2011

MIT LINCOLN LABORATORY




FACTS

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Comments and requests may be sent to llnews@ll.mit.edu.

MIT Lincoln Laboratory's fundamental mission is to apply science and advanced technology to critical problems of national security. To assure excellence in the fulfillment of this mission, the Laboratory is committed to fostering an environment that embraces and leverages diversity of thought, culture, and experience.

The work described in this document is performed under the prime contract with the U.S. Air Force, FA8721-05-C-0002.

1951–2011
LINCOLN LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MIT LINCOLN LABORATORY

2011 FACTS

244 Wood Street
Lexington, MA 02420
781-981-5500
www.ll.mit.edu

Quick Facts

MIT Lincoln Laboratory is a Department of Defense federally funded research and development center.

Established
1951

Research areas
Sensors, data extraction (signal processing and embedded computing), communications, integrated sensing and decision support, advanced electronics

Major sponsors
U.S. Air Force, Defense Advanced Research Projects Agency, Office of the Secretary of Defense, U.S. Army, U.S. Navy, Missile Defense Agency, NASA, Federal Aviation Administration

Director
Dr. Eric D. Evans

Personnel
1780 technical staff; 480 technical support staff; 530 technical and technical support subcontractors; 3600 total personnel

Facility profile
28 buildings and structures—a total area of 2.1 million sq ft

Located on 3 sites—main facility in Lexington, Mass.; Flight and Antenna Test Facility on Hanscom Air Force Base in Bedford, Mass.; Millstone Hill radar complex in Westford, Mass.
Field Sites: 3
Field Offices: 14

U.S. patents issued to Lincoln Laboratory technical staff since 1951
696

Spin-off companies since 1951
>95

Contents

Overview

MIT Lincoln Laboratory is a Department of Defense (DoD) federally funded research and development center working on problems critical to national security. The Laboratory's core competencies are in sensors, information extraction (signal processing and embedded computing), communications, cyber security, integrated sensing, and decision support.

Technology development is geared to the Laboratory's primary mission areas—space control; air and missile defense; communication systems; intelligence, surveillance, and reconnaissance systems; advanced electronics; tactical systems; homeland protection and chemical and biological defense; cyber security; and air traffic control.

Two of the Laboratory's principal technical objectives are (1) the development of components and systems for experiments, engineering measurements, and tests under field operating conditions and (2) the dissemination of information to the government, academia, and industry.

Program activities extend from fundamental investigations through the design process and finally to field demonstrations of prototype systems. Emphasis is placed on transitioning systems and technology to industry.

As a DoD Research and Development Laboratory, Lincoln Laboratory focuses on developing and prototyping innovative technologies and enhanced capabilities to meet the evolving needs of the DoD.

Lincoln Laboratory also undertakes government-sponsored, nondefense projects in areas such as the development of systems the Federal Aviation Administration relies on to improve air traffic control and air safety, and systems that the National Oceanic and Atmospheric Administration uses in weather surveillance.

Historical Brief

Lincoln Laboratory was established in 1951 to develop an air defense system for the United States. The Laboratory's first building was completed in 1952 and four more buildings were completed by 1954. Today, the complex, located primarily on Hanscom Air Force Base, comprises 28 facilities, including a state-of-the-art Microelectronics Laboratory.

The first project of Lincoln Laboratory was the Semi-Automatic Ground Environment (SAGE) air defense system, which was developed to collect, analyze, and relay data from multiple radars quickly enough to initiate a response if an air attack were identified. The Whirlwind computer built at MIT was at the heart of this system; the Laboratory's second-generation Whirlwind enabled transmittal and interpretation of enormous amounts of data—virtually in real time. SAGE was the beginning of the Laboratory's long history of developing innovative technology.

In 2001, Lincoln Laboratory received the Secretary of Defense Medal for Outstanding Public Service in recognition of a half-century of technical innovation and scientific discoveries.

To learn more about Lincoln Laboratory's history, visit the web at http://www.ll.mit.edu/about/History/history.html.

