Division and Group Summaries
Career Opportunities

A tradition of excellence...

a history of innovation.

LINCOLN LABORATORY
Massachusetts Institute of Technology

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The Air and Missile Defense Technology Division’s role is to work with government, industry, and laboratories to develop an integrated ballistic missile defense system. This division’s main focus is investigating system concepts, developing technology, building prototypes, and conducting measurements to support the development of long-range radar and optical sensors, interceptors, and networks for ballistic missile defense systems. A strong emphasis is placed on partnerships and the transfer of technology to industry.

**Group 31—Systems and Architectures**
The Systems and Architectures Group examines near- and long-term technology opportunities for the purpose of charting the future development of U.S. ballistic missile defense. As the country proceeds toward its first deployment of a national missile defense, Lincoln Laboratory and this group are working on the next generation of systems. The group investigates advanced radar concepts, new infrared sensors, missile designs, space-based platforms, and future distributed command and control software to help identify opportunities to develop, test, and deploy these technologies. Staff members in the group have a wide variety of backgrounds, including physics, electrical engineering, math, and astrodynamics.

**Group 32—Advanced Concepts and Technology**
The Advanced Concepts and Technology Group supports the Missile Defense Agency in the development and evaluation of advanced algorithms and architectures for ballistic missile defense. Algorithms and architectures of interest are target detection in noise and clutter, multitarget and multisensor tracking, target identification and handover, multisensor fusion, and sensor/weapon resource management. The group analyzes radar and optical sensor data to identify phenomenologies that can be exploited to improve target identification and subsequent engagement. Based on findings, algorithms and architectures that utilize advanced cognitive science techniques to demonstrate these exploitation concepts are developed and evaluated over broad parameter spaces.

**Group 33—Ranges and Test Beds**
The Ranges and Test Beds Group supports the Department of Defense (DoD) by designing and developing modern sensor systems and components to enable a ballistic missile defense system. The group has a long-term association with the Reagan Test Site (RTS) at the Kwajalein Missile Range and has played a key role in developing the sophisticated radar instrumentation at RTS. The group’s sensor systems expertise is being extended to support ranges involved in ballistic missile defense system testing throughout the entire Pacific region and to design test beds that support discrimination algorithm testing and sensor fusion experiments. This group is also investigating the system architecture and signal processing concepts associated with a radical radar design approach for the next generation of discrimination radar sensors.
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**Group 34—Intelligence, Test, and Evaluation**
The Intelligence, Test, and Evaluation Group supports the testing and development of the ballistic missile defense system being pursued by the Missile Defense Agency. In particular, the group plans and conducts field experiments and collects data to understand problems and formulate solutions that impact the nation’s capability to defend against ballistic missiles. The group also focuses on characterizing threat missile systems based on the analysis of collected radar and optical data.

**Group 36—Missile Defense Elements**
The Missile Defense Elements Group supports the Missile Defense Agency in the development, deployment, testing, and enhancement of the ballistic missile defense system. This system is currently being developed to defend the United States, deployed forces, and allies from ballistic missile attacks. This group performs detailed system and component engineering, flight and ground test analysis, and advanced capability development in collaboration with the contractors and government program offices that are building the missile defense elements and components. Several elements are being developed, tested, and deployed in the near future, including the ground-based missile defense element (to protect the United States from intercontinental ballistic missiles) and a ship-based Aegis ballistic missile defense element (to protect deployed forces and allies against short- and medium-range ballistic missiles).

**Group 38—Seeker and Interceptor Technology**
The Seeker and Interceptor Technology Group supports the development of advanced technologies and systems for application to interceptor missiles to be used in future ballistic missile defense systems. These programs support the Missile Defense Agency as well as the military services in developing elements of the planned ballistic missile defense system. The technology and system development efforts also support the evolution of advanced ballistic missile defense concepts and capabilities as well as new ground, airborne, and space-based sensors for data collection. The emphasis of the group’s work is on advanced sensors and algorithms, missile guidance, mission simulations, laboratory and field/flight tests, and data reduction and analysis.

**Group 39—Air Defense Techniques**
The Air Defense Techniques Group develops radar, communications, and systems technologies for use in future air defense systems. Of particular interest is the development of highly digitized phased-array radars and advanced signal processing techniques to enable the next generation of shipboard and airborne surveillance sensors. Major activities within the group include system concept development, modeling and simulation, signal processing algorithm design, prototype system design and development, and experimental field testing and data analysis.
Reagan Test Site (Kwajalein)
The Reagan Test Site Group serves as the scientific advisor to the Reagan Test Site at the US Army Kwajalein Atoll installation located about 2,500 miles WSW of Hawaii. Twenty staff members, accompanied by their families, work at this site, serving two- to three-year tours of duty. The site’s radars and optical and telemetry sensors support ballistic missile defense testing and space surveillance. The radar systems provide test facilities for radar technology development and for the development of ballistic missile defense techniques. MIT Lincoln Laboratory also supports upgrades to the command-and-control infrastructure of the range to include applications of real-time discrimination and decision aids developed as a result of research at the Laboratory.
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Homeland Protection and Tactical Systems

The Homeland Protection and Tactical Systems Division is leading Lincoln Laboratory efforts in the Homeland Defense and Security, Air Traffic Control, Counterterrorism, and Air Force Red Team areas. The division has world-class expertise in systems analysis, system development, and field testing, and is leading a lab-wide Blue Team effort to support rapid innovation capability. It focuses on a wide variety of areas including biological-chemical sensing, air vehicle survivability, electronic attack and electronic protection, detection of improvised explosive devices, and homeland air surveillance and air control. Recent efforts include architecture studies for the defense of civilians and facilities against potential biological attacks, development of the Enhanced Regional Situation Awareness system for the air defense of the National Capital Region, and development of technology for civil and military air traffic control. In addition, this division operates the Lincoln Laboratory Flight Facility, which provides aircraft, personnel, and ground support services for Laboratory programs’ flight operations.

Group 42—Surveillance Systems

The Surveillance Systems Group pioneers integrated sensing and decision support systems for both Air Traffic Control and Homeland Air Defense. Since the 1970s, this group pioneered significant advancements to the surveillance technology used by the major modern air traffic control radars and airborne collision avoidance systems. Ongoing programs focus on advancing new sensor, data fusion, and net-centric technologies to take new ideas from concept definition through the development and evaluation with an operational prototype. Examples of currently fielded systems include the Enhanced Regional Situation Awareness System, which improves the identification and response to airborne threats to the National Capital Region, and the Runway Status Lights System, which improves the safety of taxiing aircraft at Dallas/Fort Worth. To accomplish these goals, this group employs a broad base of analysis, modeling, algorithm development, signal processing, software architecture and development, RF and digital hardware design, and system integration skills.

Group 43—Weather Sensing

The Weather Sensing Group develops sensors, automated forecasting systems, and decision support tools to reduce the impact of adverse weather on commercial aviation. To accomplish this, the group combines Lincoln Laboratory expertise in innovative signal, image, and sensor data-fusion processing with physical insights furnished by staff meteorologists. Key accomplishments have included the development of the FAA’s Terminal Doppler Weather Radar, ASR-9 Weather Systems Processor, Integrated Terminal Weather Systems, and Corridor Integrated Weather System.
**Group 45 – Advanced Capabilities and Systems**
The Advanced Capabilities and Systems Group provides assessments of novel technologies and system concepts in solution of significant defense and intelligence needs and, where appropriate, rapidly develops prototype solutions to demonstrate concepts or provide fieldable capability. To accomplish these goals, the group taps Laboratory-wide knowledge and couples this with the group’s strong systems analysis expertise. Modeling, often supported by quick measurements and tests, is used to evaluate the feasibility of proposed solutions to problems, as well as to creatively develop new alternatives. Products of this assessment process include briefings and proposals for follow-on development efforts. Where a rapid capability is sought, the group often leads multi-group coalitions in the execution of these efforts.

**Group 46—Advanced System Concepts**
The Advanced System Concepts Group conducts systems analysis on a broad range of problems related to surface surveillance, force protection, and homeland defense. Activities include sensor and system modeling, mission requirements analysis, and architecture development. A variety of technologies are examined, including radar, optical, acoustic, biological, and chemical sensors. Modeling and the analysis of field measurements are used to quantify the ability of current and proposed technology to meet mission requirements. This work includes analysis, algorithm development, and field testing.

**Group 47—Biodefense Systems**
The Biodefense Systems Group works on the design, development, and demonstration of bioagent and other hazardous material sensing and protection systems that detect and warn of the presence of organisms of concern in air, water, or environmental samples. The goal of the sensing component is to increase the speed and accuracy of current detection methods by improving existing systems or inventing new sensors. The goal of the protection aspect is to develop methods and systems for mitigating the effect of a bioagent attack on buildings or people (civilian and military). Research from this group encompasses algorithm development and signal processing for integration of data from multiple sensors, deployment and modeling of existing sensors, hardware design for next-generation sensors, applied research in surface chemistry for organism concentration or detection, and applied biology research to rapidly purify organisms or their DNA or RNA from complex matrices. Systems analyses, including threat and vulnerability assessment, modeling of attacks and defenses, and cost/benefit assessment, are performed to optimize the design of biological or chemical defense systems. The backgrounds of the researchers in this group span a wide range of disciplines that includes engineering (electrical, mechanical, chemical, and biomedical), computer science, physics, mathematics, chemistry, and biology.
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Group 48—Tactical Defense Systems
The Tactical Defense Systems Group works on air defense issues, in particular, air vehicle survivability, vulnerability of United States Air Force (USAF) aircraft to weapons systems, electronic countermeasures, and air surveillance for homeland defense. The group focuses on understanding USAF and threat air defense systems through tests and measurements. Test activities include flight, field, and laboratory testing. The group operates two airplanes, both highly instrumented, and numerous ground systems as needed for test efforts. The group also develops new hardware for testing and prototype systems as well as for instrumenting existing sensors. There are a few major field-testing campaigns each year. Local testing is used to validate flight readiness. Data collected from testing are analyzed and compared with models in concert with Group 49, Systems and Analysis. The group’s activities continue to evolve in parallel with USAF efforts, but the emphasis remains on providing answers to questions from our Air Force sponsors by conducting field measurements using state-of-the-art instrumentation and then analyzing the resulting data.

Group 49—Systems and Analysis
The Systems and Analysis Group provides technical analyses to USAF leadership on air vehicle survivability; the effectiveness of advanced weapon systems; the capabilities and limitations of intelligence, surveillance and reconnaissance systems; and the vulnerability of U.S. aircraft and weapon systems to countermeasures. These system analyses rely on a large body of air-defense modeling and simulation tools for RF, IR, and directed-energy systems. Validation of these tools is ensured by participation in an active program of laboratory measurements and flight testing. This infrastructure is used to support both USAF studies and Lincoln Laboratory initiatives.
The Communications and Information Technology Division develops and demonstrates new technology to enable worldwide communications for the military and other government agencies, with emphasis on networked sensor and computer data. These communications systems carry data that are used by people to make operational decisions. Identifying, organizing, and fusing data from many sources into a form useful to them is also a part of this division’s effort and has a strong influence on the operational performance of large systems. There are many diverse elements to this program, including satellite, airborne, and terrestrial communications systems, networked together and employing advanced RF, optical, and networking technologies. The division is also extensively involved in field experimentation to verify algorithms and architectural concepts.

**Group 61—Net-centric Integration**

The Net-centric Integration Group focuses on integrating communication and networking capabilities to provide a prototyping and test environment for future airborne networking implementations. The future network-centric operations environment will include multiple terrestrial networks, airborne assets with multifaceted communication and networking capabilities, and a space backbone. The emphasis in the Net-centric Integration Group is the development of an airborne communication node, which serves as a hub providing heterogeneous RF and optical data links, onboard gateway and routing, and network capacity brokering. To support experimentation and test, the group manages and operates a 707 test aircraft; a ground-based, portable communications and operations center, and a free-space microwave propagation measurement range. These test assets are used as proofs of concept for advanced communication and networking architectures, both in controlled experiments and operational exercises. Current activities include integrating protected military satellite communications (MILSatcom), high-rate point-to-point tactical data links, and optical laser communication capabilities into the 707 test aircraft, as additions to the numerous existing modes of communication. Proof-of-concept objectives include utilizing the rich set of communication links with time-varying capacities in a brokered, IP-based, airborne network and demonstrating robust communications through dynamic link management and brokering techniques.
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**Group 62—Information Systems Technology**
The Information Systems Technology Group is engaged in a wide range of information-processing-related projects focusing on speech and language processing and information operations. This group’s speech and language processing R&D efforts include speech recognition, speaker recognition (identification, verification, and authentication), language and dialect identification, word spotting, speech coding, speech and audio signal enhancement, and machine translation. The group’s information operations R&D efforts focus on techniques for protecting from, and detecting and reacting to, intrusions into networked information systems, and for preventing software faults and understanding malicious code that exploits those faults. The group is involved in testing and evaluating the security of U.S. Government systems and networks and in identifying and demonstrating vulnerabilities in such systems. The group is also initiating new R&D in analysis of social networks based on speech, text, and network communications and activities. In each of this group’s R&D areas, emphasis is placed on realistic data and experimental evaluation of techniques in test beds.

