apparatus may mix nano-filler particles into the material substrate prior to exposure to Gamma radiation. The cure assembly may also include a control system for determining exposure dosages and exposure times based at least in part, on the material properties of the material substrate.	Microelectronics
Systems and methods for gamma radiation based stabilization of replicated mirror structures at the nanometer-scale	US11125669B2	ZALDIVAR, RAFAEL J. | FERRELLI, GEENA L. | KIM, HYUN I.	A system includes a curing assembly for low temperature curing and residual stress relief of material substrates. The curing assembly includes a first exposure chamber configured to expose the material substrate to UV radiation, and a second exposure chamber configured to expose the material substrate to Gamma radiation. In some embodiments, a mixing apparatus may mix nano-filler particles into the material substrate prior to exposure to Gamma radiation. The cure assembly may also include a control system for determining exposure dosages and exposure times based at least in part, on the material properties of the material substrate.	Microelectronics

Systems and methods for generating feasible solutions from two parents for an evolutionary process	US8494988B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY	Systems and methods may include receiving a pair of parent chromosome data structures, where each parent chromosome data structure provides a plurality of genes representative of variables that are permitted to evolve; combining genes of the two parent chromosome data structures to generate at least one first child chromosome data structure; evaluating the at least one first child chromosome data structures according to a plurality of constraint functions to generate a respective plurality of constraint function values for each of the at least one first child chromosome data structure, where the constraint functions define constraints on a feasible solution set; determining whether any of the at least one first child chromosome data structure is within the feasible solution set.	Microelectronics
Systems and methods for generating random feasible solutions for an evolutionary process	US8285653B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY	Systems and methods may include identifying an input population of parent chromosome data structures, where each parent chromosome data structure provides a plurality of genes representative of variables in which associated values are permitted to evolve; selecting pairs of parent chromosome data structures from the input population of parent chromosome data structures; combining genes of each selected pair of parent chromosome data structures according to at least one evolutionary operator to generate a plurality of child chromosome data structures; evaluating the plurality of child chromosome data structures according to a plurality of constraint functions to generate a respective plurality of constraint function values for each child chromosome data structure, where the constraint functions define constraints on a feasible solution set; determining whether any of the plurality of child chromosome data structures are within the feasible solution set based upon the respective plurality of constraint violation function values.	Microelectronics

Systems and methods for inhibiting contamination enhanced laser induced damage (CELID) based on fluorinated self-assembled monolayers disposed on optics	US9323051B2	WEILLER, BRUCE H. | FOWLER, JESSE D. | VILLAHERMOSA, RANDY M.	Embodiments of the present invention provide systems and methods for inhibiting contamination enhanced laser induced damage (CELID) based on fluorinated self-assembled monolayers (F-SAMs) disposed on optics. For example, a coating for inhibiting CELID to an optic disposed in a sealed gas environment or vacuum may include an F-SAM that includes a fluorinated hydrocarbon tail group covalently bound to the optic by a head group. The coating may be formed by heating the optic and a liquid-phase precursor of the F-SAM to generate a gas-phase precursor, and exposing the heated optic to the gas-phase precursor for a period of time sufficient for the gas-phase precursor to coalesce at and covalently bond to the optic and form the F-SAM. The optic may include silica, and the F-SAM may include a siloxane group covalently bound to the silica.	Microelectronics
Systems and methods for measuring a physical parameter of a substance based on an isoclinic point in the absorption spectrum of another substance	US8873061B1	WELLS, NATHAN P. | CAMPARO, JAMES C.	Systems and methods measure a physical parameter of a first substance having an absorption feature that varies based on the physical parameter. A tunable-frequency laser may transmit a first laser beam through the first substance and a second laser beam through a second substance having an isoclinic point. A first output is based on an intensity of the first laser beam transmitted through the first substance, and a second output is based on an intensity of the second laser beam transmitted through the second substance. Controller circuitry locks a first frequency of the first laser beam to the absorption feature based on the first output, and locks a second frequency of the second laser beam to the isoclinic point based on the second output. Measurement circuitry calculates the physical parameter of the first substance based on a difference between the first and second frequencies.	Microelectronics

Systems and methods for modifying acoustic waves based on selective heating	US10160061B2	HELVAJIAN, HENRY | MANZO, ANTHONY J.	An acoustic wave is modified by initiating excitation of an acoustic wave from a first location on a substrate to a second location on the substrate and selectively heating the second location of the substrate so as to alter a property of the second location. With such arrangements, the altered property of the second location modifies the acoustic wave to result in a modified acoustic wave that is propagated from the second location to a third location on the substrate. Related apparatus, systems, and methods are also described.	Microelectronics
Systems and methods for modifying material substrates	US10613513B2	LIVINGSTON, FRANK EDWARD	A system includes a computing device that generates at least one process script for the modification to a material substrate and at least one pattern script that corresponds to the process script. The computing device also merges the process script with the pattern script and generates a plurality of command signals that are based on the merged process and pattern scripts. An energy source generates a plurality of light beams based on the generated command signal(s). At least one modulating component modulates the generated light beams based on generated command signal(s). A waveform apparatus generates at least one waveform signal to customize the generated light beams based on the generated command signal(s). A motion control apparatus controls at least one parameter of the light beams based on the generated command signal(s).	Microelectronics