Lincoln Laboratory Logo

The Lincoln Laboratory logo, which first appeared in February 1958 in the Lincoln Laboratory Bulletin, was conceived by Carl Overhage, the Laboratory's fourth director. Overhage drew a Lissajous figure based on the superposition of two simple harmonic vibrations and commissioned retired Brigadier General Robert Steinle and the firm Advertising Designers of Los Angeles to transform the Lissajous figure into an artistic image.

The two L's rotated 180 degrees with respect to each other stand for Lincoln Laboratory. They form a rectangle enclosing the Lissajous figure generated by the parametric equations $x = 3\sin(8\pi t/T)$ and $y = 4\sin(6\pi t/T)$. The figure is traced along the horizontal axis x and the vertical axis y as the variable t progresses from $t = 0$ to T.

The Lincoln Laboratory logo is an identifying symbol on Laboratory publications and its website. Because of its distinctive and striking appearance, it was included in the 1972 edition of *The Book of American Trademarks*, a compilation of the nation's most significant trademarks, logos, and corporate symbols.

Lissajous Figure

The Lissajous figure, familiar to most physical scientists and engineers, connotes harmony, order, and stability. The Lissajous figures, named for the French mathematician Jules-Antoine Lissajous, are also known as Bowditch curves after their discoverer, Nathaniel Bowditch, the mathematician from Salem, Massachusetts.

Directors of Lincoln Laboratory

11 **Eric D. Evans** 1 July 2006–present
10 **David L. Briggs** 1 July 1998–30 June 2006
9 **Walter E. Morrow** 1 April 1977–30 June 1998
8 **Gerald P. Dinneen** 1 June 1970–1 April 1977
7 **Milton U. Clauser** 1 January 1967–1 June 1970
6 **C. Robert Wieser (Acting)** 10 May 1966–1 January 1967
5 **William R. Radford** 1 February 1964–9 May 1966
4 **Carl F.J. Overhage** 1 February 1957–1 February 1964
3 **Marshall G. Holloway** 5 May 1955–1 February 1957
2 **Albert G. Hill** 9 July 1952–5 May 1955
1 **F. Wheeler Loomis** 26 July 1951–9 July 1952

Six Decades of Technical Achievements

1950s

- Semi-Automatic Ground Environment (SAGE) System
- Distant Early Warning Line
- Whirlwind computer magnetic-core memory and subsequent models—Whirlwind II and the AN/FSQs
- Ballistic Missile Early Warning System
- Millstone Hill Radar / Space Surveillance

1960s

- Lunar range-Doppler mapping
- First satellite television transmission
- Gallium arsenide semiconductor laser demonstrated
- Haystack Radar operations
- Lincoln Experimental Satellites 1 to 6
- Lunar mapping for Apollo landing

1970s

- Air Traffic Control program / Mode S airport surveillance
- ARPA-Lincoln C-band Observables Radar and TRADEX Radar S-band upgrade, Kwajalein Atoll
- Extremely high-frequency submarine communications demonstrated

- Lincoln Experimental Satellites 8 and 9
- Continuous-wave diode laser developed in InGaAsP/InP alloy
- Ground-based Electro-Optical Deep Space Surveillance system at Experimental Test Site in New Mexico
- Air vehicle survivability programs

1980s

- Airborne towed countermeasures
- Millimeter Wave Radar, Kwajalein Atoll
- Cobra Judy X-band system
- Kwajalein / Lexington Discrimination System
- Space-Based Visible Sensor program
- Charge-coupled device for Short-Wavelength Adaptive Techniques program
- Airborne Seeker Test Bed
- Compact linear-predictive coding vocoder

1990s

- Firepond laser radar imaging demonstration
- Terminal Doppler Weather Radar deployed
- Traffic Alert and Collision Avoidance (TCAS) system
- Microelectronics Laboratory operational
- Earth Orbiting (EO)–1 Advanced Landsat Imager
- Fly-Along Sensor Package
- Cobra Gemini
- Space-Based Visible payload delivered
- Kwajalein Modernization and Remoting program
- Biological Agent Warning Sensor
- Theater Critical Measurements Program flight tests launched
- Lincoln Near-Earth Asteroid Research (LINEAR) program
- Chandra X-ray telescope charge-coupled device camera delivered

Six Decades of Technical Achievements, cont.