**Group 63—Wideband Tactical Networking**
The Wideband Tactical Networking Group develops concepts, technologies, and prototypes to provide on-the-move tactical military forces with wideband packet network access. The group’s current focus is on the design and integration of increasingly more capable, inexpensive, modular, mobile network nodes that support satellite, airborne, and terrestrial links. The purpose of these nodes is to give mobile warfighters the network access they need to run critical command-and-control applications and situational awareness applications no matter where they are moving in a theater of operations. During testing, nodes are placed on military vehicles and driven in rugged, off-road environments both at MIT Lincoln Laboratory and at military test ranges around the country. New technologies that are being developed and integrated into the modular nodes include novel tri-band antenna feeds, three-axis positioning systems, new waveforms and protocols for transponding satellites, and programmable modems.

**Group 64—Advanced Satcom Systems and Operations**
The Advanced Satcom Systems and Operations Group is involved in a synergistic combination of research, proof-of-concept test beds, and system engineering/application efforts focused on the goals of enhancing the capacity, the robustness to interference, and the flexibility of future generations of communications satellites, as well as line-of-sight radio communications systems. Current research is concentrating on the design and performance of advanced waveforms (including higher-order signaling constellations and iterative demodulation/decoding), the construction of flexible, adaptive wideband frequency plans, robust acquisition and tracking techniques, dynamic resource-allocation protocols, and advanced networking strategies. Promising research results are verified in hardware/software proof-of-concept implementations that provide quantitative performance data as well as complexity information. The group’s system engineering activities apply new concepts and technologies to specific communications programs in the national interest.
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**Group 65—Advanced Networks and Applications**
The Advanced Networks and Applications Group specializes in networking issues in the context of unique government requirements. One major activity focuses on mobile, ad-hoc, heterogeneous networking in an airborne context. High-performance networking (Gigabit class and above) over satellite systems to both fixed and mobile systems is another area of focus. In the application area, the group is exploring ways to apply service-oriented architectures to sensor and decision support systems in environments with both wide- and narrowband communication systems comprising reliable (fiber) and unreliable (wireless) links. The group also operates an experimental all-optical, dark fiber network (Bossnet) that runs from Boston to Washington, D.C.

**Group 66—Advanced Lasercom Systems and Operations**
The Advanced Lasercom Systems and Operations Group develops, builds, and operates prototype space and airborne lasercom terminals. The technology developed and the lessons learned from these activities are transferred to operational programs through participation in standards groups and through the operation of a gold-standard test infrastructure. Major efforts include demonstration of a low-cost, high-performance airborne lasercom terminal, design of lasercom interoperability standards, development of a test capability to validate interoperability among various contractor-produced terminals, and investigation into techniques to enable multiple simultaneous lasercom links through a single aperture. This group has close interactions with both government and industrial partners.

**Group 67—Optical Communications Technology**
The Optical Communications Technology Group develops advanced laser communications technology for many applications. Research in optical switching and optical logic supports the development of future ultra-high-speed, all-optical routing. Research in superconducting, single-photon-counting detectors, novel modulation formats, and coding supports the development of future high-data-rate, interplanetary laser communications links. These technologies support the most sensitive optical communications links ever developed, enabling communication of several bits per detected photon across vast distances.
The Engineering Division, working in partnership with all the other Lincoln Laboratory divisions, performs rapid development and large system demonstrations through design, analysis, hardware fabrication, and testing support. The division’s expertise includes mechanical, fabrication, aero, thermal, optical, and control systems engineering. The division’s groups work in teams supporting a wide range of projects, including communications systems, missile defense testing, pointing and tracking systems, aircraft and satellite payload design, and optical systems. Special emphasis is placed on the ability to meld design and analysis capabilities to support the rapid prototyping of hardware systems.

**Group 71—Mechanical Engineering**
The Mechanical Engineering Group has expertise in static, dynamic, and thermo-elastic analyses; tribology; and mechanical design for systems ranging from large antenna structures to mechanisms and optical systems. The group is the Engineering Division’s center for 3D computer-aided design. It also provides electronics packaging and cable design for airborne and space systems. Example projects include airborne and space-based laser communications systems, biological agent detectors and identifiers, and large radar antenna systems.

**Group 72—Fabrication Engineering**
The Fabrication Engineering Group provides fabrication engineering for both mechanical and electronic projects. The group is involved from the initial design through manufacturing, assembly, integration, and test. Facilities include a machine shop with a wide range of computer-aided machine tools, plus sheet metal, welding, and polymer facilities. In the electronics area, capabilities include circuit-board design, assembly, and inspection. The group also supports the Laboratory’s environmental test requirements with vibration shakers, thermal chambers, vacuum chambers, and clean rooms. Planners and project leaders use a computerized system for quoting, scheduling, part ordering, and fabrication.

**Group 73—Aerospace Engineering**
The Aerospace Engineering Group has expertise in the areas of low-speed to hypersonic aerodynamics and aero-thermal analyses, wind tunnel, arc jet testing, and flight testing. The group has extensive experience in missile payload design and is also responsible for thermal engineering applied to terrestrial, airborne, and space systems. Example projects include missile defense payload development and testing, missile-borne target development for high-energy lasers, and computational fluid dynamics modeling of building interiors for biodefense.
**Group 75—Optical Systems Engineering**
The Optical Systems Engineering Group applies various aspects of mechanical and optical engineering to the development of space-borne, airborne, and terrestrial optical systems. Expertise includes integrated analysis capabilities combining structural and thermal analyses with optical ray tracing, as well as stray light and optical performance analyses. These analysis tools support opto-mechanical design and a wide range of testing activities. Example projects include satellite passive imaging sensors, optics for space and ground laser communications systems, and airborne laser radar and imaging systems on both manned and unmanned aircraft. The group also has specialized expertise in very dense, multichip module electronics packaging for radar and processor systems.

**Group 76—Control Systems Engineering**
The Control Systems Engineering Group has expertise in pointing and stabilization for radars and optical systems, embedded servo control systems, space-qualified electronics, real-time programming, airborne stabilization systems, mechanism control, and power electronics. Example projects include controller, power, and telemetry electronics hardware and software for Laboratory space payloads; stabilization and pointing control systems for airborne laser radars and imaging sensors; and pointing and stabilization systems for terrestrial and shipboard radar antennas. The group is also heavily involved in the development and testing of a wide variety of missile defense payloads.
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Solid State Division 8

The Solid State Division performs research and development on component and subsystem-level technologies which can enable new approaches to DoD systems and which advance the state of the art for U.S. industry. This division’s expertise covers a wide front including biology, chemistry, computer science, device physics, integrated circuit design and fabrication, lithography, materials, nanofabrication, optics, optoelectronics, packaging, photonics, quantum information systems, and RF technology. The Solid State Division strives to understand DoD systems and develops technologies “which will make a difference.”

Group 81—Submicrometer Technology
The Submicrometer Technology Group develops concepts, equipment, materials, and processes for nanoscale fabrication. This group also applies chemistry to sensing applications and to emerging areas. Examples of research activities include pioneering the development of 193-nm-wavelength lithography (now commercial) and liquid immersion lithography (in development, joint with industry). Work continues on materials and process issues associated with the development of 157-nm lithography and immersion lithography. Chemistry-focused work includes the synthesis and formulation of advanced photoresists, characterization of chemical sensors, and surface chemistry. Lithographic and microfabrication technologies are applied to such varied uses as photonic devices, advanced field effect transistors, and microelectromechanical system devices.

Group 82—Laser Technology and Applications
The Laser Technology and Applications Group develops application-specific solid-state lasers, beam control and diagnostics for high-energy laser systems, and optically based bio and chemical agent sensors for DoD applications. Examples of research activities include creating new microchip-laser-based illuminators for sensor applications, demonstrating spectral and coherent laser-beam-combining techniques, developing tracking algorithms for use with 3-D lidar systems, and developing high-discrimination bio-aerosol sensors. These activities span the range from laser device development to optical subsystems through complete optical sensors.

Group 83—Electro-Optical Materials and Devices
The Electro-Optical Materials and Devices Group develops compound semiconductor materials and devices. This group also develops and applies photonic components including semiconductor lasers, amplifiers, and detectors for enhancing the capabilities of DoD systems. Examples of research activities include high-brightness and high-power diode lasers, vertical cavity surface-emitting lasers, quantum cascade lasers, photon-counting avalanche photodiodes, mid-infrared lasers and detectors, and thermoelectric and energy conversion devices. Disciplines span from epitaxial materials research, growth, and characterization, through electronic and photonic device modeling, design, fabrication, testing, and subsystem integration.
**Group 84—Biosensor and Molecular Technologies**
The Biosensor and Molecular Technologies Group combines molecular and cell biology with various engineering disciplines, enabling the development of new technologies of DoD importance such as biodefense sensors, diagnostic and forensic methods, and power sources. Examples of research activities include demonstration of new classes of biosensors using living cells as the sensing element, development of improved processes and protocols for sensing DNA and RNA, and the demonstration of new concepts for integration of biology with electronic, optical, and microfluidic Microsystems.

**Group 86—Analog Device Technology**
The Analog Device Technology Group performs analog component research and development along with analog-centric subsystem development and demonstrations. Examples of research activities include development of high-performance mixed-signal devices such as ultra-low power and wideband A/D converters, and development of RF front-end technologies such as bulk-acoustic-wave filters, high-$T_c$ superconductive devices, and precision packaging. Low-$T_c$ superconductive Josephson-junction technology is being applied to research in quantum computing. Examples of subsystem development activities include wideband receivers, low-power communication receivers, and radar array modules. Work spans such diverse disciplines as analog circuit design, materials science, microfabrication process development, RF design, advanced electronic packaging technology, and quantum and solid-state physics.

**Group 87—Advanced Imaging Technology**
The Advanced Imaging Technology Group develops advanced silicon-based focal-plane technologies for both DoD and scientific applications, such as astronomy, remote sensing, and adaptive optics. Focal planes may address special requirements (for example, multiple or very high-speed image samples), time-of-arrival imaging (LADAR receiver), or high quantum-efficiency or very low noise applications. Examples of research activities include design, fabrication, and testing of world-class CCD imaging devices used in a variety of high-end scientific applications (for example, the focal planes for the Chandra x-ray telescope and various major telescopes), demonstration of silicon-based photon-counting detector arrays, and development of unique active-pixel sensors.

**Group 88—Advanced Silicon Technology**
The Advanced Silicon Technology Group applies its silicon microelectronics capabilities to develop new electronic, microelectromechanical structures and optical devices, with a special focus on silicon-on-insulator complementary metal oxide semiconductor technology. Examples of research activities include demonstration of new processes enabling 3D integration of multiple layers of silicon-on-insulator circuits with applications to advanced focal planes and 3D computing architectures, demonstration of approaches to scaling silicon devices into the nanometer regime, and development of microelectromechanical structure devices for RF and optical-switching applications. Work spans from device design and device physics, through integrated circuit design, process development, packaging, and testing.
Division and Group Summaries

Aerospace

The Aerospace Division develops sensors, technologies, and systems that help to strengthen national security. Focus areas are space control and environmental monitoring. The division’s work includes development of system concepts, hardware demonstrations, and technology transfer to industry. The primary technology focus is the application of new components and algorithms to enable sensors with greatly enhanced capabilities.

Group 91—Space Control Systems
The Space Control Systems Group develops technology and techniques for space control and space surveillance missions. The group has its roots in the development of technology to detect, track, and characterize satellites, including the Ground Based Electro-Optical Deep-Space Surveillance System (GEODSS) and the Millstone Hill Radar. The group is currently developing a technology prototype for a unique, large, ground-based Space Surveillance Telescope (SST) to provide a wide-area search capability for small microsatellites in deep space. The group also supports the development and demonstration of a space-based optical system for space surveillance and provides technical support to the Government for the procurement of an operational constellation to perform this task in the future. The group also operates an extensive observational program utilizing space surveillance technology to search for and discover near-Earth asteroids at its electro-optical field site near Socorro, New Mexico. This program, Lincoln Near-Earth Asteroid Research (LINEAR), has discovered more than 50% of the known asteroids in our solar system. The group’s core talents are also applied to other mission areas, including the development and demonstration of data fusion and discrimination algorithms for missile defense. Finally, the group’s activities include substantial efforts in the modeling and evaluation of technology for new space systems, sensor data collection by radar, and visible and infrared optical systems.

Group 92—Aerospace Sensor Technology
The Aerospace Sensor Technology Group develops sensor technology for aerospace applications. Current emphasis is on advanced wideband radar systems for space-object imaging and exploitation of radar and optical data. A major ongoing effort in the group is the development of a wideband radar system for timely on-demand imaging of small satellites in orbits ranging from low-Earth to geosynchronous (40,000 km range). The new radar will operate in the 92–100 GHz band and will achieve an order of magnitude improvement in inverse synthetic aperture radar (ISAR) image quality. Other areas of research include 3D imaging of space objects using interferometric ISAR techniques and fusion of optical and 3D ISAR data. The group is also responsible for technology development and upgrades to the Lincoln Space Surveillance Complex (LSSC), an operational test bed for radar technology and space situational awareness comprising the Haystack, Haystack Auxiliary, and Millstone radars in Westford, Massachusetts.
**Group 93—Space Situational Awareness**

There are currently more than 12,000 objects in Earth’s orbit, ranging in importance from operational satellites to orbital debris. In order to monitor this large population, the Space Situational Awareness Group develops sensors, algorithms, techniques, and operational concepts to track and characterize these objects. The group operates the Lincoln Space Surveillance Complex (LSSC), comprising the Millstone deep-space satellite tracking radar and the Haystack and Haystack Auxiliary wideband satellite imaging radars. These radars, which are used daily, are remotely controlled from the Lexington Space Situational Awareness Center (LSSAC), which serves as a data processing and fusion node for the LSSC and other ground- and space-based space surveillance sensors. Together, the LSSC and LSSAC serve as an operational test bed for space situational awareness technologies and provide access to a rich set of radar and optical data. The group’s current research and development efforts focus on problems such as tracking and identification of newly launched satellites, tracking and discrimination of satellites in geosynchronous clusters, automated radar image exploitation, close approach monitoring and collision warning, applications of multisensor data fusion, and decision support. The group is also developing a web-based, service-oriented architecture that networks all these capabilities together in an integrated information system.