Systems and methods for monitoring temperature using acoustic waves during processing of a material	US10413969B2	HELVAJIAN, HENRY | MANZO, ANTHONY J.	Under one aspect, a method of processing a material includes heating a region of the material with a first energy source; exciting an acoustic wave in the material; and transmitting the acoustic wave through the heated region, the heated region changing at least one property of the acoustic wave. The method also can include detecting the change in at least one property of the acoustic wave; characterizing a temperature of the material in the heated region based on the detected change in at least one property of the acoustic wave; and comparing the characterized temperature of the material in the heated region to a threshold. The method further can include, based on the characterized temperature of the material in the heated region being less than the threshold or being above the threshold for an insufficient amount of time, modifying a property of the heated region with a second energy source.	Microelectronics
Systems and methods for monitoring temperature using acoustic waves during processing of a material	US10173262B2	HELVAJIAN, HENRY | MANZO, ANTHONY J.	Under one aspect, a method of processing a material includes heating a region of the material with a first energy source; exciting an acoustic wave in the material; and transmitting the acoustic wave through the heated region, the heated region changing at least one property of the acoustic wave. The method also can include detecting the change in at least one property of the acoustic wave; characterizing a temperature of the material in the heated region based on the detected change in at least one property of the acoustic wave; and comparing the characterized temperature of the material in the heated region to a threshold. The method further can include, based on the characterized temperature of the material in the heated region being less than the threshold or being above the threshold for an insufficient amount of time, modifying a property of the heated region with a second energy source.	Microelectronics

Systems and methods for multi-objective evolutionary algorithms with category discovery	US10311358B2	THOMPSON, TIMOTHY GUY	Systems and methods are provided to engage in multi-tiered optimization where there may be a first multi-objective optimization and a second constraint optimization. The multi-objective optimization may be used to drive to one or more goals of the optimization problem. The constraint optimization or minimization may be used to drive towards a reduced and/or no constraint situation where the solution to the overall problem is feasible or near-feasible.	Microelectronics
Systems and methods for multi-objective evolutionary algorithms with soft constraints	US10387779B2	THOMPSON, TIMOTHY GUY | FERRINGER, MATTHEW PHILLIP	Systems and methods are provided to engage in multi-objective optimization where there may be one or more constraints. At least one of the constraints may be soft constraints, such that if a potential solution to the multi-objective optimization problem violates only soft constraint(s), then that potential solution may be allowed to persist in a population of potential solutions that may be used to propagate child potential solutions. Potential solutions that violate soft constraints may be tested for non-domination sorting against other potential solutions that violate soft constraints and based at least in part on values associated with the soft constraint violations.	Microelectronics
Systems and methods for multi-objective heuristics with conditional genes	US10402728B2	THOMPSON, TIMOTHY GUY | FERRINGER, MATTHEW PHILLIP | CLIFTON, RONALD SCOTT | HORAN, CATHERINE F. | HANIFEN, KYLE D.	Systems and methods are provided to engage in multi-objective optimization where there may be potential solutions for evaluation (e.g., chromosomes) that each have one or more conditional genes. The value of each of the conditional genes in each of the chromosomes may be equivalent to one of a plurality of hidden genes in each of the chromosomes. The value of each of the conditional genes may be evaluated prior to determining objective values of each of the chromosomes. The objective values of each of the chromosomes may be used to evaluate the potential solutions embodied in the chromosomes and further drive to more optimized solutions. The use of the conditional genes in the chromosomes may reduce the amount of constraint violation checks that may need to be performed.	Microelectronics

Systems and methods for multi-objective optimizations with decision variable perturbations	US10474953B2	THOMPSON, TIMOTHY GUY | FERRINGER, MATTHEW PHILLIP	Systems and methods are provided for providing an optimized solution to a multi-objective problem. Potential solutions may be generated from parent solutions to be evaluated according to multiple objectives of the multi-objective problem. If the potential solutions are infeasible, the potential solutions may be perturbed according to a perturbation model to bring the potential solution to feasibility, or at least a reduced level of constraints. The perturbation models may include a weight vector that indicates the amount of perturbation, such as in a forward and/or reverse direction, of decision variables of the potential solutions. In some cases, the perturbation models may be predetermined. In other cases, the perturbation models may be learned, such as based on training constraint data. Additionally, potential solutions may be generated in a secondary optimization where a constraint based optimization may be performed to drive to generating a feasible solution for further evaluation according to objective values.	Microelectronics
Systems and methods for multi-objective optimizations with live updates	US10474952B2	THOMPSON, TIMOTHY GUY	Systems and methods are provided for generating an initial optimized baseline solution to a multi-objective problem. As the baseline solution is implemented, live (e.g., real-time or near real-time) data associated with one or more parameters may be received and compared to expectations of those parameters with the implementation of the initial optimized solution. If a deviation is detected between the expectation of the time progression of the parameters and live data associated with the parameter, then that deviation may be compared to a threshold. If the deviation meets a threshold condition, then an irregular operation may be declared and a new baseline solution may be implemented. The new baseline solution may be obtained as a re-optimized solution.	Microelectronics