2000s

- NASA Earth Observation-1 launched
- Forward-Based Radar test bed for missile defense
- Geosynchronous Lightweight Integrated Technology Experiment
- Airport Surveillance Radar/Weather Systems Processor
- CANARY / PANTHER pathogen detection sensors
- Three-dimensional imaging
- Airborne Ladar Imaging Research Testbed
- Jigsaw 3D imaging laser radar
- Slab-coupled optical waveguide laser invented; near-ideal beam quality demonstrated in various materials/wavelengths
- Orthogonal transfer arrays for wide-field camera
- Enhanced Regional Situation Awareness system
- LLGrid cluster computing
- Runway Status Lights system
- Extended Space Sensor Architecture
- Decision support architectures
- Nonlinear equalization for receiver dynamic range extension
- Wideband Global SATCOM system

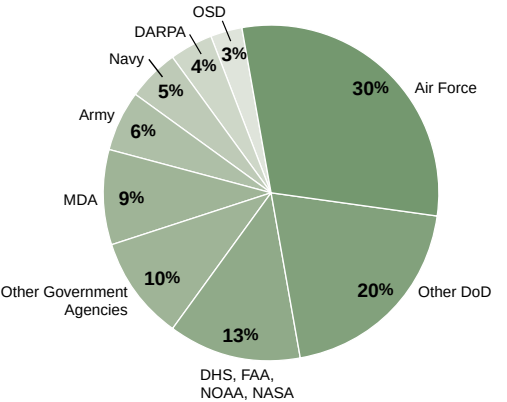
2010s

- Haystack Ultrawideband Satellite Imaging Radar
- X-band Transportable Radar
- Missile Alternative Range Target Instrument payloads
- Geiger-mode avalanche photodiode focal plane arrays
- Digital focal plane arrays
- Graphene-on-insulator electronics
- Multi-Aperture Sparse Imager Video System
- Imaging System for Immersive Surveillance
- Lincoln Adaptable Real-time Information Assurance Testbed
- Graph detection algorithms
- Miniaturized radio-frequency receiver
- Lincoln Distributed Disaster Response System

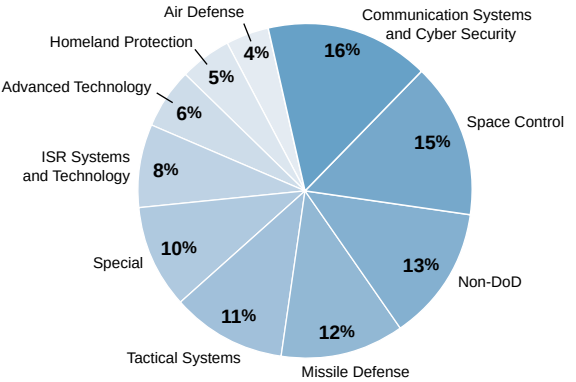
Funding

Lincoln Laboratory programs are funded by a number of DoD agencies through its prime contract with the Air Force.

Breakdown of Program Funding by Sponsor



Breakdown of Program Funding by Mission Area



Missions and Capabilities

Mission Areas and Technical Programs

Space Control

The Space Control mission develops technology that enables the nation's space surveillance system to meet the challenges of space situational awareness. Lincoln Laboratory works with systems to detect, track, and identify man-made satellites; performs satellite mission and payload assessment; and investigates technology to improve monitoring of the space environment, including space weather and atmospheric and ionospheric effects. The technology emphasis is the application of new components and algorithms to enable sensors with greatly enhanced capabilities and to support the development of net-centric processing systems for the nation's Space Surveillance Network.