**Group 97—Sensor Technology and System Applications**

The Sensor Technology and System Applications Group develops environmental monitoring electro-optical (EO) infrared (IR) sensor systems for detecting and tracking natural and man-made phenomena. As such, this group’s activities include the extraction of target and feature information from airborne and space-borne hyperspectral imagery; system support of National Oceanic and Atmospheric Administration (NOAA) environmental satellites in performance analysis and improvement of existing sensors and products; architecture definition and sensor development support for the next-generation NOAA satellite systems; and chemical and biological agent detection sensor and system development. Work includes EO IR sensor design, system and architecture analysis, signal processing, data analysis, and algorithm development.

**Group 99—Advanced Space Systems and Concepts**

The Advanced Space Systems and Concepts Group’s expertise includes advanced passive imaging system hardware development and video-processing technology research and development. These areas of expertise are used to support the development of advanced system concepts (architecture definition; prototype design; and hardware, algorithm, and software fabrication) for Department of Defense and NASA sponsors.
Group 903—Space Systems Analysis
The Space Systems Analysis Group identifies and evaluates threats to U.S. use of space for military, intelligence, civil, and commercial purposes. This work involves understanding the attributes and vulnerabilities of U.S. space-related systems, including the sensors and networks used to detect, track, and characterize objects in space, the satellites that provide space-based services, and the infrastructure used to control and operate these satellites. A central component of this effort involves consideration of how adversaries might try to exploit vulnerabilities and technically evaluating the knowledge and resources required to mount a credible threat against U.S. systems. The group also develops concepts for reducing U.S. vulnerabilities to these identified threats. This work requires detailed modeling of optical, radar, and propulsion systems; novel ideas for new space systems and on-orbit operations; and consideration of the timelines, architectures, and decision-making processes for maintaining awareness of the space environment. In addition, the group pursues potentially game-changing, innovative ideas for remote sensing of space and the Earth. This part of our work involves sensor design, signal and image processing as well as target and environmental phenomenology. The group seeks researchers from the physical sciences, including physics, mathematics, and chemistry, as well as from a wide range of engineering disciplines (including electrical, computer, mechanical, chemical, aeronautical, and astronomical).
The Intelligence, Surveillance, and Reconnaissance (ISR) Systems and Technology Division is engaged in the development of advanced sensors and sensor technologies for undersea, surface, airborne, and space-based mission applications. Efforts span a variety of disciplines including systems analysis, signal and image processing, advanced sensor concepts, signal processor hardware and software design and development, large-scale system prototyping, and field-testing and data analysis.

Group 102—Embedded Digital Systems
The Embedded Digital Systems Group concentrates on delivering real-time embedded processing for a broad spectrum of military applications. This group is involved in hardware architecture design, embedded software engineering, and signal processing analysis applied to a wide range of platforms that run the gamut from space-based radars, airborne radars and missiles, to shipborne systems, submarines, and torpedoes. The group’s expertise is both in full system-level prototyping as well as advanced enabling hardware and software technology. The group’s charter is focused on providing high-level, cross-platform designs across the entire spectrum of high-performance embedded architectures and applications. The group produces some of the world’s highest-performance digital signal processor hardware technology. At the same time, it is a leader in software engineering initiatives that are revolutionizing high-level, middleware approaches to provide full portability across platforms, improved performance, and enhanced programmer productivity. Through the application of its multidisciplinary approach, the group is able to address evermore sophisticated processing requirements, matching challenging signal processing applications to enabling technologies ranging from VLSI application-specific integrated circuits and field programmable gate arrays through to large-scale parallel signal processors.

Group 103—Advanced Sensor Techniques
The Advanced Sensor Techniques Group concentrates on developing and demonstrating new signal, image, and data-processing algorithms for a broad range of sensor systems applications that include airborne and space-based radar, passive sonar, advanced wireless communications, signals intelligence, and robust navigation. The group’s charter is to detect, classify, and locate signals of interest in difficult propagation and interference environments. The staff has expertise in adaptive sensor array processing, detection and estimation, pattern recognition, electromagnetics, underwater acoustics, and systems analysis. Our staff hold advanced degrees in electrical engineering, physics, and applied mathematics. This group is engaged in a significant amount of field testing and data collection to prove new concepts, and works with other groups within the division in real-time prototype implementation, experiment conduct, and systems analysis.
Division and Group Summaries

Group 104—Intelligence and Decision Technologies
The Integrated Sensing and Decision Support (ISDS) Group develops advanced technologies for processing and integrating data from a variety of sensors, such as radar, electro-optic, video, etc., to extract information about targets and areas of interest on the Earth’s surface that are important to decision makers. A key aspect of this work focuses on the development of systems architectures, procedures, and algorithms for the efficient and timely distribution of this information to analysts and decision makers. Technologies include multisensor integration and data fusion, and algorithms for knowledge management and decision support to turn high-volume sensor data streams into tactically useful information. Group programs include analysis of airborne and space-based ground surveillance radars for broad-area imaging and moving-target detection; network-centric sensor architectures; sensor data exploitation; full-scale sensor grid experimentation; and software development to implement architectures and techniques for integrated sensing and decision support. Technical areas of staff expertise include systems analysis, modeling and simulation, feature extraction and pattern analysis using multisensor data, information-theoretic analysis of decision processes, and design, execution, and analysis of laboratory and field experiments.

Group 105—Advanced Sensing and Exploitation
The Advanced Sensing and Exploitation Group develops technology solutions for intelligence, surveillance, and reconnaissance-oriented missions with emphasis on RF sensing, signal processing, target feature exploitation, and prototype system development. Challenging defense-related problems are analyzed from a system-level perspective, and innovative solutions that typically require small size, low weight, and low power consumption form the basis for several key program development thrusts. For example, custom RF front-end hardware such as ultra-wideband multifunction antenna arrays and VLSI-based digital receivers are developed for military platforms ranging from ground vehicles to unmanned aerial vehicles. The group synergistically combines hardware with digital signal processing to enable new radar and intelligence collection capabilities. The group is now moving beyond classical radar signal detection and imaging to develop concepts that utilize target features and data fusion from multiple sensor types to enhance detection and tracking in challenging (e.g., dense urban) environments. The group’s programs typically involve prototype system development, which culminate in ground-based or airborne field testing. Our RF test chambers and rapid prototyping facilities give us a unique capability to develop and demonstrate new concepts for a wide variety of technical problems. Principal group staff expertise includes system engineering, digital signal processing, EM analysis and antenna design, RF IC and receiver design, experimental physics, and hardware development and integration.
Group 106—Active Optical Systems
The Active Optical Systems Group’s mission is to be a laser radar center of excellence through the development of advanced laser radar concepts. One of the major thrust areas in technology development involves three-dimensional (3D) laser radar. These systems employ a novel receiver technology using arrays of single-photon-sensitive detectors. The group is currently involved in the development and operation of airborne and ground-based 3D laser radars along with data collection, data exploitation, and simulation and modeling efforts for various applications. The group also has significant efforts in the area of coherent laser radar. These include the adoption of advanced radar techniques to the optical regime, pushing the bandwidth of coherent systems into the THz regime, and the use of photon-counting detector arrays for coherent receivers. These efforts span the range from laboratory demonstrations to fieldable systems development. The group is also developing technologies to enable remote sensing systems in the near-optical THz regime. This includes both receiver and source development for integrated remote sensing systems.
The following position descriptions are representative of positions that may at any given time be available at MIT Lincoln Laboratory. These generic descriptions do not reflect the details and nuances of specific openings, but do provide an overall picture of the skills and responsibilities involved in technical employment at the Laboratory. The level of the position for which a person is hired is determined based upon the individual’s combination of skills, experience, and education. Any of these descriptions may be tailored as necessary.

Employment at MIT Lincoln Laboratory is contingent upon being able to receive and maintain the appropriate level of security clearance for the position and project. *All positions at MIT Lincoln Laboratory require U.S. Citizenship.*
Career Opportunities

Analysis

Air and Missile Defense Technology

Groups 31, 32, & 36

MISSILE DEFENSE SYSTEMS ANALYST
Will work on the development and evaluation of large-scale ballistic missile and air defense systems. Should have a basic understanding of the physics associated with ballistic missile defense and the ability and flexibility to analyze a broad variety of problems. The analyses will include trade-off studies, system performance characterization and evaluation, and the development of algorithms to support understanding of the effectiveness of target identification and data fusion. 

Qualifications: BS, MS, or PhD in Electrical Engineering, Physics, Computer Science, or Applied Mathematics. A background in electrical engineering, physics, mathematics, or related experience is desired, as well as a working knowledge of modern, computer-based analysis tools. Familiarity with programming languages (MATLAB, C++, Fortran, and Java) is an asset. The ability to work well in a team environment and to communicate effectively, both orally and in writing, is important. Responsibilities may include interaction with government sponsors and technical staff from other organizations. (31/32/36-01-07)

Groups 32, 34, 36, & 38

SENSOR DATA ANALYST – ADVANCED PROCESSING TECHNIQUES
Will work on the reduction and interpretation of data from a variety of state-of-the-art radar and IR optical sensors used by the defense community. Should have a basic understanding of physics and data processing techniques as well as a working knowledge of high-level data analysis software. 

Qualifications: BS, MS, or PhD in Electrical Engineering, Physics, Computer Science, or Applied Mathematics. An understanding of data fusion techniques is a plus. A background in electrical engineering, computer science, physics, mathematics, or related experience is expected. A successful applicant will possess adaptability, creativity, and flexibility in his/her approach to problem solving, as well as the ability to apply these skills in a team environment demanding good oral and written communication skills. Prior experience with target phenomenology and sensor operations is desirable. (32/34/36/38-01-07)

Homeland Protection and Tactical Systems

Group 43

RADAR SCIENTIST / SIGNAL PROCESSING ENGINEER
Will work on problems related to the development of next-generation weather radar technology, including active aperture techniques and adaptive data processing. Position requires ability to apply analytic and heuristic techniques to remote sensing problems and to implement candidate solutions using simulated and recorded weather radar data.
Qualifications: PhD in Physics or Engineering and familiarity with digital signal processing and remote sensing technologies. (43-01-07)

Group 45
SYSTEMS ANALYST
Will assess novel technology options as solutions to critical national defense shortfalls and creatively formulate alternative options. Assessments will be conducted applying existing or newly developed modeling tools. Where appropriate, rapid measurements or tests will also be planned and conducted to understand critical phenomenology and model parameters. Work also involves close interaction with other groups with expertise in relevant technical areas.
Qualifications: PhD in Physics, Mathematics, Engineering, or other technical field with the ability to work in a diverse set of technical areas and to understand problems at a system level. Excellent communication skills and the ability to convey technical concepts in a clear, concise manner to a wide spectrum of audiences are also required. (45-01-07)

Group 46
SYSTEMS ANALYST
Will analyze the requirements for, and the performance of, sensor systems for military and homeland defense problems. Examples of analysis problems include rapid detection of biological attacks; developing and using systems of sensors to track, identify, and target military vehicles and personnel; air defense; and detection of hidden weaponry and machinery. The principal skill required is the ability to develop and analyze models of complex, and sometimes ill-defined, problems, environments, and systems, while retaining a clear focus on the larger context of the problem. Activities include system analysis, modeling, simulation, and data analysis.
Qualifications: MS or PhD in a technical field. (46-01-07)

Group 46
SYSTEMS ANALYSIS SUPPORT
Will work with senior staff members to analyze the requirements for, and the performance of, sensor systems for military and homeland defense problems. Examples of analysis problems include rapid detection of biological attacks; developing and using systems of sensors to track and identify military vehicles and personnel; air defense; and detection of hidden weaponry and machinery. Activities include computer programming, systems analysis, modeling, simulation, and data analysis.
Qualifications: BS in a technical field. (46-02-07)

Group 47
SYSTEMS ANALYST
As part of an interdisciplinary team, will develop and analyze strategies for the defense against biological and chemical terrorism aimed at military and civilian targets.
Qualifications: MS or PhD in Engineering, Physics, Mathematics, or Biomedical Engineering. Experience in the design and analysis of complex systems, benefit assessment, risk analysis, and management of small research teams is desired. Must be able to use a variety of tools in the analysis, including analytical and statistical methods, modeling and simulation, algorithm
development, and measurements and data analysis. Knowledge of biological and chemical defense terminology or processes is desired. A logical and structured approach to problem-solving and the ability to analyze problems through a variety of methods are required. Must have strong communication and presentation skills. (47-01-07)

Group 49
SYSTEMS ANALYST
Will work with a multidisciplinary team to address a broad range of technical areas of importance to senior Air Force and Department of Defense decision makers. Technical areas include U.S. air vehicle survivability against modern integrated air defense systems, electronic and infrared countermeasure development, directed-energy system capability, precision-guided munition performance, homeland defense, and counterterrorism. Work involves data analysis, mathematical modeling, and software simulation of radar, infrared, laser, and sensor integration systems as well as unconventional defenses.