Systems and methods for multi-objective optimizations with objective space mapping	US11676038B2	THOMPSON, TIMOTHY GUY	Systems and methods are provided for operating to an initial optimized baseline solution to a multi-objective problem. As the initial optimized baseline solution is determined, some regions, such as local or global maxima, minima, and/or saddle points in the objective space may be mapped. The mapping may be performed by storing mesh chromosomes corresponding to some of the features (e.g., extrema, saddle points, etc.) in the objective space along with the location of those chromosomes within the objective space (e.g., objective values corresponding to each of the objectives). The mesh chromosome may be used in subsequent re-optimization problems, such as with reformulation. Although in a re-optimization the objectives, decision variables, and or objective/constraint models may change, the mesh chromosomes may still provide information and direction for more quickly and/or with reduced resources converge on a re-optimized solution.	Microelectronics
Systems and methods for optimizing satellite constellation deployment	US9321544B2	THOMPSON, TIMOTHY GUY | FERRINGER, MATTHEW PHILLIP | DIPRINZIO, MARC DAVID | CLIFTON, RONALD SCOTT	Systems and methods are provided to determine launch parameters of satellites of a satellite constellation that provides optimized performance of the satellite constellation over the service lifetime of the satellite constellation. The launch parameters may be determined by considering perturbing accelerations of one or more of the satellites for the purposes of optimizing the launch parameters of the satellites of the satellite constellation. The systems and methods may include heuristic optimization and high-fidelity astrodynamic modeling methodologies.	Microelectronics

Systems and methods for parallel processing optimization for an evolutionary algorithm	US8255344B2	FERRINGER, MATTHEW PHILLIP | CLIFTON, RONALD SCOTT | THOMPSON, TIMOTHY GUY	The systems and methods may include receiving an initial population of parent chromosome data structures, where each parent chromosome data structure provides a plurality of genes; selecting pairs of parent chromosome data structures; applying at least one evolutionary operator to the genes of the selected pairs to generate a plurality of child chromosome data structures; allocating, the generated plurality of child chromosome structures to a plurality slave processors, where each slave processor evaluates one or more of the plurality of child chromosome data structures and generates respective objective function values; receiving objective function values for a portion of the plurality of allocated child chromosome data structures; merging the parent chromosome data structures with the received portion of the child chromosome data structures for which objective function values have been received; and identifying a portion of the merged set of chromosome data structures as an elite set of chromosome data structures.	Microelectronics

Systems and methods for parallel processing with infeasibility checking mechanism	US8255345B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY	Systems and methods may include obtaining an input population of parent chromosome data structures, where each parent chromosome data structure provides having a plurality of genes representative of variables in which associated values are permitted to evolve; selecting pairs of parent chromosome data structures from the input population; allocating the selected pairs of parent chromosome data structures to respective ones of a plurality of slave processors, where each slave processor applies an evolutionary process to genes of the allocated pair to generate a plurality of child chromosome data structures; receiving a portion of the plurality of child chromosome data structures generated by the plurality of slave processors; merging the parent chromosome data structures with at least the received portion of the child chromosome data structures to generate a merged set of chromosome data structures; and identifying a portion of the merged set of chromosome data structures as an elite set of chromosome data structures.	Microelectronics
Systems and methods for performing linear algebra operations using multi-mode optics	US10095262B2	VALLEY, GEORGE C. | SHAW, THOMAS JUSTIN	Under one aspect, a method for performing a linear algebra operation includes imposing matrix elements onto a chirped optical carrier; inputting into a multi-mode optic the matrix elements imposed on the chirped optical carrier; outputting by the multi-mode optic a speckle pattern based on the matrix elements imposed on the optical carrier; and performing a linear algebra operation on the matrix elements based on the speckle pattern. The matrix elements can be from matrix A and a vector b, and the multi-mode optic can optically transform each of matrix A and vector b by a speckle transformation S, so as to output a speckle pattern including elements of a matrix SA of dimension p,n and matrix elements of a vector Sb of dimension p. The linear algebra operation can include generating {tilde over (x)}=(SA)†Sb, wherein † indicates a pseudo-inverse operation.	Microelectronics

Systems and methods for pre-averaged staggered convolution decimating filters	US8855254B2	POKLEMBA, JOHN JAMES | GRAMANN, MARK ROBERT	Certain embodiments of the invention may include systems and methods for implementing a multirate digital decimating filter for filtering received symbol data. The method may include sampling the received symbol data at a selected sample rate, pre-averaging the sampled received data to provide two samples per symbol; convolving the pre-averaged samples with decimated finite impulse response (FIR) aperture impulse response coefficients to produce detected output samples, convolving the pre-averaged samples with shifted decimated FIR aperture impulse response coefficients to produce zero-crossing transition samples, and adjusting the sample rate based at least in part on averaging the zero-crossing transition samples.	Microelectronics
Systems and methods for preparing films comprising metal using sequential ion implantation, and films formed using same	US8946864B2	ABRAHAM, MARGARET H. | TAYLOR, DAVID P.	Systems and methods for preparing films comprising metal using sequential ion implantation, and films formed using same, are provided herein. A structure prepared using ion implantation may include a substrate; an embedded structure having pre-selected characteristics; and a film within or adjacent to the embedded structure. The film comprises a metal having a perturbed arrangement arising from the presence of the embedded structure. The perturbed arrangement may include metal ions that coalesce into a substantially continuous, electrically conductive metal layer, or that undergo covalent bonding, whereas in the absence of the embedded structure the metal ions instead may be free to diffuse through the substrate. The embedded structure may control the diffusion of the metal through the substrate and/or the reaction of the metal within the substrate.	Microelectronics