Air and Missile Defense Technology

In the Air and Missile Defense Technology mission, Lincoln Laboratory works with government, industry, and other laboratories to develop integrated systems for defense against ballistic missiles, cruise missiles, and air vehicles in tactical, strategic, and homeland defense applications. Activities include the investigation of system architectures, development of advanced sensor and decision support technologies, development of flight-test hardware, extensive field measurements and data analysis, and the verification and

assessment of deployed system capabilities. The program includes a focused evaluation of the survivability of U.S. air vehicles against air defense systems. A strong emphasis is placed on the rapid prototyping of sensor and system concepts and algorithms, and the transfer of the resulting technologies to government contractors responsible for the development of operational systems.

Communication Systems

The Communication Systems mission works to enhance and protect the capabilities of the nation's global defense networks. Emphasis is placed on synthesizing system architectures, developing component technologies, building and demonstrating end-to-end system prototypes, and then transferring this technology to industry for deployment in operational systems. Current efforts span all network layers (from physical to application), with primary focuses on radio-frequency (RF) military satellite communications (MILSATCOM), net-centric operations, free-space laser communications, line-of-sight networking, speech and language processing, and computer network operations.

ISR Systems and Technology

The Intelligence, Surveillance, and Reconnaissance (ISR) Systems and Technology mission conducts research and development into advanced sensing concepts, signal and image processing, high-performance computing, networked sensor architectures, and decision sciences. This work is focused on providing improved surface and undersea surveillance capabilities for problems of national interest. The Laboratory's ISR program encompasses airborne imaging and moving target detection radar, RF geolocation systems, electro-optic imaging, laser radar, and acoustic sensing. For such systems, the Laboratory typically performs phenomenology analysis, system design, component technology development, and significant experimentation. Successful concepts often develop into

experimental prototype ISR systems, sometimes on surrogate platforms, that demonstrate new capabilities in operationally relevant environments.

Advanced Technology

Research and development in Advanced Technology focus on the invention of new devices, the practical realization of those devices, and their integration into subsystems. Although many of these devices continue to be based on solid-state electronic or electro-optical technologies, recent work is highly multidisciplinary, and current devices increasingly exploit biotechnology and innovative chemistry. The broad scope of Advanced Technology work includes the development of unique high-performance detectors and focal planes, 3D integrated circuits, biological- and chemical-agent sensors, diode lasers and photonic devices using compound semiconductors and silicon-based technologies, microelectromechanical devices, RF components, and unique lasers including high-power fiber and cryogenic lasers.

Tactical Systems

In the Tactical Systems mission, Lincoln Laboratory focuses on assisting the Department of Defense to improve the acquisition and employment of various tactical air and counterterrorist systems. The Laboratory does this by helping the U.S. military understand the operational utility and limitations of advanced technologies. Activities focus on a combination of systems analysis to assess technology impact in operationally relevant scenarios, rapid development and instrumentation of prototype U.S. and threat systems, and detailed, realistic instrumented testing. The Tactical Systems area is characterized by a very tight coupling between the Laboratory's efforts and the DoD sponsors and warfighters involved in these efforts. This tight coupling ensures that the analysis that is done and the

systems that are developed are relevant and beneficial to the warfighter.

Homeland Protection

The Homeland Protection mission is supporting the nation's security by innovating technology and architectures to help prevent terrorist attacks within the United States, reduce the vulnerability of the nation to terrorism, minimize the damage from terrorist attacks, and facilitate recovery from either man-made or natural disasters. The broad sponsorship for this mission area spans the Department of Defense, the Department of Homeland Security (DHS), and other federal, state, and local entities. Recent efforts include architecture studies for the defense of civilians and facilities against biological attacks, development of the Enhanced Regional Situation Awareness system for the National Capital Region, the assessment of technologies for border and maritime security, and the development of architectures and systems for physical infrastructure protection.

Cyber Security

The Cyber Security mission conducts research, development, evaluation, and deployment of prototype components and systems designed to improve the security of computer networks, hosts, and applications. Lincoln Laboratory's cyber security efforts have grown from their roots in developing the first quantitative, repeatable, objective evaluations of computer network intrusion-detection systems to include assessment via analysis; modeling, simulation, emulation, and field testing; creation of survivable architectures; development of prototype components and systems consistent with these architectures; quantitative evaluation of these components and systems; and, where appropriate, deployment of these prototypes in experiments, exercises, and operations.