Qualifications: PhD in Physics, Mathematics, Engineering, or other technical field with the ability to apply talents to new fields at both the technically detailed and big-picture levels. Excellent communication skills and the ability to convey technical concepts in a clear, concise manner to a wide spectrum of audiences are required. (49-01-07)

Group 62
INFORMATION ASSURANCE FOR COMPUTER NETWORKS
Will contribute to an active computer security research and development program that aims to develop secure protocols, automated malicious code detection and analysis tools, and reliable and repeatable network traffic analysis tools. Tasks include algorithm design, software development and testing, and prototype deployments on important government networks for the most successful research.

Qualifications: BS (with relevant experience), MS, or PhD in Computer Science, Applied Mathematics, or relevant engineering discipline. For network protocol and analysis tasks, the applicant should have experience and interest in TCP/IP and Microsoft networking protocols; knowledge of common tools for understanding network traffic and network security, such as ethereal, tcpdump, nmap, etc., is a must. For software analysis tasks, understanding of secure computing and compiler design and development is a must, and an understanding of network protocols is desired. Experience with programming with Perl, C, C++, or Java is required. (62-01-07)

Group 91
OPTICAL IMAGE ANALYST
Will help develop and test a processing pipeline for optical space surveillance data from ground-and space-based sensors.
Qualifications: MS or PhD in Electrical Engineering, Physics, Optics, or Astronomy. Understanding of reflected energy, CCD sensors, and digital signal processing is required. Familiarity with MATLAB, C++, and Java is desired. (91-01-07)

Group 91
SYSTEMS ANALYST
Will help design, develop, and test future ground- and space-based systems for satellite tracking.
Qualifications: MS or PhD in Electrical Engineering, Physics, Optics, or Astronomy. Knowledge of sensors, data processing, and complex system testing is required. (91-02-07)

Group 92
SYSTEMS ANALYST
Will contribute to the development of advanced sensor concepts and systems. Duties will include algorithm development and implementation; experiment planning; and data collection, reduction, and analysis.
Qualifications: BS or BA in Physics, Electrical Engineering, or a related field. Minimum of two years of experience in solving engineering and scientific problems is required. Experience with experiment planning, data collection, and analysis is desired. Strong background in software or hardware development is also desired. Excellent communication skills and the ability to work effectively in a team environment are required. Knowledge of signal processing and principles of radar operation is highly desired, as are strong software development skills in C/C++ or MATLAB. (92-01-07)

Group 93
SPACE DATA ANALYST
Will analyze and interpret signature and image data from a variety of space surveillance sensors (narrowband radars, wideband radars, optical telescopes, etc.) and supporting information sources. End-products of analysis will feed operational system improvements and lead to the development of new data-fusion and exploitation capabilities.
Qualifications: BS, MS, or PhD in Electrical Engineering or Physics. Understanding of electromagnetics, radar and/or optical signature modeling, and signal and image processing is required. Knowledge of modern software programming languages (MATLAB, SQL, and UNIX) is strongly recommended. Familiarity with computer-aided geometry modeling, satellite systems, and orbital dynamics is desired. Must be able to work in a team environment and be willing to support occasional off-hour missions. (93-01-07)

Group 99
ELECTRO-OPTICAL SYSTEMS DEVELOPER
Will work on the definition, design, and implementation of advanced electro-optical sensor systems for imaging and optical communications applications.
Qualifications: BS, MS, or PhD in Electrical Engineering or Physics, or MS with equivalent experience. Should have the ability to work on a broad range of problems and feel comfortable working with a team to build challenging systems with demand performance and schedule goals. Experience is desired in developing high-performance hardware systems, creating advanced image and video processing algorithms, and architecting complex electro-optical systems. (99-01-07)
Group 903

SPACE SYSTEMS ANALYST
Will work in a team environment to study a broad range of technical questions of importance to the United States’ use of space. Technical areas include United States space situational awareness; space-based intelligence, surveillance, and reconnaissance; and space vehicle survivability. Work involves data analysis, mathematical modeling and software simulation of space systems, including space vehicles and their subsystems, as well as radars, optical sensors, and integrated networks for surveillance of the space environment.

Qualifications: PhD in Physics, Mathematics, Engineering, or other technical field. Master’s degree with extensive experience in the technical areas described in the position description will also be considered. Must have the ability to quickly learn new fields and creatively understand complex problems at both the technically detailed and system levels. Excellent communication skills and the ability to clearly present concepts to a wide spectrum of audiences are required. (903-01-07)

Biology

Homeland Protection and Tactical Systems

Group 47

BIOLOGIST
Will develop innovative methods for sensing biological materials in environmental or clinical samples. Will be required to develop, analyze, and test technology for the detection of biological terrorism.

Qualifications: BS, MS, or PhD in Biology or equivalent. Must have microbiological training. Experience with conventional laboratory techniques such as PCR, immunoassays, genetic sequencing, gels, microscopy, culturing techniques, mass spectrometry, and basic sample-handling procedures is preferred. Understanding of bacterial and viral structure and function, and a systems-level view of biological processes are required. Strong communication and presentation skills and comfort working within an interdisciplinary team are helpful. (47-02-07)

Solid State

Group 84

BIOLOGIST
Will work within an interdisciplinary team for the development of advanced biosensor devices for the rapid detection and identification of pathogens. This position will require the engineering of living cells, molecules, and surfaces for innovative functions. Will perform molecular biological protocols, including plasmid preparation, competent cell production, and maintenance of mammalian cell lines. May also participate in creating novel mergers of biological and electronic
components for new systems, with applications ranging from high-energy-density renewable “living batteries” to broad-spectrum antiviral treatments.

**Qualifications:** BS or MS in Biology or Biochemistry and knowledge of standard biological techniques such as plasmid preparation, subcloning, bacterial transformation, and blotting. Should also be familiar with gel electrophoresis and tissue culture. Knowledge of flow cytometry, protein chemistry, and virology is a plus. (84-01-07)

**Group 84 BIOLOGIST**
Will work within an interdisciplinary team focused on providing novel biotechnology solutions for important national needs and providing a biotechnology support base to the biodefense mission area. The technical goal is to conceive and develop new microdevices, sensors, living cells, molecules, and chemical and therapeutic processes. Will work as part of a team that is developing very rapid pathogen-detection methods, broad-spectrum antiviral treatments, and other revolutionary biotechnology projects. Will work with a number of staff with expertise in molecular biology, biochemistry, immunology, chemical engineering, bioengineering, microfluidics, micromachining, and electrical engineering.

**Qualifications:** BS or MS in Biology or equivalent field. Must have extensive experience propagating, freezing, and assaying mammalian cell lines. Expertise in standard molecular biology techniques, including PCR, subcloning, plasmid maxi/mini preparation, enzymatic manipulation of DNA, bacterial transformation, and southern/northern/western blotting, is also required. Experience with luminescent assays, protein purification, or viral plaque assays is a plus. (84-02-07)

**Group 84 BIOLOGIST**
Will work within an interdisciplinary team focused on providing novel biotechnology solutions for important national needs and providing a biotechnology support base to the biodefense mission area. The technical goal is to conceive and develop new microdevices, sensors, living cells, molecules, and chemical and therapeutic processes. Will work with a number of staff with expertise in molecular biology, biochemistry, immunology, chemical engineering, bioengineering, microfluidics, micromachining, and electrical engineering.

**Qualifications:** PhD in Cell Biology, Immunology, Biochemistry, or equivalent field. Must have extensive experience with mammalian tissue culture and a strong background in cell physiology. Familiarity with signal transduction or *in vitro* diagnostic assay development is a plus. (84-03-07)

**Group 84 BIOLOGIST – BIOMED DEVICES**
Will work within an interdisciplinary team focused on providing novel biotechnology solutions for important national needs and providing a biotechnology support base to the biodefense mission area. The technical goal is to conceive and develop new microdevices, sensors, living cells, molecules, and chemical and therapeutic processes. Will participate in the research and development of biosensor and sample-processing hardware. Will work with a number of staff with expertise in molecular biology, biochemistry, immunology, chemical engineering, bioengineering, microfluidics, micromachining, and electrical engineering.
Career Opportunities

**Qualifications:** BS or MS in Mechanical or Chemical Engineering, Physics, or equivalent field. Must have prior experience in biotechnology or biomedical-device development. Familiarity with molecular biology techniques, *in vitro* diagnostic assays, and optical sensing methods is a plus. 
(84-04-07)

**Group 84**

**MOLECULAR BIOLOGIST**

Will work within an interdisciplinary team for the development of advanced biosensor devices for the rapid detection and identification of pathogens. This position will require the engineering of living cells, molecules, and surfaces for innovative functions. Will perform molecular biological protocols, including plasmid preparation, competent cell production, and maintenance of mammalian cell lines. May also participate in creating novel mergers of biological and electronic components for new systems, with applications ranging from high-energy-density renewable “living batteries” to broad-spectrum antiviral treatments.

**Qualifications:** PhD in Molecular Biology or Biochemistry. In-depth knowledge of standard biological techniques, such as plasmid preparation, subcloning, bacterial transformation, and blotting. Should be practiced at electrophoresis and chromatography assays. Must have experience with tissue culture and be able to transfect cell lines using various protocols. Experience with flow-cytometry analysis on transfected cells is also desired. Familiarity with synthesis and analysis procedures in protein chemistry is a plus, as is experience in virology. 
(84-05-07)

Communication Systems

**Communications and Information Technology Division 6**

**Group 61**

**SYSTEM INTEGRATION AND TEST ENGINEER**

This position involves the integration, debug, and test of complex digital satellite communication and data link systems. Responsibilities include the integration, debug, and test of hardware and DSP circuits, boards, and systems. At various times, work may include digital design using digital signal processors and field programmable gate arrays, laboratory measurements, and automated testing using software programs or scripts. This work is highly team-oriented.

**Qualifications:** MS in Electrical Engineering with relevant project or internship experience or BS in Electrical Engineering with at least two years of professional experience. Good organizational skills and the ability to thoroughly document work are important. Skills in RF measurement, RF testing, digital design, digital testing, and system test and integration are also needed. Basic knowledge of digital communication systems and signal processing is also necessary. 
(61-01-07)
Group 61
COMMUNICATIONS SYSTEMS ENGINEER
This position involves the implementation of an advanced, protected military satellite communication capability and line-of-sight data links in mobile platforms, including jet aircraft. Assignments will involve communication system engineering, analysis, simulation, performance estimation, functional decomposition, and requirements development for hardware and firmware engineers.

**Qualifications:** PhD or MS in Electrical Engineering. Knowledge of communication systems engineering, modulation and coding methods, channel capacity calculations, and data networking theory is required. Experience in some of the following areas is also desired: anti-jam modulation and coding methods, satellite-based signal processing, earth terminal/satellite interactions, and data networking in a satellite communications environment. Previous hands-on experience (e.g., project or internship) with digital communication system analysis and/or implementation is highly desired, but not required. *(61-02-07)*

Group 63
COMMUNICATIONS SYSTEMS ENGINEER
This position provides the opportunity to define new modes of communication connectivity for hybrid Satcom/terrestrial networks. The core work involves defining media access techniques and network protocols to enable internetworking between mobile wireless terrestrial systems and a wide variety of satellite communication systems.

**Qualifications:** MS or PhD in Electrical Engineering. Must be able to fully develop new concepts through analysis, simulation, and prototype development. Knowledge of link, network, and transport layers is required. Hands-on experience with IP networks, quality of service issues, network simulation software, Optnet, etc., is desired. Experience with military communications is a plus, as is knowledge of physical layer considerations. *(63-01-07)*

Group 64
COMMUNICATIONS SYSTEMS ENGINEER – WIRELESS SYSTEMS
Will develop advanced system concepts and implementation approaches for communication systems consisting of satellites, terrestrial networks, and several types of communications terminals operating at a variety of data rates. Tasks will involve communications systems analysis, synthesis, and simulation pertinent to the development of advanced waveforms (including higher-order signaling constellations and iterative demodulation/decoding); the construction of flexible, adaptive wideband frequency plans; robust acquisition and tracking techniques; dynamic resource-allocation protocols; and advanced networking strategies.

**Qualifications:** MS or PhD in Electrical Engineering with coursework and experience in communications theory, signal processing, and detection and estimation techniques. Experience with anti-jam modulation and coding systems, signal processing, satellite/terminal interactions, and data networking in a satellite and/or terrestrial communications environment is desired. *(64-01-07)*

Group 65
SERVICE-ORIENTED ARCHITECTURE SOFTWARE DEVELOPER
This position requires a background in, and preferably some experience in, large network or distributed systems implementation.
Career Opportunities

Qualifications: MS in Electrical Engineering or Computer Science or equivalent. Range of desired skills includes Service Oriented Architectures systems, network protocols (beyond TCP/IP), and network simulations (e.g. OPNET). C/C++, TCP/IP, and programming experience with large systems is desired. Good written and verbal communication skills are required. (65-01-07)

Group 65
NETWORK ENGINEER
This position requires experience in network management, policy-based network management, network management architectures, network management protocols, current network management research and existing systems.
Qualifications: PhD or MS in Electrical Engineering or Computer Science or equivalent is desired. Excellent written and verbal communication skills are required. (65-02-07)

Group 65
COLLABORATION SYSTEMS ENGINEER
This position requires a background in computer- and network-based collaborative systems.
Qualifications: PhD or MS in Electrical Engineering or Computer Science or equivalent. Relevant experience includes open standards-based systems as well as commercial offerings. Should also be well-versed in computer network issues. Excellent written and verbal communication skills are required. (65-03-07)

Group 66
OPTICAL COMMUNICATIONS SYSTEMS ENGINEER
Will be responsible for the design, development (leading a team of engineers), and test of lasercom terminals and systems. Will also work with device technologists to identify enabling components and define their functions in the various systems.
Qualifications: MS or PhD in Electrical Engineering. An understanding of communications channels, channel mitigation techniques, waveforms, etc., is required. Five years of related experience is desired. (66-01-07)

Group 66
MODULATION AND CODING SPECIALIST
Will explore the performance of coding on novel channels. Work includes the analysis of existing codes and the development of new codes. Will work with hardware developers to strike a balance between performance and complexity.
Qualifications: PhD in Electrical Engineering. An understanding of coding theory from both an analysis and synthesis perspective is required. (66-02-07)

Group 66
CONTROLS SPECIALIST
Will work with lasercom systems engineers to analyze, design, build, and test lasercom tracking systems. Work will also address active stabilization of optical and mechanical components.
Qualifications: MS or PhD in Electrical Engineering. A general understanding of optical detectors and actuators, including nutators, FSMs, gimbal drives, quad cells, cameras, etc., is needed. Five years of related experience is desired. (66-03-07)

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**Group 67**

**COMMUNICATIONS SYSTEMS ENGINEER**

Will develop system architectures and implementation approaches for next-generation, free-space lasercom and terrestrial, fiber-based, optical communication systems.