Systems and methods for preventing or reducing contamination enhanced laser induced damage (C-LID) to optical components using gas phase additives	US10155284B2	WEILLER, BRUCE H. | VILLAHERMOSA, RANDY M. | FOWLER, JESSE D.	Systems and methods for preventing or reducing contamination enhanced laser induced damage (C-LID) to optical components are provided including a housing enclosing an optical component, a container configured to hold a gas phase additive and operatively coupled to the housing; and a delivery system configured to introduce the gas phase additive from the container into the housing and to maintain the gas phase additive at a pre-selected partial pressure within the housing. The gas phase additive may have a greater affinity for the optical component than does a contaminant and may be present in an amount sufficient to inhibit laser induced damage resulting from contact between the contaminant and the optical component. The housing may be configured to maintain a sealed gas environment or vacuum.	Microelectronics
Systems and methods for preventing or reducing contamination enhanced laser induced damage (C-LID) to optical components using gas phase additives	US9498846B2	WEILLER, BRUCE H. | VILLAHERMOSA, RANDY M. | FOWLER, JESSE D.	Systems and methods for preventing or reducing contamination enhanced laser induced damage (C-LID) to optical components are provided including a housing enclosing an optical component, a container configured to hold a gas phase additive and operatively coupled to the housing; and a delivery system configured to introduce the gas phase additive from the container into the housing and to maintain the gas phase additive at a pre-selected partial pressure within the housing. The gas phase additive may have a greater affinity for the optical component than does a contaminant and may be present in an amount sufficient to inhibit laser induced damage resulting from contact between the contaminant and the optical component. The housing may be configured to maintain a sealed gas environment or vacuum.	Microelectronics

Systems and methods for reducing a relatively high power, approximately constant envelope interference signal that spectrally overlaps a relatively low power desired signal	US9197360B2	WYCKOFF, PETER S.	Systems and methods are provided for processing time-domain samples of a digitized signal in rectangular coordinates. The digitized signal can include a low power desired signal and a high power, approximately constant envelope interference signal that spectrally overlaps the desired signal. A rectangular to polar converter can obtain magnitude and phase of each time-domain sample in polar coordinates. An interference estimator can estimate a magnitude of the interference signal based on magnitudes of a predetermined number of time-domain samples in polar coordinates. A subtractor can obtain a difference magnitude for each time-domain sample in polar coordinates based on the magnitude of that sample and the estimated magnitude of the interference signal in polar coordinates. A polar to rectangular converter can obtain time-domain samples in rectangular coordinates of the desired signal with reduced power of the interference signal based on the difference magnitude and phase of time-domain samples in polar coordinates.	Microelectronics
Systems and methods for reducing a relatively high power, approximately constant envelope interference signal that spectrally overlaps a relatively low power desired signal	US9391654B2	WYCKOFF, PETER S. | DAFESH, PHILIP	Systems and methods are provided for processing a time-domain signal in rectangular coordinates. The signal can include a low power desired signal and a high power, approximately constant envelope interference signal that spectrally overlaps the desired signal. A rectangular to polar converter can obtain magnitude and phase of the time-domain signal in polar coordinates. An interference estimator can estimate a magnitude of the interference signal based on the magnitude of the time-domain signal in polar coordinates. A subtractor can obtain a difference magnitude in polar coordinates based on the magnitude of the time-domain signal and the estimated magnitude of the interference signal in polar coordinates. A polar to rectangular converter can obtain the desired signal with reduced power of the interference signal based on the difference magnitude and phase of the time-domain signal in polar coordinates.	Microelectronics

Systems and methods for reducing directional interference based on adaptive excision and beam repositioning	US10056675B1	DYBDAL, ROBERT B.	Systems and methods are provided for repositioning a directional antenna that responds to a desired signal and directional interference. The antenna can generate a sum beam and first and second difference beams. Respective powers of the sum beam and the first and second difference beams can be determined. At least a portion of any of the directional interference can be excised from the sum beam and the first and second difference beams. Measures of the directional interference can be determined in the sum beam and the first and second difference beams. A first correlation between the sum beam and the first and second difference beams can be generated. Additional correlations between a signal identifier and the sum beam and first and second beams monitor the desired signal reception. The antenna can be repositioned away from the directional interference based on the powers, the measures, and the first correlation.	Microelectronics
Systems and methods for stabilizing laser frequency based on an isoclinic point in the absorption spectrum of a gas	US8442083B2	WELLS, NATHAN P. | CAMPARO, JAMES C.	Systems and methods for stabilizing laser frequency based on an isoclinic point of an atomic or molecular medium are provided herein. A system may include: a transmission cell containing a gas and configured to transmit light from the laser, the gas having an absorption spectrum with an isoclinic point; a photodiode generating an output based on an amplitude of transmitted laser light; and circuitry configured to tune the frequency of the laser to the isoclinic point of the absorption spectrum based on the output. The absorption spectrum may have first and second overlapping peaks respectively corresponding to first and second transitions of the gas, the isoclinic point being a saddle point between the first and second peaks. The first and second peaks may have substantially equal amplitude as one another and/or may broaden substantially equally as each other as a function of a physical parameter of the gas.	Microelectronics