Air Traffic Control

Since 1971, Lincoln Laboratory has supported the Federal Aviation Administration (FAA) in the development of new technology for air traffic control. This work initially focused on aircraft surveillance and weather sensing, collision avoidance, and air-ground data link communication. Today, the program has evolved to include a rich set of safety applications, decision support services, and air traffic management automation tools. A focus of the current program is support for the FAA's Next Generation Air Transportation System (NextGen). Key activities include the operation of a national-scale integrated weather-sensing and decision support prototype, testing and technology transfer of a runway incursion prevention system, development of a future air traffic control tower automation platform, and the development of a net-centric, system-wide information management system.

Engineering

Fundamental to the success of Lincoln Laboratory is the ability to build hardware systems incorporating advanced technology. These systems are used as platforms for testing new concepts, as prototypes for demonstrating new capabilities, and as operational systems for addressing warfighter needs. To construct the variety of systems used in programs across all mission areas, the Laboratory relies on its extensive capabilities in mechanical design and analysis, optical system design and analysis, aerodynamic analysis, mechanical fabrication, electronics design and assembly, control system development, system integration, and environmental testing. These capabilities are centered in the Laboratory's Engineering Division, which is an important contributor to many of the Laboratory's most successful efforts.

For more about the Laboratory's mission areas, visit the web at http://www.ll.mit.edu/mission/index.html.

Major Capabilities of Lincoln Laboratory

- Adaptive signal processing
- Advanced imaging
- Advanced microelectronics and microsystems
- Advanced radar technology
- Advanced RF technology
- Biological/chemical agent detection and identification
- Communication systems
- Cyber operations
- Decision support technologies
- Environmental monitoring
- High-performance computing
- Homeland protection
- Laser communications
- Net-centric architectures
- Network security
- Open systems architectures
- Optics and laser systems
- Rapid prototyping
- Space situational awareness
- Speech and language processing
- Systems analysis
- Threat assessment
- Weather sensing

Current Research Thrusts

Advanced Electronics and Chem-Bio Technology

- Metabolic markers of high explosives
- Cryogenic laser for high-energy laser
- Improved quantum cascade laser arrays for atmospheric sensing
- Nonfluorescent aerosol detection techniques
- Indium phosphide/silicon (InP/Si)–bonded substrates
- Free-standing gallium nitride (GaN) substrates
- Computationally designed enzymes
- Technologies for rapid identification of bioagents

- High-Q cryogenic passive devices
- Micro-optics for improved detection and reduced cross talk in detector arrays
- 256 × 256 Si passive imaging avalanche photodiode array
- Molecular-beam epitaxy for low dark current imagers
- Next-generation orthogonal transfer charge-coupled devices (CCDs)
- Advanced CCD packaging
- Next-generation wide-field-of-view imager
- Extreme-environment electronics
- Microfluidics devices
- 90 nm complementary metal-oxide semiconductor (CMOS) process development

Advanced Optical Communications

- Superconducting photon-counting detector arrays
- Novel frequency-shift-keying modulation for photon-counting communications
- Integrated photonic systems for space-based communication applications
- Vertical Cavity Surface Emitting Laser arrays for agile beam communication transmitters
- High-speed quantum key distribution
- High-speed laser communications through clouds

Advanced Sensor Technology

- Advanced signals intelligence (SIGINT) technology
- Infrared digital focal-plane array
- Radar "sidecars" (adjunct processors)
- Advanced CCD imagers
- Ultrahigh-resolution ladar
- Multiple-input–multiple-output (MIMO)/ground moving-target indication radar design
- Three-dimensional graph processor for acceleration of decision algorithms

Homeland Defense / Critical Infrastructure Protection

- Critical infrastructure protection—video analytics
- Distributed chemical/biological sensing and surveillance network
- Chemical-biological advanced sensor study
- Disaster management initiative