**Qualifications:** MS or PhD in Electrical Engineering or Mathematics. A solid foundation in communication theory, signal processing, and detection theory is required. Experience in developing software simulation tools to study advanced modulation formats, channel capacity and coding, and channel impairment mitigation is also required. The ability to communicate effectively with hardware engineers is desired. *(67-01-07)*

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**Aerospace**

**Division 9**

**Group 97**

**COMMUNICATIONS SYSTEMS ENGINEER**

Will work on communication system analysis for satellite RF systems.

**Qualifications:** MS or PhD in Electrical Engineering or Physics. Ability to analyze and test RF transmit and receive systems is required, as is ability to develop communication system architectures to meet modulation and coding, error rate, and link margin requirements. Hands-on experience with RF systems is highly desired. *(97-01-07)*

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**ISR Systems and Technology**

**Division 10**

**Group 103**

**COMMUNICATIONS SYSTEMS ANALYST**

Will work in the development of advanced multi-input, multi-output (MIMO) network communication systems to maintain high-data-rate communications in the presence of impediments such as interference, jamming, and difficult propagation channels. Will analyze the effectiveness of multiple communications links including space-borne, airborne, and surface assets. Responsibilities may include end-to-end link budget calculation, development and characterization of advanced modulation schemes, system performance modeling and evaluation, field testing, and data analysis. Will participate in formulating innovative communications systems concepts to meet future operational needs, including concepts for distributing data between diverse platforms such as manned aircraft, unmanned aerial vehicles, satellites, and fixed and mobile ground sites.

**Qualifications:** MS or PhD in Electrical Engineering. Expertise in advanced modulation and encoding theory, propagation theory, spread spectrum, and MIMO and LPI communications is needed. Experience with numerical analysis, functional analysis, optimization, and data analysis is desired. Strong communication skills, both oral and written, and an ability to interact with government sponsors to transfer and implement technologies into operational systems are strongly desired. Must be willing to work in a team environment. *(103-01-07)*
**Communications and Information Technology**

**Group 62**

**INFORMATION ASSURANCE FOR COMMERCIAL OPERATING SYSTEMS**

Will contribute to an active research and development program aimed to enhance security on commercial operating systems. Will develop kernel modifications, software wrappers, and improved attack detection algorithms.

**Qualifications:** BS, MS, or PhD in Computer Science, Applied Mathematics, or relevant engineering discipline. Should have experience and interest in operating system kernel development, audit systems, or network security. Knowledge of loadable kernel modules and host security is required, as is programming experience with C, C++, or Java. *(62-02-07)*

**ISR Systems and Technology**

**Group 102**

**COMPUTER SCIENTIST OR EMBEDDED SYSTEMS ANALYST**

Will develop advanced embedded digital systems with the capability to process sensor signals in real time. Responsibilities may include advanced computing architectures and middleware technologies; software architectures for rapid signal processing algorithm insertion on massively parallel processors, programmable logic devices, and advanced integrated circuits; real-time signal processors for sensor system applications; and service-oriented architectures for multisensor tasking, processing, and dissemination.

**Qualifications:** MS or PhD in Computer Science, Computer Engineering, or Electrical Engineering. Expertise required for this position must include one or more of the following disciplines: digital communications systems, signal and image processing, scientific grid computing, networking and web services, artificial intelligence, cognitive computing, knowledge engineering, and pattern recognition. Strong communication skills, both oral and written, are required. Must be willing to work in a team environment. *(102-01-07)*
Electrical Engineering

Air and Missile Defense Technology

Division 3

Group 39
RADAR / COMMUNICATIONS SYSTEMS ENGINEER
Will work in the architecture, design, and development of advanced sensors. Examples of advanced sensors are phased-array digitally steered antennas, and multichannel beamforming and conformal wideband multifunction sensors. Responsibilities may include phased-array design for radar, signals, or communications applications; antenna, analog RF, and digital hardware development; electromagnetic modeling; and system integration and testing. Will participate in formulating innovative radar systems concepts to meet future operational needs, including concepts for netting and integration of data from sensors on diverse platforms such as manned aircraft, unmanned aerial vehicles, and satellites, as well as ground sensors.
Qualifications: MS or PhD in Electrical Engineering, Physics, or a related physical science. Expertise required will include transmitters, antenna design, system integration, array antennas, and electromagnetic modeling. Working knowledge of electromagnetic modeling, electromagnetic propagation and broad understanding of basic signal analysis techniques are required. Strong communication skills, both oral and written, and an ability to interact with government sponsors to transfer and implement technologies into operational systems are strongly desired. Must be willing to work in a team environment. (39-01-07)

Group 39
SIGNAL PROCESSING ANALYST
Will develop and validate signal processing algorithms to provide dramatic improvements in the ability to extract desired signals from complex sensor data. Responsibilities may include signal processing and data exploitation algorithm design, assessments of signal processing implementation alternatives, field testing and data collection, and data analysis and performance evaluation.
Qualifications: MS and PhD in Electrical Engineering, Physics, Mathematics, or a related physical science. Expertise required for this position will include one or several of the following disciplines: digital signal processing, adaptive signal processing, adaptive array processing, detection and estimation, image processing, underwater acoustics, sonar, radar, and communications. Experience with numerical analysis and data analysis is desired. Working knowledge of advanced signal processing techniques is required. Strong communication skills, both oral and written, are required. Must be willing to work in a team environment. (39-02-07)
Group 45

**SIGNAL PROCESSING ANALYST**
Will develop and test novel signal processing algorithms for extracting desired signals from complex sensor data. Responsibilities may include signal processing and data exploitation algorithm design, assessments of signal processing implementation alternatives, field testing and data collection, and data analysis and performance evaluation.

**Qualifications:** MS and PhD in Electrical Engineering, Physics, Mathematics, or a related physical science. Expertise required for this position will include one or several of the following disciplines: digital signal processing, adaptive signal processing, adaptive array processing, detection and estimation, image processing, underwater acoustics, sonar, radar, and communications. Experience with numerical analysis and data analysis is desired. Working knowledge of advanced signal processing techniques is required. Strong communication skills, both oral and written, are required. Must be willing to work in a team environment. (45-02-07)

Group 47

**INSTRUMENTATION ENGINEER**
Will design, develop, and fabricate new air, fluid, and solid-sample biochemical analysis instrumentation. These instruments require integration of electronics, optics, fluid handling, embedded software, and mechanisms. Skills in electronics development, including signal conditioning, digital processing, and data communications, are desired. Previous development of similar electro-optic-mechanical or biomedical instruments is also desired, as is the ability to design and conduct performance tests in controlled conditions. Travel to field sites and participation in mission-level testing is also involved.

**Qualifications:** BS in Electrical, Optical, Mechanical, or Biomedical Engineering. Should be versatile and have good hands-on laboratory and fabrication skills. Experience with circuit design, schematic capture, board fabrication, mechanical layout, optical components, pumps, and fluid-handling components is desired. Should be able to work independently and be a creative problem solver. (47-03-07)

Group 61

**RF ENGINEER**
Will provide technical assistance in the development and evaluation of EHF satellite communication test systems. Work will include designing, developing, and testing all elements of RF/IF systems from the antenna to the input of a digital data processor. Responsibilities include design interfacing and test of new designs. This work will also include the design of test procedures to perform typical RF measurements.
**Qualifications:** MS in Electrical Engineering with some relevant experience or BS in Electrical Engineering with at least two years of professional experience. Skills in RF design, RF measurement, and RF testing are needed. Experience using PCs and test equipment for calibrating and diagnosing RF subsystems is needed, as is familiarity with all elements of noise and dynamic range analysis in a communications system. Some experience with digital hardware and design practices, to include field programmable gate arrays, A/D and D/A converters, DDS, and PLL techniques, is highly desired. Programming skills are also desired. *(61-03-07)*

**Group 61**

**ANTENNA AND RF ENGINEER**
Will participate in the design and development of prototype EHF satellite communication systems. Responsibilities will include specifying, designing, developing, and testing high-performance antenna and front-end RF subsystems. The work will also include prediction of overall system link performance, based on the performance constituent antenna and RF subsystems.

**Qualifications:** PhD in Electrical Engineering or equivalent or MS in Electrical Engineering with at least five years of experience with antenna and RF systems engineering. Strong skills in analyzing and designing complex antenna and electromagnetic structures, including both theoretical analysis as well as computer-based modeling, are needed. Should have significant graduate research and/or course work in antenna and RF systems, and experience in some or all of the following areas: antenna design, electromagnetic analysis, RF and antenna measurement, and RF design. *(61-04-07)*

**Group 64**

**SOFTWARE ENGINEER – DIGITAL SIGNAL PROCESSING**
Will design and implement real-time digital signal processing (DSP) software for modulation, coding, and signal acquisition and tracking for next-generation satellite communications payloads and terminals as well as advanced terrestrial systems.

**Qualifications:** BS or MS in Electrical Engineering or Computer Science. Knowledge of C and assembly code for DSP processors is required. Experience with Analog Devices’ SHARC DSP chip and its Visual DSP development tool is desired. *(64-02-07)*

**Group 64**

**DIGITAL SYSTEMS ENGINEER**
Will develop digital signal processing hardware/firmware, including high-performance systems for use in next-generation communications satellite payloads and associated ground terminals, as well as advanced terrestrial systems.

**Qualifications:** MS or PhD in Electrical Engineering. Coursework and experience in the design, simulation, and implementation of complex signal processor circuit boards using workstation-based computer-aided design tools and incorporating DSP chips, high-speed field programmable gate arrays, and/or programmable logic devices. Knowledge of VHDL or other hardware description languages, designs incorporating application-specific integrated circuits, and/or space-qualified circuitry is desired. *(64-03-07)*
Career Opportunities

Group 64
SOFTWARE ENGINEER – SATCOM CONTROL PROTOCOLS
Design and implementation of real-time software enabling dynamic interactions among advanced terrestrial and satellite communications terminals and payloads for system access, as well as service initiation and reconfiguration.
Qualifications: BS or MS in Electrical Engineering or Computer Science. Knowledge of C, C++, UNIX, X, and Motif is required. Experience with Solaris, vxWorks, VME systems, scripting languages, GUI development, and cross-platform development is desired. (64-04-07)

Group 66
VHDL DESIGN ENGINEER
Will work as a member of a digital design team to implement high-rate communications processing functions (coding, interleaving, etc.).
Qualifications: BS or MS in Electrical Engineering and five years of related experience. Must have solid, highly developed laboratory debugging skills. Familiarity with communications systems is a plus. (66-04-07)

Group 67
DIGITAL SYSTEMS ENGINEER
Will lead a team of electrical engineers in the development of high-rate digital communication hardware for free-space, satellite-based lasercom and terrestrial, fiber-based, optical communication systems.
Qualifications: MS or PhD in Electrical Engineering. Experience in developing digital communication hardware is required. The ability to interface with communication systems engineers to abstract theoretical communication concepts into practical hardware implementations is also required. Effective interpersonal communication skills are desired. (67-02-07)

Group 67
ELECTRONIC HARDWARE ENGINEER
Will develop analog RF interfaces between wideband sensors and optical communication transceivers and/or complex digital signal processing hardware for ultrasensitive laser communication systems.
Qualifications: BS, MS, or PhD in Electrical Engineering. Should have experience in design, simulation, and implementation of complex analog/digital circuit boards using computer-aided design tools to incorporate high-speed analog-to-digital converters, digital signal processing chips, and field-programmable gate arrays. Knowledge of VHDL is desired. (67-03-07)

Solid State Division 8

Group 83
ADVANCED INTEGRATED CIRCUIT PROCESS ENGINEER
Will work closely with other staff members in the group and division to identify present and future optoelectronic packaging requirements and to assist with the actual execution of
packaging work for current programs. Responsibilities will include hands-on packaging and fabrication-related work, measurement and evaluation of packaged devices and theoretical design and modeling of existing and next generation packages.

**Qualifications:** BS in Mechanical Engineering, Electrical Engineering, or related field with at least 3 years of direct hands-on experience with advanced optoelectronic packaging. MS is desired. Position requires a candidate with a broad background and in-depth understanding of advanced optoelectronic packaging technology, as specifically applied to high-power diode lasers and photodetectors. Relevant industrial experience is preferred, but academic experience will also be considered. A broad background in advanced optoelectronic packaging techniques is required. Should have a solid understanding of thermal-mechanical-optical issues and trade-offs in advanced packaging. Must be able to use modeling and simulation software to predict and validate packaged device performance. Must be capable of learning supporting device fabrication skills. (83-01-07)

**Group 86**

**RF CIRCUIT ARCHITECT**
Will work in an interdisciplinary team developing advanced RF front-ends for prototype system demonstrations. The work involves understanding the proper balance of analog signal processing, A/D conversion, and digital signal processing, as well as performing the detailed RF design. Will work with component specialists developing high-performance RF components and with state-of-the-art commercial off-the-shelf components. Will be responsible for overseeing the manufacture, debugging, and subsystems characterization.