Systems and methods for stabilizing laser frequency based on an isoclinic point in the absorption spectrum of a gas	US8050301B2	WELLS, NATHAN P. | CAMPARO, JAMES C.	Systems and methods for stabilizing laser frequency based on an isoclinic point of an atomic or molecular medium are provided herein. A system may include: a transmission cell containing a gas and configured to transmit light from the laser, the gas having an absorption spectrum with an isoclinic point; a photodiode generating an output based on an amplitude of transmitted laser light; and circuitry configured to tune the frequency of the laser to the isoclinic point of the absorption spectrum based on the output. The absorption spectrum may have first and second overlapping peaks respectively corresponding to first and second transitions of the gas, the isoclinic point being a saddle point between the first and second peaks. The first and second peaks may have substantially equal amplitude as one another and/or may broaden substantially equally as each other as a function of a physical parameter of the gas.	Microelectronics
Systems and methods for supporting restricted search in high-dimensional spaces	US8560472B2	FERRINGER, MATTHEW PHILLIP | THOMPSON, TIMOTHY GUY | CLIFTON, RONALD SCOTT | DIPRINZIO, MARC DAVID	Embodiments of the invention may provide systems and methods for supporting restricted search capabilities in high-dimensional spaces. These example restricted search capabilities may allow for an unbiased search that is simply restricted to those regions of interest to a decision maker. It will be appreciated that a restricted search does not mean that additional constraints, such as preference or biasing information, are utilized to reduce the search space into some feasible sub-space of the original optimization problem. Instead, the example restricted search may limit the search to a certain sub-space of the full multi-dimensional tradeoff space.	Microelectronics

Systems and methods for the patterning of material substrates	US10838406B2	LIVINGSTON, FRANK EDWARD	A system includes a computing device that generates at least one process script for the modification to a glass ceramic substrate and at least one pattern script that corresponds to the process script. The computing device also merges the process script with the pattern script and generates a plurality of command signals that are based on the merged process and pattern scripts. An energy source generates a plurality of light beams based on the generated command signal(s). A waveform apparatus generates at least one waveform signal to customize the generated light beams based on the generated command signal(s). At least one modulating component modulates the generated light beams based on generated command signal(s). An optical assembly is configured to apply the modulated plurality of light beams to the glass ceramic substrate. At least one motion stage encoder is configured to provide at least one three dimensional (3D) coordinate position of the optical assembly with respect to the motion control drive in order to coordinate application of the modulated light beams with a predefined spatial location.	Microelectronics
Systems and methods for threat response	US11747824B2	WOODS, CHRISTOPHER P. | KSIENSKI, DAVID A. | LOGUE, KYLE A. | BRANCHEVSKY, DONNA | WILSON, AIDAN R.	The disclosed threat response system(s) and method(s) provide a mean to secure an area around the clock. The system includes a plurality of microphones strategically located at various locations of the protected area, a plurality of acoustic beacons to provide navigational support one or more autonomous non-flying (ANF) drones, and a central controller. In one example each of the one or more ANF drones are equipped with an acoustic positioning system that uses beacon signals (e.g., mechanical waves) transmitted by the plurality of acoustic beacons to determine its position relative to the plurality of acoustic beacons. Once an acoustic event is detected, it is analyzed to determine whether there is a threat. When the threat is confirmed, the central controller dispatches one or more of the ANF drones to investigate and/or to engage the target.	Microelectronics

Systems and methods for use in communicating data	US10312963B2	SAYANO, MASAHIRO | CHEUNG, MICHAEL S. | AMBROSIA, OLIVER D. | SCHWARTZ, DAVID M.	A system comprises a transmitter configured to receive at least one message that corresponds to at least one set of data received from at least one user. The transmitter includes a modulating device that is configured to generate at least one signal that corresponds to the received message, wherein the signal includes at least one sequence of a plurality of hopping patterns. A receiver is coupled to the transmitter, wherein the receiver is configured to receive the signal. The receiver includes a demodulating device that is configured to identify the sequence of the hopping patterns and to determine at least one variable that corresponds to the sequence of the hopping patterns. The demodulating device is further configured to generate at least one output that is based on the determined variable, wherein the output is displayed such that at least one other user is enabled to view the output.	Microelectronics
Systems and methods for use in determining hazardous charging conditions	US8963553B2	CRAIN, JR., WILLIAM R. | KOOKER, WAYNE E. | MABRY, DAN J. | CRAIN, SUSAN | ROEDER, JAMES L. | FENNELL, JOSEPH F. | MAZUR, JOSEPH E.	A charge detection device includes a dielectric member, a base plate coupled to the dielectric member, and a processing unit coupled to the plate. The dielectric member is representative of at least one material on a location of a vessel and the dielectric member induces an electrostatic potential energy when charged. The plate channels the induced energy through at least a portion of the device. The plate further receives at least one signal that is representative of an electrostatic discharge from a different location of the vessel. The processing unit generates at least one first output of a measurement for the induced energy. The processing unit further generates at least one second output of the presence of the electrostatic discharge to facilitate a correlation between the first and second outputs such that a user is enabled to determine the presence of at least one hazardous charging condition on the vessel.	Microelectronics