Net-Centric Operations

- Data integration—multiple classes and source of data; inferring network relationships
- Net-centric cross-domain service composition including automated resource brokering

Counterterrorism

- Counterterror Social Network Analysis and Intent Recognition
- Advanced SIGINT techniques
- Advanced antenna arrays
- Small unmanned aerial vehicle payload design and prototyping
- Tagging, tracking, and locating technologies

Decision Support

- Multi-intelligence data integration
- Graph exploitation
- Knowledge-building tools
- Data-fusion algorithms and architectures

Organization

Lincoln Laboratory is led by the Director, Associate Director, Assistant Director for Operations, and the Director's Office Staff, in conjunction with the Steering Committee and with oversight from the Joint Advisory Committee (JAC), which annually reviews the Laboratory's proposed five-year plan. A JAC Executive Group, made up of key sponsors, assists the JAC in reviewing technical programs. The Laboratory reports to the MIT Office of the President.

Lincoln Laboratory is organized into seven technical divisions, each of which contains work-specific groups. Projects at the Laboratory are within the seven core mission areas and are often multidisciplinary, involving interdivisional collaborations. The technical research and development work of the Laboratory is supported by six service departments.

Technical Divisions

Division 3–Air and Missile Defense Technology
Division 4–Homeland Protection and Air Traffic Control
Division 6–Communication Systems and Cyber Security
Division 7–Engineering
Division 8–Advanced Technology
Division 9–Aerospace
Division 10–Intelligence, Surveillance, and Reconnaissance and Tactical Systems

Service Departments

Contracting Services
Facility Services
Financial Services
Human Resources
Information Services
Security Services

For more details on the Laboratory's divisions and departments, visit the web at http://www.ll.mit.edu/employment/orgtechdivisions.html.

Working at Lincoln Laboratory

Lincoln Laboratory's reputation has been built on the strength and quality of its technical staff. Approximately 1780 technical staff members work on research, prototype building, and field demonstrations. The technical staff come from a broad range of scientific and engineering fields. Two-thirds of the professional staff hold advanced degrees.

The Laboratory also employs approximately 1600 people who provide the strong infrastructure and administrative functions that support the research and demonstration activities behind the development of new devices and technologies.

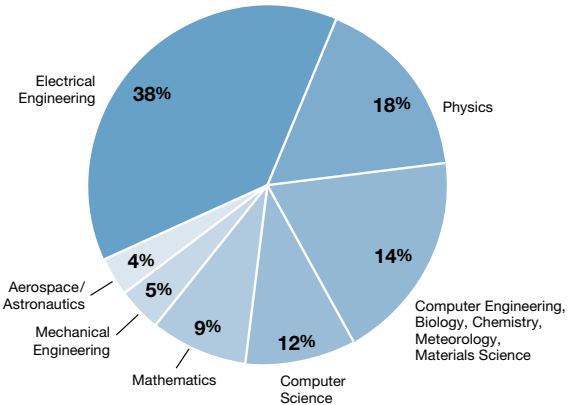
Technical Positions

Lincoln Laboratory technical staff members come from many scientific and engineering fields; electrical engineering, physics, and computer science are three of the most common disciplines represented at the Laboratory.

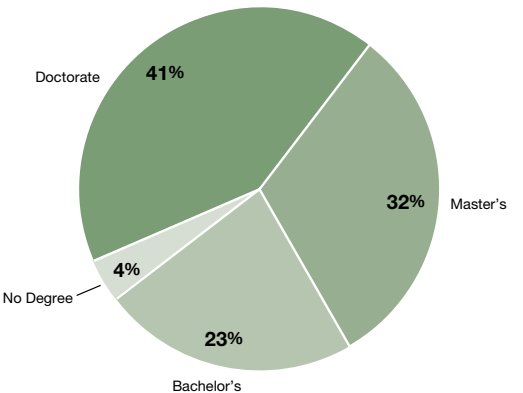
Positions filled by engineers and scientists at Lincoln Laboratory require problem-solving ability, analytical skills, and creativity.