**Qualifications:** MS or PhD in Electrical Engineering or Physics. Must have in-depth knowledge of RF front-end design. Experience with microwave computer-aided design software is required. Strong experimental, analytical, and communication skills are essential. Familiarity with one or more of the following subspecialties is desired: RF integrated circuits, film bulk acoustic resonators, RF microelectromechanical structures, analog-to-digital converters, and high-density digital/high-performance RF packaging. (86-01-07)

**Groups 86 & 88**

**INTEGRATED CIRCUIT ARCHITECT**
Will work in an interdisciplinary team developing state-of-the-art custom silicon mixed analog-digital and digital integrated circuits. Example applications include imaging, analog-to-digital conversion, RF communication, electronic intelligence, and radar/lidar signal processing. Will lead all aspects of chip design and evaluation, from the conceptual and architectural development through simulation, layout, and verification to packaging, testing, and analysis of results. Will work closely with silicon-chip fabrication specialists.

**Qualifications:** MS or PhD in Electrical Engineering or Physics. In-depth knowledge of digital or analog CMOS electrical circuits is required. Should have experience with computer-aided design software for integrated circuit development in one or more of the following design flows: full-custom analog, full-custom digital, full-custom mixed-signal, standard-cell digital, or microwave. Strong experimental, analytical, and communication skills are essential. Familiarity with one or more of the following subspecialties is desired: charge-coupled devices, active-pixel
sensors, analog/digital converters, RF transceivers, or signal-processing application-specific integrated circuits. Familiarity with silicon-on-insulator CMOS circuit technology and/or microelectromechanical structures is also desired. Working knowledge of bump-bonded or other 3D circuit packaging techniques is a plus. *(86/88-01-07)*

**Groups 86, 87, & 88**

**INTEGRATED CIRCUIT DESIGNER**

Will work within an interdisciplinary team developing state-of-the-art custom silicon mixed analog-digital and digital integrated circuits. Example applications include imaging, analog-to-digital conversion, RF communication, electronic intelligence, and radar/lidar signal processing. Will be responsible for detailed layout, verification, and documentation of integrated circuits involving extensive use of computer-aided design (CAD) tools. Will participate in the electrical design and simulation of advanced circuits and may participate in the generation of test vectors and test waveforms for measurement of fabricated circuits.

**Qualifications:** BS in Electrical Engineering or Physics. Working knowledge of digital integrated circuits at the transistor level is required. Should have a basic grounding in analog circuit design. Must be familiar with analog SPICE simulation, digital behavioral simulation, and CAD layout tools. Experience with complete CAD design flow and one or more of the following design flows is required: full-custom analog, full-custom digital, full-custom mixed-signal, standard-cell digital, or microwave. Working knowledge of analog or mixed-signal integrated circuits at the transistor level is desired. Coursework or experience in RF or microwave circuit design is a plus. *(86/87/88-01-07)*

**Groups 86, 87, & 88**

**INTEGRATED CIRCUIT TEST ENGINEER**

Will work in an interdisciplinary team developing state-of-the-art custom silicon mixed analog-digital and digital integrated circuits. Example applications include imaging, analog-to-digital conversion, RF communication, electronic intelligence, and radar/lidar signal processing. Will be responsible for test system configuration and functional measurements. Will also participate in the incorporation of custom ICs into circuit-board subsystems for real-time applications. May participate in the generation of test vectors and test waveforms for measurement of custom fabricated circuits.

**Qualifications:** BS in Electrical Engineering or Physics. Working knowledge of digital integrated circuits at the transistor level is required. Experience with laboratory electronic instrumentation and circuit-testing practices is essential. Knowledge of data-acquisition instrumentation and software is a must. Working knowledge of analog or mixed-signal integrated circuits at the transistor level is desired. Understanding of signal processing algorithms and software tools is very useful, as is experience with analog-to-digital converters. *(86/87/88-02-07)*

**Groups 87 & 88**

**ADVANCED INTEGRATED CIRCUIT PROCESS ENGINEER**

Will work on a team to develop silicon integrated-circuit processes in state-of-the-art microelectronics facility. This class-10 clean room supports fabrication of deep-submicron digital and mixed-signal signal-on-insulator CMOS, scientific charge-coupled device imagers, avalanche photodiode imagers, single-chip high-performance imaging/CMOS, and three-dimensionally stacked circuits, as well as microelectromechanical structures (MEMS)-based RF switches, mirrors,
and optical waveguides. These processes exploit advanced fabrication techniques, including phase-shift and gray-tone lithography. Projects range from new device concept design and implementation to construction of custom silicon mixed-signal and digital integrated circuits. Will lead all aspects of technology realization: addressing fundamental issues in process and device trade-offs and operation, process design and fabrication, testing, and analysis of results. Will work in a fast-paced interdisciplinary team involving close collaboration with circuit designers.

**Qualifications:** MS or PhD in Electrical Engineering, Material Science, or Physics. Hands-on experience in laboratory techniques for fabricating semiconductor devices. Understanding of device physics and experience with computer simulation for both process development and device modeling are essential. Strong experimental, analytic, and communication skills are required. Knowledge of digital and analog circuits or material science (particularly control and characterization of electronic, mechanical, and thermal properties of silicon) is very useful. Computer programming experience is a plus. Familiarity with silicon-on-insulator CMOS circuit technology, silicon-based focal plane array processes, and/or MEMS is highly desired.

(87/88-01-07)

**Group 88**

**PLASMA ETCH DEVELOPMENT SCIENTIST / ENGINEER**

Will lead plasma etch process development, improvement, and sustaining in the Microelectronics Laboratory. Etch development will support the following key fabrication areas: deeply scaled silicon devices; high-speed, ultra-low-power 180 nm fully depleted silicon-on-insulator CMOS circuits; scientific-grade low-noise, broadband focal planes; compact RF and optical microelectromechanical devices; and sophisticated precision packaging work utilizing MCM-D and 3D circuit integration processes. Will work closely with researchers in these application areas to define and implement specialized etch process modules, satisfying critical dimension, selectivity, and integration requirements.

**Qualifications:** MS or PhD, or relevant work experience, in Electrical Engineering or Material Science. In-depth understanding of plasma processing, metrology, and diagnostics for semiconductor circuit fabrication is required. Broad knowledge of semiconductor manufacturing processes, CMOS process integration, and electrical test parameters is required. Demonstrated experience with both dry and wet processes and design and analysis of experiments is also required. Excellent written and oral communication skills and the ability to work cooperatively in a team environment are essential. Knowledge of digital and analog circuits and computer programming is a plus. (88-01-07)

**Aerospace**

**Group 93**

**DATA FUSION SCIENTIST / ENGINEER**

Will work with a team of analysts and software engineers to develop algorithms and analysis techniques to automatically process and extract information from a variety of space surveillance
Career Opportunities

sensors and phenomenologies. Will analyze and model missions, architectures, and dynamic
human reasoning processes; will also develop automated decision support aids and tools.
Qualifications: PhD in Electrical Engineering, Computer Science, Mathematics, or related
field. Experience with real-world sensors and data analysis is essential. Strong communication,
presentation, and programming skills are required. (93-02-07)

Group 97

ELECTRONICS SYSTEMS ENGINEER
Will support several ongoing programs dealing with operational satellite communications
systems, space-borne and aircraft imaging flight hardware, space qualification of electronic
hardware, and design verification. Will work on cross-divisional efforts to develop state-of-the-
art active and passive RF systems as well as passive X-ray through IR sensing systems.
Qualifications: BS in Physics, Electrical Engineering, Computer Engineering, or a related
field. Strong analytical and problem-solving skills are desired. Will work as part of an existing
team in hardware development and testing. A strong background and experience in electronics
design, fabrication, and testing are desired. (97-02-07)

ISR Systems and Technology

Group 102

ELECTRONICS HARDWARE ENGINEER
Will design and develop innovative, complex signal processing algorithms in large field
programmable gate arrays (FPGAs) and/or digital signal processing (DSP) and embedded
processors in support of rapid systems prototyping of high-performance embedded signal,
image, and communications systems.
Qualifications: MS in Electrical Engineering or BS with several years of experience.
Proficiency in VHDL and/or real-time environments using C and C++ is required. Must have
expertise in architectural design of embedded digital hardware, as well as detailed, hands-on
experience in the implementation of signal and image processing algorithms using FPGA or
DSP technology. Strong communication skills, both oral and written, are required. Must be
willing to work in a team environment. (102-02-07)

Group 105

RADAR / COMMUNICATIONS SYSTEMS ENGINEER
Will work in the architecture, design, and development of advanced sensors. Examples of
advanced sensors are phased-array digitally steered antennas, multichannel beamforming
and conformal wideband multifunction sensors. Responsibilities may include phased-array
design for radar, signals, or communications applications; antenna, analog RF, and digital
hardware development; electromagnetic modeling; and system integration and testing. Will
participate in formulating innovative radar systems concepts to meet future operational needs,
including concepts for netting and integration of data from sensors on diverse platforms, such
as manned aircraft, unmanned aerial vehicles, and satellites, as well as ground sensors.
**Career Opportunities**

**Qualifications:** MS or PhD in Electrical Engineering, Physics, or a related physical science. Expertise required for this position will include transmitters, antenna design, system integration, array antennas, and electromagnetic modeling. Working knowledge of electromagnetic modeling and electromagnetic propagation and a broad understanding of basic signal analysis techniques are required. Strong communication skills, both oral and written, and an ability to interact with government sponsors to transfer and implement technologies into operational systems are strongly desired. Must be willing to work in a team environment. *(105-01-07)*

**Groups 103 & 104**

**SENSOR SYSTEMS ANALYST**
Will be responsible for the innovation of techniques to improve the capabilities of sensor systems. Will have the opportunity to work with a one-of-a-kind instrumented sensor to validate concepts utilizing real data. Will develop concepts for, and analyze effectiveness of, integrated multisensor networks, including space-borne, airborne, and surface assets. Responsibilities may include end-to-end signal processing architectures for radar, sonar, or communications applications, system performance modeling and evaluation, and field testing and data analysis.

**Qualifications:** MS or PhD in Electrical Engineering, Physics, Mathematics, or a related physical science. Expertise required for this position will include systems, control, detection and estimation, performance modeling, Kalman filtering, statistical signal processing, radar, sonar, or communications. Experience with numerical analysis, functional analysis, optimization, and data analysis is desired. Working knowledge of state and parameter estimation and signal processing techniques is required. Strong communication skills, both oral and written, and an ability to interact with government sponsors to transfer and implement technologies into operational systems are strongly desired. Must be willing to work in a team environment. *(103/104-01-07)*

**Groups 102, 103, 104, 105, & 106**

**SIGNAL PROCESSING ANALYST**
Will develop and validate signal processing algorithms to provide dramatic improvements in the ability to extract desired signals from complex sensor data. Responsibilities may include signal processing and data exploitation algorithm design, assessments of signal processing implementation alternatives, field testing and data collection, and data analysis and performance evaluation.

**Qualifications:** MS or PhD in Electrical Engineering, Physics, Mathematics, or a related physical science. Expertise required for this position will include one or several of the following disciplines: digital signal processing, adaptive signal processing, adaptive array processing, detection and estimation, image processing, underwater acoustics, sonar, radar, and communications. Experience with numerical analysis and data analysis is desired. Working knowledge of advanced signal processing techniques is required. Strong communication skills, both oral and written, are required. Must be willing to work in a team environment. *(102/103/104/105/106-01-07)*

**Group 106**

**ELECTRONICS HARDWARE ENGINEER**
Will implement complex signal processing algorithms in large field programmable gate arrays and/or digital signal processing and embedded processors in support of active optical system integration.
**Career Opportunities**

**Qualifications:** MS in Electrical Engineering or BS with several years of experience. Proficiency in VHDL and/or real-time environments using C and C++ and assembly language is required. A working knowledge of Ethernet and TCP/IP is a plus. *(106-01-07)*

**Electro-Optical Systems**

**Engineering Division 7**

**Groups 71 & 75**

**MECHANICAL-AERO-ASTRO ENGINEER**

Will work on the development of optical, mechanical, and biodefense systems. Work will include analysis, design, and testing applied to the development of complex hardware from conceptual design through fabrication and performance evaluation. Must have an interest in working on a broad range of challenging problems involving structures, mechanisms, thermal systems, fluid dynamics, and optics. Work involves close-knit teams with design, analysis, and test personnel. May require special security clearances and travel to meetings and field sites.

**Qualifications:** MS or PhD in Mechanical or Aero-Astro Engineering. Must have demonstrated ability to produce professional oral presentations and written reports. Experience in hardware development is desired. *(71/75-01-07)*

**Aerospace Division 9**

**Group 91**

**SYSTEMS ENGINEER**

Will lead efforts to design, develop, and test future ground- and space-based systems for satellite tracking.

**Qualifications:** MS or PhD in Electrical Engineering, Physics, Optics, System Engineering, or Astronomy. Knowledge of sensors, data processing, and complex system testing is required. *(91-03-07)*

**Group 97**

**SYSTEMS ENGINEER**

Will lead the development, analysis, implementation, and testing of data processing algorithms for biological, chemical, and electro-optical sensors. Will work with a small team of analysts and software developers to implement robust data processing algorithms.