Systems and methods for use in generating pulsed terahertz radiation	US8716685B1	BUSHMAKER, ADAM WAYNE | LOTSHAW, WILLIAM T.	A terahertz generating assembly generally includes a light emitting device that is configured to generate at least one pulsed light beam. A first dispersion member is positioned proximate to the light emitting device, wherein the first dispersion member is configured to facilitate a temporal dispersion of the light beam. A second dispersion member is positioned proximate to the first dispersion member and to the light emitting device, wherein the second dispersion member is configured to facilitate a spatial dispersion of the light beam. A lens is positioned proximate to each of the first and second dispersion members, wherein the lens is configured to focus the temporal and spatial dispersions to produce at least one moving spot of light. At least one waveguide is positioned proximate to the lens, wherein the waveguide is configured to apply a biased voltage to the spot of light to generate pulsed terahertz radiation.	Microelectronics
Systems and methods for vector scalability of evolutionary algorithms	US9189733B2	THOMPSON, TIMOTHY GUY | FERRINGER, MATTHEW PHILLIP	Systems and methods are provided to enable vector scalability in evolutionary algorithms to enable execution of optimization problems having a relatively large number of variables. A subset of the total number of variables of a chromosome data structure may be considered relative to a baseline known solution for the purpose of evaluating one or more objective functions of the evolutionary algorithm.	Microelectronics

Systems, methods, and apparatus for doppler LIDAR	US8938362B2	IONOV, PAVEL IGOREVICH | BECK, STEVEN M.	Certain embodiments of the invention may include systems, methods, and apparatus for Doppler light detection and ranging (LIDAR). According to an example embodiment of the invention, a method is provided for measuring atmospheric wind speed. The method includes tuning, in sequence, light output of a laser to a first wavelength and a second wavelength, wherein the first wavelength and the second wavelength are symmetric about a maximum transmission wavelength peak associated with a Fabry-Perot etalon; directing the light output to one or more portions of the atmosphere; receiving backscattered light from the one or more portions of the atmosphere; directing the received backscatter light through the Fabry-Perot etalon; detecting a transmission signal corresponding to light transmitted through the Fabry-Perot etalon; and determining, by at least the transmission signal, atmospheric wind speed at one or more portions of the atmosphere.	Microelectronics
Systems, methods, and apparatus for improving the visibility and identification of satellites using light emitting diodes	US8593065B2	TARSITANO, CHRISTOPHER GEORGE | FIELDS, RENNY ARTHUR | HINKLEY, DAVID ARTHUR	Certain embodiments of the invention may include systems, methods, and apparatus for improving the visibility and identification of satellites using light emitting diodes. According to an example embodiment of the invention, a method is provided for improving the visibility of satellites. The method can include attaching one or more light emitting diodes (LEDs) to a satellite, supplying one or more signals to the one or more LEDs, and producing light emission having a unique identifier from the one or more LEDs based at least in part on the one or more signals.	Microelectronics

Systems, methods, and apparatus for sensing flight direction of a spacecraft	US8538606B2	JANSON, SIEGFRIED W. | FULLER, JEROME K.	Certain embodiments of the invention may include systems, methods, and apparatus for sensing flight direction of a spacecraft. According to an example embodiment of the invention, a method is provided for determining flight direction of a spacecraft. The method includes providing at least one imaging detector associated with a spacecraft; imaging at least a portion of a celestial body onto the at least one imaging detector; acquiring, by the at least one imaging detector, sequential images of at least a portion of the celestial body; and determining the spacecraft flight direction relative to the celestial body based at least in part on processing the sequential images, wherein the processing is performed by one or more computer processors.	Microelectronics
Terahertz detection assembly and methods for use in detecting terahertz radiation	US9766127B2	BUSHMAKER, ADAM WAYNE	A terahertz detection assembly generally has a light generating apparatus configured to generate at least one illuminating light pattern and a substrate member positioned proximate to the light generating apparatus. The substrate member includes a semiconductive portion configured to receive at least a portion of the illuminating light pattern such that a conductive path is defined within the semiconductive portion. At least one waveguide is coupled to the semiconductive portion such that the waveguide is adjacent to the conductive path. The waveguide is configured to receive at least a portion of the illuminating light pattern such that the pattern is moving along the waveguide. The waveguide is further configured to receive a plurality of terahertz electromagnetic waves that are transmitted within the waveguide in the same direction as the motion of the illuminating light pattern to facilitate the detection and characterization of the terahertz electromagnetic waves.	Microelectronics
Thermoelectric array	US20210336116A1	HU, SONG-JUN	An apparatus includes a thermoelectric generator and a lens. The thermoelectric generator includes a hot plate, and is configured to convert heat directly into electrical energy. The lens faces the sun on one side and faces the hot plate on the other side. The lens is configured to concentrate heat from the sun and onto the hot plate.	Microelectronics