Profile of Professional Staff

by Academic Discipline



by Degree



Representative Technical Positions

- Aerospace engineer
- Applications engineer
- Biologist
- Communications systems engineer
- Data analyst
- Data fusion engineer/scientist
- Electro-optical device developer
- Electro-optical systems developer
- Electronics hardware engineer
- Integrated circuit architect/designer
- Laser applications engineer
- Mechanical/Optomechanical engineer
- Meteorology analyst
- Network engineer
- Optical image analyst
- Radar systems analyst
- Radar systems engineer
- RF engineer
- Scientific programmer
- Signal processing engineer/analyst
- Software developer/programmer
- Software engineer
- Systems analyst
- Systems engineer
- System integrator and test engineer

For information on available positions at Lincoln Laboratory, visit the web at http://www.ll.mit.edu/employment/jobs.html.

Professional Development

Lincoln Laboratory's commitment to the professional development of its staff is founded on the recognition that the Laboratory's extensive research and development contributions are made possible through the staff's continuing excellence and accomplishments.

To encourage professional development, the Laboratory supports a variety of opportunities for employees:

- The tuition assistance program provides support for educational endeavors at MIT or other schools in the Boston area.
- The competitive Lincoln Scholars Program, for which staff are eligible to apply, enables the pursuit of advanced degrees on a full-time basis.
- Distance learning programs—the Carnegie Mellon University Master of Science in Information Technology–Software Engineering and the Pennsylvania State University Master of Professional Studies in Information Sciences—allow staff to complete a degree while continuing to work full time.
- The Technical Education Program offers semester-length courses, taught by senior staff members or professors from area universities, on technical subjects such as electro-optics or circuit design.
- In-house training in computer applications and seminars on topics in management are held regularly.
- Collaborative technical seminar series with MIT, Northeastern University, and other universities bring guest speakers to the Laboratory, while Laboratory staff present at the partner campuses.
- Each week, one or more in-house technical seminars on innovative work are given by staff members and are open to all employees.

Support for professional activities is strong. The Laboratory encourages staff to publish in technical journals, attend conferences, and participate in activities of their professional societies. In addition, interdisciplinary projects allow staff to grow professionally.

The onsite library offers a highly focused, comprehensive collection of technical books, reports, and electronic journals and databases in all Laboratory technology areas.

Information specialists are available to provide training and research support. In addition, the resources of the main MIT library system are available to staff.

Diversity and Inclusion

Lincoln Laboratory is committed to diversity and inclusion in the workforce. The Laboratory recognizes that its continuing success is achieved through the appreciation and support of the diverse talents, ideas, cultures, and experiences of its employees.

The Diversity and Inclusion Office seeks to

- Recruit the best technical and support talent from the diverse national pool of candidates
- Foster a work environment built on trust and inclusion
- Develop all aspects of the Laboratory community through improved mentorship, networking, and staff development
- Adapt training and development approaches to ensure the professional growth of the Laboratory's diverse staff
- Build external and internal relationships that align with the Laboratory's diversity initiatives

Diversity and Inclusion Initiatives

- Recruiting efforts and outreach to minority student organizations have been enhanced to increase the hiring of highly qualified women and minority technical professionals.
- The Lincoln Laboratory Technical Women's Network promotes the recruitment, retention, and achievement of technical women employees.
- The Lincoln Laboratory New Employee Network provides resources and activities to help employees transition from their previous environment to Lincoln Laboratory and the region.
- Supportive mentoring programs have been established within technical groups, as well as by the Technical Women's and New Employee Networks.

For more information about Laboratory participation in diversity programs, visit the web at http://www.ll.mit.edu/employment/diversity.html.

Work–Life Balance

Lincoln Laboratory recognizes that a balance between work and personal life is essential for employees' well being. The Laboratory offers a number of services to assist employees in maintaining such a balance, as well as offering flexible work schedules, part-time employment, and telecommuting opportunities.