**Qualifications:** Experience in electro-optical system analysis, statistical decision theory, and algorithm development is required. Must be cognizant of the trade-offs between system performance and operational constraints. A working knowledge of high-level programming languages, such as C++ and MATLAB, and experience with UNIX-based processing systems is desired. *(97-03-07)*
Group 97
SYSTEMS ENGINEER
Will lead efforts to define and develop the next generation of civilian operational space weather remote and in situ sensing instrumentation. Will also contribute to the development of experimental and research instrumentation.
**Qualifications:** MS or PhD in Astrophysics, Astronomy, Physics, Electrical Engineering, or related areas. Experience in remote-sensing instrumentation is required. Experience with space-borne X-ray/EUV and charged-particle sensors is desired. Should have a strong physical understanding of detectors and detection processes, optics, electronics, and issues associated with operation in a space environment. Should have excellent interpersonal and written/oral communication skills. Ability to work in a team composed of both technical and nontechnical members is critical. *(97-04-07)*

Group 97
OPTICAL SYSTEMS ENGINEER
Will support several ongoing programs dealing with operational satellite communications systems, space-borne and aircraft imaging flight hardware, and space qualification of electronic hardware and design verification. Strong analytical and problem-solving skills are desired. Will work as part of an existing team in hardware development and testing.
**Qualifications:** BS in Physics, Electrical Engineering, Computer Engineering, or a related field. Entry-level experience with strong internship/co-op background is highly desired. Must have a strong background and experience in electronics design, fabrication, and testing. Familiarity with digital and analog circuit design, as well as testing and design verification, is essential. Must have excellent interpersonal and written/oral communication skills and be able to work in a team environment. *(97-05-07)*

Group 903
ELECTRO-OPTICAL SYSTEMS ANALYST
Will work in a team environment to study a broad range of technical questions of importance to the United States’ use of space. Technical areas include United States space situational awareness; space-based intelligence, surveillance, and reconnaissance; and space vehicle survivability. Work involves data analysis, mathematical modeling, software simulation and conceptual design development of space systems, with a focus on electro-optical sensors and integrated networks of such sensors for surveillance of the space environment.
**Qualifications:** PhD in Physics, Mathematics, Engineering, or other technical field. Master’s degree with extensive experience in the technical areas described in the position description will also be considered. Must have the ability to quickly learn new fields and creatively understand complex problems at both the technically detailed and system levels. Excellent communication skills and the ability to clearly present concepts to a wide spectrum of audiences are required. *(903-02-07)*
Career Opportunities

ISR Systems and Technology

Division 10

Group 106

ASSISTANT EXPERIMENTALIST
Will participate in the design and integration of complex electro-optical systems. Responsibilities include setup and alignment of opto-electronic components, development of data collection and processing hardware, characterization of electro-optical systems, and participation in the collection of experimental data.

Qualifications: BS in Physics, Electrical Engineering, or Optics. Familiarity with lasers, optical detectors, and opto-electronic components is a plus. (106-02-07)

Hardware Engineering

Air and Missile Defense Technology

Division 3

Group 33

ADVANCED RADAR DEVELOPMENT ENGINEER
Will work on the design, integration, testing, and installation of next-generation instrumentation radars and defense systems for use by the military and space surveillance community. Areas of work will include hardware and software development and system integration in a distributed computing network.

Qualifications: BS, MS, or PhD in Electrical Engineering, Physics, Computer Science, or Applied Mathematics. An understanding of data-fusion techniques is a plus. A background in electrical engineering, computer science, physics, mathematics, or related experience is expected. The development environment is team oriented, and communication skills, both oral and written, are important. A broad understanding of radar systems, including RF design, signal processing, and the operator interface, is desired. Several years of experience with radar systems operating at S-, C-, or X-band are desired. Familiarity with modern radar modeling software and with computer languages (MATLAB, C++, Java, and Fortran) is desired. Some travel to instrumentation sites around the world may be required. (33-01-07)

Homeland Protection and Tactical Systems

Division 4

Group 45

PROJECT ENGINEER
Will participate in the rapid development of novel prototype capabilities and systems that address critical defense shortfalls. Work involves development, integration, and test of RF and digital hardware, as well as the development and implementation of associated advanced signal processing algorithms.
Qualifications: PhD in Physics, Mathematics, Engineering, or other technical field with experience in the development of hardware systems. The ability to work in a multigroup coalition team environment is required. Experience in project management is also highly desired. (45-03-07)

Group 48
SYSTEMS ENGINEER
Will participate in testing and development of air defense and surveillance systems. May be involved with developing software and/or hardware for prototype systems or test hardware. May also be responsible for analysis of test data or modeling of air defense systems.
Qualifications: MS in Engineering or Physics and experience with developing hardware or software systems. (48-01-07)

Group 48
INSTRUMENTATION ENGINEER
Will assist with the development of hardware to support field testing with ground and airborne instrumentation of RF and IR sensors. Will participate in the design of subsystems, component selection, layout, construction, and lab testing of analog and digital control and data-acquisition units. May also be involved with field testing and data analysis.
Qualifications: MS or BS in Electrical Engineering, Computer Engineering, or Physics with related experience. (48-02-07)

Group 48
PROJECT ENGINEER
Will participate in testing, modeling, and analysis of air defense and surveillance systems. May be involved in development of prototype systems and advanced hardware for test support.
Qualifications: PhD in Engineering, Physics, or Applied Mathematics with experimental background. Experience with RF or electro-optical hardware is desired. Good communication skills and the ability to work in a team environment are required. (48-03-07)

Group 71
MECHANICAL ENGINEER
Will develop mechanical hardware for radar, communication, biodefense, and optical systems. Assignments will include conceptual design through fabrication and testing. Responsibilities will include structural, dynamic, thermoelastic, thermal, and fluid flow analyses; mechanical design; and validation and performance testing. Will work as part of a multidisciplinary team.
Qualifications: PhD in Mechanical, Aeronautical, or Civil Engineering. Must have knowledge in hardware design, analysis, and experimental methods. Good oral presentation and written reporting skills are also required. Familiarity with Patran, Nastran, and Fluent analysis codes is desired. (71-01-07)
Career Opportunities

Group 73
AEROSPACE ENGINEER
Will develop state-of-the-art hardware for ground-based, airborne, and space payloads from conceptual design and analysis through fabrication and performance evaluation. Will join a multidisciplinary engineering team performing mechanical design, structures, dynamics, thermal engineering, fluid mechanics, and aerodynamics systems engineering.

Qualifications: PhD in Mechanical or Aerospace Engineering. Must have knowledge and interest in hardware development, analysis tools, and experimental methods. Good oral presentation and written reporting skills are required. (73-01-07)

Group 75
OPTO-MECHANICAL ENGINEER
Will participate in the development of optical, mechanical, and biodefense systems. Applications include ground-based, airborne, and space payloads. Work will include analysis, design, and testing applied to the development of complex hardware from conceptual design through fabrication and performance evaluation. Candidate should be interested in working on a broad range of challenging problems involving optics, structures, materials, thermal systems, and fluid dynamics. Position involves working in close-knit teams with design, analysis, and test personnel.

Qualifications: MS or PhD in Mechanical, Aero/Astro, or Optical Engineering. Working knowledge of computational tools and experimental experience is required. Hardware development experience is desired. Must have demonstrated capability to produce professional oral presentations and written reports. (75-01-07)

Group 76
CONTROL SYSTEMS ENGINEER
Opportunities to fully implement the latest in practical feedback control systems, including analog and digital circuit design, digital signal processors and field programmable gate arrays, interfacing and software, sensor signal conditioning, actuator selection, bench checkout, and field testing. Will specify control systems and lead subsequent hardware design, simulation, fabrication, and demonstration.

Qualifications: MS in Control Systems (Electrical, Mechanical, or Aero Engineering). Must have good presentation and written reporting skills. Will use knowledge of transducers (angle encoders, tachometers, gyros, and accelerometers) and motion control devices (motors, actuators, and power amplifiers) as part of an interdisciplinary, project-oriented engineering team. Familiarity with MATLAB, Simulink, a real-time operating system such as VxWorks, C/C++, or very-high-speed integrated circuit hardware description language is desired. (76-01-07)

ISR Systems and Technology Division 10

Group 102
ADVANCED INTEGRATED CIRCUIT DESIGNER / ANALYST
Will work within an interdisciplinary team to formulate innovative architectures and to design and demonstrate unprecedented performance with mixed-signal integrated circuits operating at
Career Opportunities

very high frequencies. Responsibilities may include high-performance VLSI analog and/or digital circuit design, layout, fabrication, and testing; heterogeneous processor architecture definition and evaluation; system on-chip and/or board-level integration; I/O interface definition and implementation; and field programmable gate array (FPGA) programming.

**Qualifications:** PhD in Electrical Engineering or Computer Engineering. Expertise required for this position must include one or more of the following disciplines: high-speed, low-power VLSI circuits, RF VLSI circuits, high-performance wideband mixed-signal devices, FPGA system design, parallel computer architectures, and digital signal processing. Strong communication skills, both oral and written, are desired. Must have the ability to work closely with system and signal processing analysts and be part of the development of real-time embedded system to transfer and implement technologies into operational systems. Must be willing to work in a team environment. *(102-03-07)*

**Group 105**

**RF VLSI ENGINEER**

Work will involve the design, development, and testing of advanced RF receiver/transmitter systems with emphasis on analog component design activities. This RF IC design position will focus on X-, K-, and W-band RF components (amplifiers, mixers, filters) and subsystems for high-performance, low-power consumption applications that include space-based, airborne, and other DoD platforms. This position will be part of a design and prototyping team that produces fabricated modules and chips using state-of-the-art silicon processes.

**Qualifications:** MS or PhD in Electrical Engineering. Expertise in circuit design, RF system analysis, and semiconductor processes is required. Experience with CAD tools and test equipment is also essential. Must be willing to work in a team environment. *(105-02-07)*

**Information Systems**

 ISR Systems and Technology  

**Group 104**

**SYSTEMS ARCHITECT / ANALYST**

Will develop system architectures and algorithms for the efficient extraction, integration, and dissemination of sensor information in support of human and machine decision making. Areas of research involve feature extraction from multisensor data; pattern recognition and behavior analysis; information-theoretic analysis of human and machine decision making; semiautomated sensor cueing and control; modeling and simulation of surveillance and reconnaissance networks; information architectures for collaborative exploitation; predictive algorithm development for content staging; distributed web services; and design and analysis of laboratory and field experiments.

**Qualifications:** MS in Electrical or Computer Engineering, Computer Science, Physics, Applied Mathematics, or related system engineering or information sciences discipline. Experience analyzing
large semistructured data sets and developing pattern extraction algorithms is desired. Knowledge of any subset of Java, MATLAB, C/C++, database systems, web services, and related technologies is desired. Strong communication skills, both oral and written, are required. Familiarity with remote sensing technologies and military intelligence, surveillance and reconnaissance (ISR) systems is a plus. Must be willing to work in a multidisciplinary team environment. \((104-01-07)\)

Lasers and Laser Systems

Solid State Division 8

Groups 82

LASER APPLICATIONS ENGINEER

Will work with staff to develop laser technology and laser-based subsystems for applications such as biosensors, lidars, directed energy, and optical countermeasures. Will help in many facets of laboratory research, including laboratory experiments and data analysis, and optical, mechanical, and electrical design. Should be able to carry responsibility, with little technical supervision, for a portion of a project with a fast-paced interdisciplinary team.

Qualifications: BS in Physics, Electrical Engineering, or Computer Science. A general understanding of lasers or optical engineering and some hands-on experience are required. Strong design, experimental, and analytical skills are essential. Familiarity with laboratory electronic and optical equipment is a must. Hands-on familiarity with lasers and laser systems is desired. Significant electronic design or programming experience and a good mathematical background to aid in algorithm development are pluses. \((82-01-07)\)

Group 82

LASER AND LASER-BASED INSTRUMENT ENGINEER

Will develop laser technology and laser-based subsystems for applications such as biosensors, lidars, directed energy, and optical countermeasures. Will formulate research plans, conduct research, report to sponsors, and supervise support personnel. Should be able to work on small individual projects, as well as on larger projects in interdisciplinary teams.

Qualifications: PhD in Physics, Electrical Engineering, or equivalent (such as Chemistry with background in laser spectroscopy, for example, in applications such as the development of laser-based techniques for studying fast chemical reaction dynamics). A good understanding of laser physics and optical engineering is required. Must have extensive hands-on experience in the development of new lasers or new laser-based instruments and systems. Examples include fiber lasers, solid-state lasers, semiconductor lasers; also laser-based systems for metrology (laser stabilization), lidar systems, and high-power laser systems. Strong experimental, analytical, and communication skills are essential. Some chemistry knowledge is a plus. Electronic design, software, and algorithm development experience is desired. \((82-02-07)\)
Meteorology

Homeland Protection and Tactical Systems

Group 43
METEOROLOGIST
A computer-savvy scientist/analyst is needed to assist with the development of advanced decision support tools (DST) to improve the management of air traffic during adverse weather. Will assist in the evaluation of meteorological algorithms and associated DSTs, and provide maintenance and documentation of the software.

Qualifications: MS in Meteorology or Physical Science. Proficiency in the management of software systems in a UNIX environment, including C, scripts, and crons is required. Understanding of meteorology and weather forecasting is required, as is an interest in applications to air traffic controllers. (43-02-07)

Aerospace

Group 97
SYSTEMS ENGINEER
Will lead efforts to define and develop the next generation of civilian operational space weather remote and in situ sensing instrumentation. Will also contribute to the development of experimental and research instrumentation.