Thermo-mechanical magnetic coupler	US11749438B2	DENHAM, DONALD WAYNE | MCHALE, JOHN PATRICK	An electromagnetic mooring system (MMS) that includes a first object and a second object, at least one of which includes an electronic coupler configured to connect the first object with the second object. The electronic coupler comprises a pair of magnets, at least one of which is an electro permanent magnet (EPM), having a flux path. When the electronic coupler is in the ON states, the flux path moves towards the first or second object transferring heat from the first or second object to the second or first object, and when the electronic coupler is in the OFF state, the flux paths moves towards the EPM.	Microelectronics
Tracking system	US12063068B2	UTTER, ALEXANDER CLIFTON | LEE, CHANG	A tracking system includes one or more cameras and machine-vision processors configured to track the position of a plurality of optical tracking emitters. Each of the plurality of tracking emitters is modulated with a message. The message includes identification information for any of the plurality of tracking cameras receiving the message, so that the cameras can track the location of each emitter.	Microelectronics
Tracking system	US10996340B1	UTTER, ALEXANDER CLIFTON | LEE, CHANG	A tracking system includes one or more modulated projectors configured to broadcast a plurality of signals to a plurality of tracking receivers. Each of the plurality of signals is modulated with a message. The message includes positioning information for any of the plurality of tracking receivers receiving the message. The positioning information identifies a location of one or more the tracking receivers able to receive that message.	Microelectronics

Training-support-based machine learning classification and regression augmentation	US20220284261A1	LILLO, WALTER ENGEVALD	Machine learning models are provided that consider, during the process of producing output, various aspects of the training data and/or training process from which the models are created. A machine learning model may generate output (e.g., classification determinations or regression output) that is augmented with information regarding the distribution(s) of the corpus of training data upon which the model was trained, the features extracted from the training data, the resulting determinations made by the model, and/or other information. The augmentation may occur internally while generating the model output, or the output itself may be augmented to include distribution-based data in addition to a model output.	Microelectronics
Tram systems for space vehicles	US20220024610A1	DENHAM, DONALD WAYNE	Tram systems for space vehicles are disclosed. When the space vehicle is a nested ring cell, for example, the structural ring portion of the design may be mostly or completely passive and contain conducting parts, such as electrical steel. The moving trams may use field coils instead of magnets to generate the magnetic flux to propel the tram. Additional coils on the tram may steer the magnetic flux to generate the forward or reverse thrust forces. These coils may also add the overall motive flux.	Microelectronics
Turnkey power system with flexible control of configurable power stage	US12395080B2	CALDWELL, DAVID J. | LE, CHRISTOPHER H. | ETCHEY, SELASI | YU, SUNNY | WILLHOFF, MICHAEL A. | NGO, HUNG V. | VU, VIEN X.	Disclosed are example embodiments of a power system. The power system includes a half-bridge circuit. The half-bridge circuit includes a voltage input and at least one voltage output. The power system also includes an isolation interface, coupled to the half-bridge circuit. The power system includes control circuitry, coupled to the half-bridge circuit through the isolation interface, wherein the half-bridge circuit is configurable, and wherein the voltage input and the at least one voltage output of the half-bridge circuit are isolated from the control circuitry by the isolation interface.	Microelectronics

Ultrasonic inspection technique to assess bond quality in composite structures	US10495609B2	KIM, YONG MIN | CASE, JOSEPH T | KENDERIAN, SHANT	An ultrasonic inspection technique may be used to inspect quality of a bond between thermal protection system (TPS) material and a composite. The technique may include a highly damped transducer emitting an incident wave, which may traverse through thermal protection system (TPS) material and to a back wall of a composite. The incident wave may be of a low frequency signal, and may return a bondline echo and a backwall echo. The bondline echo is returned when the incident wave reaches a bondline and the backwall echo is returned when the incident wave reaches the backwall of the composite. The bondline echo and the backwall echo may be used to generate a waveform to assess the bond quality, revealing possible unbonds or kissing unbonds.	Microelectronics
Ultratight coupling prefilter detection block	US8027413B2	LILLO, WALTER E. | GOLLAKOTA, MANORAMA | LUKESH, JOHN | DOUGLAS, RANDAL K.	An observation lock detector block receives I&Q correlations and generates error measurement vectors, each including phase, frequency, code, pseudorange, and covariance residual estimates, and generates validity indicator and confidence indicator vectors, one of which error measurement vectors is an output as a selected error measurement vector with a respective validity indicator and confidence indicator vector, both of which selected vectors are communicated to a navigation solution processor in a ultratightly coupled navigation system for providing improved estimations of a navigation solution, the indicators indicating the usefulness of measurement errors, the prefilter detector block comprising discriminators, sequential filters, observation lock detectors and a measurement selector for selecting measurement vector based on phase, frequency, and code discriminations, the measurement errors being residual estimates that are indicated as valid or invalid for dynamic propagation of the residuals in a navigation receiver for improved performance, especially in low signal-to-noise environments, such as, for use in an ultratight GPS navigation system.	Microelectronics

Vapor propellant management system	US12227308B2	PIECHOWSKI, MADISON | RHODES, BRANDIE L	A propellant management device (PMD) may reduce or prevent liquid propellant from entering a thruster manifold (TM) or gas venting manifold (GVM) while allowing propellant vapor and/or gas to pass through the PMD to allow for thrust or venting.	Microelectronics
Vehicle attitude control using jet paddles and/or movable mass	US9919792B2	ZONDERVAN, KEVIN L | FULLER, JEROME K	Attitude and/or attitude rate of a vehicle may be controlled using jet paddles and/or movable masses. Thrust direction generally may also be controlled using jet paddles. The jet paddles may be moved into and/or sufficiently close to the exhaust flow, and out of the exhaust flow, to change the thrust direction. Movable masses may also be used in addition to, or in lieu of, jet paddles. Movement of the movable masses alters a center-of-mass of the vehicle, generating torque that changes vehicle attitude.	Microelectronics
Vehicle attitude control using movable mass	US10414518B2	ZONDERVAN, KEVIN L | FULLER, JEROME K	Attitude of a vehicle may be controlled using movable mass. The movable mass may move inside a vehicle or its outline, outside of the vehicle or its outline, inside-to-outside and/or outside-to-inside of the vehicle or its outline, or any combination thereof. The movable mass may be a solid, liquid, and/or gas. When the center-of-mass of the vehicle is moved relative to the line-of-action of applied forces such as thrust, drag, or lift, a torque can be generated for attitude control or for other purposes as a matter of design choice. In the case of external movable masses that extend from the vehicle or its outline, when operating in endoatmospheric flight, or general travel through a fluid, aerodynamic forces from the atmosphere or general fluid forces may further be leveraged to control the attitude of the vehicle (e.g., aerodynamic flaps).	Microelectronics

Waveform analysis and vulnerability assessment (WAVE) tool	US12400134B2	SUD, SEEMA	A waveform analysis and vulnerability assessment (WAVE) tool is disclosed that can analyze the characteristics and vulnerabilities of waveforms. The WAVE tool may identify issues in waveforms prior to their implementation in a transmit device or building the back-end processing to receive the waveform at a ground station. The WAVE tool may quantify waveform vulnerabilities, address which vulnerabilities a particular waveform has, and enable the user to modify the waveform design to optimize its performance against threats prior to implementation. Additionally, the WAVE tool may save time and money since new waveforms can be vetted against the tool before implementation. Data from waveforms can be analyzed against a plurality of metrics and scores can be generated providing a quantitative assessment of waveform performance.	Microelectronics
Wearable thermoelectric array as a graphical user interface	US11439567B2	JANSON, SIEGFRIED W.	A thermal display module configured to create a thermal pattern discerned by a visually impaired user to determine his or her surroundings. The thermal display module includes a plurality of thermoelectric modules, each of which are configured to cool or heat a pixel plate in close proximity to a user's skin. The cooling or heating of each of the thermoelectric modules create the thermal pattern discernable by the user.	Microelectronics
Windowless microbolometer array	US9851255B2	CLEMMONS, JAMES HART | BRADY, BRIAN BLAISE | HALL, JEFFREY LOUIS | CURTISS, THOMAS JAY	A windowless microbolometer for use in terrestrial applications and non-terrestrial applications is provided. The windowless microbolometer array may interact with a flow of gas such that a pixel-based image of the gas is generated when the flow of gas impinges upon the windowless microbolometer array. The windowless microbolometer array may also interact with a molecular beam to provide information related to density, shape, and propagation of the molecular beam.	Microelectronics

Wireless battery leak detection	US12038350B2	NEMANICK, ERIC JOSEPH | WILL, ROBERT G.	An apparatus for detecting leaks in a battery includes a plurality of cells, each which include a pair of conductive leads bracketing a polymer seal, and a wireless measurement and communication chip ("chip") configured to perform capacitive measurement, showing a change in capacitance when bridged by ionically conductive species or when a wick is suffused with an electrolyte.	Microelectronics
Zoned anti-glint filter for cameras in high consequence environments	US12225297B2	BYCROFT, BENJAMEN P. | DENHAM, DONALD WAYNE	Zoned anti-glint filtering includes identifying one or more pixels impacted or predicted to be impacted by glint in a captured image, and adjusting the one or more pixels to capture an image with those zones dimmed to mitigate impacts from glint. Knowledge of the applied anti-glint filter may be used in post-processing to reconstruct an image without adverse impacts from glint or the anti-glint filtering process.	Microelectronics
Interlocking, reconfigurable, reconstitutable, reformable cell-based system with nested ring structures	EP3655325B1	HELVAJIAN, HENRY	Cell-based space systems with nested-ring structures that interlock and can change configuration to support a mission are provided. The cells may self-assemble into a larger structure to carry out a mission. Multiple rotatable rings may be included in a cell, with a payload/control section in the center. The rings may provide power and/or data to trams that move about the rails. Trams may interlock with other cells, carry sensors or other devices, etc. Cells may be stowed in a cell stack that is deployable. Such cell-based systems may have various applications in space, on Earth, other celestial bodies, and underwater.	Munitions