Qualifications: MS or PhD in Astrophysics, Astronomy, Physics, Electrical Engineering, or related areas. Experience in remote-sensing instrumentation is required. Experience with space-borne X-ray/EUV and charged-particle sensors is desired. Should have a strong physical understanding of detectors and detection processes, optics, electronics, and issues associated with operation in a space environment. Should have excellent interpersonal and both written and oral communication skills. Ability to work in a team composed of both technical and nontechnical members is critical. (97-04-07)

Physics

Solid State

Group 83
ELECTRO-OPTIC DEVICE DEVELOPER
Will conduct research to advance the state of the art in electro-optic devices. Will design new device structures and work directly with material growers to create and optimize the growth
of such structures. Device opportunities and applications exist over a wide range of material systems including GaAlN, InGaAsp/InGaAlAs, antimonides, and lead salts. Will collaborate in a fast-paced multidisciplinary team to optimize both device structures and fabrication procedures to yield advanced lasers, modulators, and detector components with advanced capabilities. **Qualifications:** MS or PhD in Electrical Engineering, Physics, or Materials Science. Must have experience in designing quantum-well-based structures in compound semiconductor materials and developing devices utilizing such structures. Device fabrication knowledge and familiarity with the tools and techniques used for fabrication are essential. Exposure to materials growth is beneficial. *(83-01-07)*

**Aerospace**

**Division 9**

**Group 92**

**RADAR SYSTEMS ENGINEER**

Will work on the development of advanced radar systems, and radar signal processing, as well as participate in the design and execution of tests and experiments. **Qualifications:** MS or PhD in Physics, Electrical Engineering, or equivalent. A solid understanding of electromagnetics, radar systems, and experimental techniques is strongly desired. Must be able to work on a broad range of problems. Strong communication and briefing skills are required. Knowledge of MATLAB, C, or C++ is desired, as is familiarity with estimation theory and inverse synthetic aperture radar imaging techniques. *(92-02-07)*

**Group 92**

**SIGNAL PROCESSING ENGINEER**

Will lead the development of high-performance analog receivers and digital signal processing subsystems for wideband radars. **Qualifications:** MS in Electrical Engineering or a related field. Hands-on experience in the development of high-speed, real-time signal processing subsystems is required. A solid understanding of radar signal processing (pulse compression, waveform generation, RF receivers, pulse/Doppler integration, CFAR, etc.) is also required. Must be able to set priorities, handle multiple tasks, communicate well, and direct other team members. *(92-03-07)*

**Group 903**

**RADAR SYSTEMS ANALYST**

Will work in a team environment to study a broad range of technical questions of importance to the United States use of space. Technical areas include United States space situational awareness; space-based intelligence, surveillance, and reconnaissance; and space vehicle survivability. Work involves data analysis, mathematical modeling, software simulation and conceptual design development of space systems, including space vehicles and their subsystems, with a focus on radars and other radio-frequency sensors, as well as integrated networks of such sensors for surveillance of the space environment.
**Qualifications:** PhD in Physics, Mathematics, Engineering, or other technical field. Master’s degree with extensive experience in the technical areas described in the position description will also be considered. Must have the ability to quickly learn new fields and creatively understand complex problems at both the technically detailed and system levels. Excellent communication skills and the ability to clearly present concepts to a wide spectrum of audiences are required. *(903-03-07)*

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### Radar Systems

**Air and Missile Defense Technology**

**Division 3**

**Group 33**

**RADAR SYSTEMS ENGINEER**

Will work on the design, development, and testing of advanced, high-power instrumentation radar systems. Will be involved in planning for measurements using radar sensors and sensor performance evaluation.

**Qualifications:** MS or PhD in Electrical Engineering, Physics, or equivalent. A broad understanding of radar systems, including RF design, signal processing, and radar control hardware or software, is desired. Familiarity with radar modeling techniques and modern computer languages is desired. *(33-02-07)*

**Group 39**

**RADAR SYSTEMS ENGINEER**

Will work on the development of advanced radar systems and radar signal processing, as well as participate in the design and execution of tests and experiments.

**Qualifications:** MS or PhD in Physics, Electrical Engineering, or equivalent. A solid understanding of electromagnetics, radar systems, and experimental techniques is strongly desired. Must be able to work on a broad range of problems. Strong communication and briefing skills are required. Knowledge of MATLAB, C, or C++ is desired, as is familiarity with estimation theory and inverse synthetic aperture radar imaging techniques. *(39-03-07)*

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### RF Electronics

**ISR Systems and Technology**

**Division 10**

**Group 105**

**RF ENGINEER**

Will work in the development of advanced radar systems to be used in ground surveillance systems. Will design and supervise the construction of the radar electronics, including receivers
and transmitters. Will be involved in the system testing that may often require some travel to remote sites.

**Qualifications:** MS or PhD in Electrical Engineering. Expertise in passive and active RF circuits is essential. Experience with receiver design is desired. Strong communication skills and an ability to work in a team environment are strongly desired. *(105-03-07)*

### Software

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<td>Will conduct research and development of air traffic control software to improve the efficiency and flexibility of the national air travel system. Will analyze existing automation systems, develop new automation algorithms, analyze results, and document developed software tools. Will also implement, debug, and test real-time software demonstration systems. <strong>Qualifications:</strong> BS or MS in Computer Science or Engineering. Understanding of modern software development methodology and knowledge of UNIX and C/C++. <em>(42-01-07)</em></td>
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<td><strong>SOFTWARE ENGINEER / ANALYST</strong></td>
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<td>Will conduct analysis of automation software, develop new software algorithms related to multisensor data fusion, and document developed software. Will participate in implementation, debugging, and testing of real-time software systems and integration of sensors and automation. <strong>Qualifications:</strong> MS or PhD in Computer Science, Electrical Engineering, or Physics. Knowledge of C/C++ and UNIX. Good oral/written communication skills are required. Aviation background is desired. Experience with graphical user interface software prototyping tools is desired. <em>(42-02-07)</em></td>
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<td><strong>SOFTWARE PROGRAMMER/ANALYST</strong></td>
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<td>Will work with multidisciplinary team of senior engineers to evaluate and characterize current and future aviation safety systems. Work entails assessing performance of sensors, understanding and characterizing multisensor fusion algorithms, and developing simulation and modeling tools to predict the performance of aviation safety algorithms. System characterization involves both field measurement activities and mathematical modeling of complex systems. <strong>Qualifications:</strong> BS or MS in Electrical Engineering, Physics, Mathematics, or Computer Science. Demonstrated facility with mathematical analysis tools (e.g., MATLAB) and programming in C/C++ are essential. Some aviation background is desired. <em>(42-03-07)</em></td>
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Group 43
SOFTWARE ENGINEER
Will develop software for automated weather-processing systems and associated decision support tools.
Qualifications: BS or MS in Computer Science or Applied Mathematics. Facility with UNIX and C/C++ is required, as is an interest in weather phenomena and remote-sensing technology and applications to air traffic control. (43-03-07)

Group 45
SOFTWARE PROGRAMMER
Will participate in the rapid development of novel prototype capabilities and systems that address critical defense shortfalls. Work involves the development of embedded, real-time software applications implementing advanced signal processing algorithms, communications, and graphical user interfaces.
Qualifications: MS or BS in Physics, Mathematics, Engineering, or Computer Science. Must be able to work as part of a development team and interact with other staff in the definition of algorithms for implementation. Experience with real-time software programming in both Windows and Linux environments is highly desired. Experience with MATLAB, C++, or Java is also desired. (45-04-07)

Group 48
SYSTEMS ENGINEER
Will participate in testing and development of air defense and surveillance systems. May be involved with developing software and/or hardware for prototype systems or test hardware. May also be responsible for analysis of test data or modeling of air defense systems.
Qualifications: MS in Engineering or Physics and experience with developing hardware or software systems. (48-04-07)

Group 48
SOFTWARE ENGINEER
Will assist with the development of software to support field testing and data analysis. May be involved with developing real-time software for control of sensors, feedback to operators, and data collection. May also be involved with implementing signal processing algorithms for real-time or post-test analysis of test data.
Qualifications: MS or BS in Computer Science, Engineering, Physics, or Mathematics with related experience. Experience with C++ or Java is desired. (48-05-07)

Group 49
SOFTWARE PROGRAMMER / ANALYST
Will work with more senior members of the group in a multidisciplinary team to address a broad range of technical problems related to U.S. air vehicle survivability against modern integrated air defense systems, electronic and infrared countermeasure development, directed-energy system capability, precision-guided munition performance, homeland defense, and counterterrorism. Work entails providing simulation software, data analysis tools, and mathematical analysis for the study of radar, infrared, laser, and sensor integration systems.
Career Opportunities

**Qualifications:** BS or MS in Physics, Mathematics, Engineering, or Computer Science. Demonstrated ability to program in a technical environment in Fortran, C, or C++ is required. *(49-02-07)*

**Communications and Information Technology**  

**Division 6**

**Group 62**  

**STATIC / DYNAMIC ANALYSIS OF SOFTWARE**  
Will contribute to an active research and development program aimed at automated software vulnerability detection and analysis. Will develop prototype algorithms and tools to detect, isolate, prioritize, and eliminate buffer overflows, format string overflows, and other vulnerabilities from software. Will design and perform experiments to evaluate performance of tools, and publish and present results in various forums.  
**Qualifications:** MS or PhD in Computer Science, Applied Mathematics, relevant engineering discipline, or equivalent experience. Should have knowledge of programming languages, compiler design, static and dynamic analysis. Should be able to program in C and C++. *(62-03-07)*

**Group 62**  

**SOFTWARE SYSTEM VULNERABILITY ANALYSIS**  
Will design evaluations of U.S. Government security systems and will help develop tools and techniques to assess system security.  
**Qualifications:** MS or PhD in Computer Science, Applied Mathematics, relevant engineering discipline, or equivalent experience. Should have knowledge of programming languages, compiler design, static and dynamic analysis. Should be able to program in C and C++. *(62-04-07)*

**Group 66**  

**REAL-TIME EMBEDDED SOFTWARE ENGINEER**  
Will develop real-time control software for optical communication systems.  
**Qualifications:** BS or MS in Electrical Engineering or Computer Science. Must have experience with real-time environments such as VxWorks, LabView-RT, MATLAB Simulink, etc. A basic understanding of optical detectors and actuators, including nutators, FSMs, gimbal drives, quad cells, cameras, etc., is needed. Three years of related experience is desired. *(66-05-07)*

**Aerospace**  

**Division 9**

**Group 91**  

**SOFTWARE ENGINEER**  
Will help design, develop, and test a processing pipeline for optical space surveillance data from ground- and space-based sensors.
Career Opportunities

Qualifications: MS or PhD in Computer Science or Electrical Engineering. Familiarity with MATLAB, C++, and Java is required. Understanding of reflected energy, charge-coupled device sensors, and digital signal processing is desired. (91-04-07)

Group 93
SCIENTIFIC PROGRAMMER / ANALYST
Will support development, analysis, and simulation of signal and data processing algorithms applied to radar and optical sensors.
Qualifications: BS in Mathematics, Physics, Engineering, or Computer Science. Proficiency in UNIX and C/C++ is required. Should also be proficient in imagery and spectral data analysis, signal processing, and development of visualization tools. (93-03-07)

Group 93
APPLICATIONS ENGINEER
Will work on the development of a service-oriented architecture test bed for space surveillance and related mission areas. Will work with a team to upgrade and connect existing sensors and processing systems with modern web services and standards.
Qualifications: BS or MS in Electrical Engineering or Computer Science. Expertise in C/C++, Java, XML, SOAP, WSDL, and object-oriented design principles is required. Ability to analyze system requirements and formulate design concepts is required, as is the ability to understand and apply modern middleware and service protocols to develop operational architectures to meet requirements. Experience with real-time communications and sensor control systems is highly desired. (93-04-07)

ISR Systems and Technology
Division 10
Groups 103, 104, 105, & 106
SCIENTIFIC PROGRAMMER / ANALYST
Will work with an interdisciplinary team to develop systems to validate advanced signal processing concepts. Responsibilities may include the support of advanced sensor and signal processing concepts and test bed developments; programming advanced signal and data processing algorithms in MATLAB and C/C++; participation in field tests and data collection; and the analysis of data to support algorithm and sensor system performance evaluation.
Qualifications: BS or MS in Electrical Engineering, Physics, Mathematics, Computer Science, or a related physical science. Expertise required in several disciplines, such as C++, MATLAB, UNIX, Linux, real-time, embedded processors, and fundamental concepts in signal processing. Strong communication skills, both oral and written, are required. Must be willing to work in a team environment. (103/104/105/106-01-07)
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If you’re pursuing a degree in

Electrical Engineering   Computer Science
Physics               Mathematics
Mechanical Engineering Aeronautics /Astronautics
Aerospace Engineering  Materials Science
Molecular Biology      Biochemistry
Chemistry              or comparable fields

our technical staff members welcome the opportunity to consider you for an on-campus interview.

Learn more about us—
www.ll.mit.edu

For more information about our scheduled recruiting activities at your campus, please contact your Career Center or visit our website.

To be considered for an on-campus interview, please apply to

1. Your Career Center’s online recruiting system AND

2. MIT Lincoln Laboratory’s website http://www.ll.mit.edu/careers/careers.html (Click on College Recruitment)

Experienced professionals are also encouraged to apply to the above website. (Click on Employment Opportunities)

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Massachusetts Institute of Technology
Lexington, Massachusetts
(781) 981-5500

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