Child Care

The Technology Children's Center facility in Lexington (TCC Lincoln Laboratory) is just 1.3 miles from the Laboratory and provides developmentally based infant, toddler, and preschool programs for children from 8 weeks to 5–6 years old. Technology Children's Centers are managed by Bright Horizons and overseen by the MIT Center for Work, Family & Personal Life.

Health and Wellness Center

The Health and Wellness Center houses a medical facility operated by MIT Medical and a fitness center. The medical center offers primary care services for members of the MIT Health Plan and brief medical assistance for employees. The Fitness Center, which all employees are eligible to join, is run by the MIT Athletic Department.

MIT Activities Committee (MITAC)

MITAC promotes the enjoyment of Boston-area cultural and recreational activities by offering opportunities for or discount tickets to everything from hayrides to NYC shopping sprees to ski getaways, as well as to various sporting events, exhibitions, theater, and musical performances.

MIT Federal Credit Union

All Lincoln Laboratory employees may become members of the MIT Federal Credit Union, which offers savings plans and low-interest loans.

Professional and Community Enhancement (PACE) Committee

The role of the PACE Committee is to assist the Director in ensuring that Lincoln Laboratory provides both a productive workplace and a supportive and diverse community. The PACE Committee helps with decisions about the child-care facility, professional development opportunities, mentoring, and other workplace concerns.

Commuter Services

Lincoln Laboratory encourages sharing transportation to work and using public transportation through several programs that offer employees assistance with commuting:

- Hitch-a-Ride Matching Service
- Rideshare Program
- Guaranteed Ride Home Program
- MBTA Pass Program

Brown Bag Seminars

The Human Resources Department at Lincoln Laboratory offers a wide range of seminars, free of charge to employees. Held about once a month and called Brown Bag Seminars because they are advertised as "bring your lunch" events, the seminars are presented by community experts on topics such as parenting, communication, elder care, and managing finances.

The Ombudspersons Program

The Lincoln Laboratory ombudspersons are employees who have been appointed by the Director to help resolve employee concerns. Ombudspersons provide informal, impartial assistance that may facilitate fair and equitable resolutions of problems or disputes. Ombudspersons do not represent anyone; they act as neutral parties and respect the rights of privacy of individuals they are helping.

Facilities and Field Sites

Facilities

Microelectronics Laboratory

The Lincoln Laboratory Microelectronics Laboratory is a state-of-the-art semiconductor research and fabrication facility supporting a wide range of Lincoln Laboratory programs. The 70,000 sq ft facility has 8100 sq ft of class-10 and 10,000 sq ft of class-100 cleanroom areas.

The equipment set in this laboratory is continually updated and includes a production-class complementary metal-oxide semiconductor (CMOS) toolset with angled ion-implantation, cluster-metallization, and dry-etch equipment; chemical-mechanical planarization equipment; and rapid thermal processing and advanced lithography capabilities. A molecular-beam epitaxy system is used to provide high sensitivity and highly stable back-illuminated devices in the ultraviolet and extreme ultraviolet ranges. In addition, the Microelectronics Laboratory supports advanced packaging with a precision multichip module (MCM) technology and an advanced three-dimensional circuit-stacking technology.

Lincoln Space Surveillance Complex

The Lincoln Space Surveillance Complex in Westford, Massachusetts, has played a key role in space situational

awareness and the Laboratory's overall space surveillance mission. The site comprises three major radars—Millstone Deep-Space Tracking Radar (an L-band radar), Haystack Long-Range Imaging Radar (X-band), and the Haystack Auxiliary Radar (Ku-band).

The Millstone Hill Radar is used for tracking space vehicles and space debris. Like Millstone, Haystack is also a contributing sensor to the U.S. Space Surveillance Network, collecting radar data on space objects. The Haystack Auxiliary Radar was built in 1993 by Lincoln Laboratory to augment satellite imaging and space-debris data collections.

RF System Test Facility

The antenna and radar cross-section measurements facility, constructed at Lincoln Laboratory on Hanscom Air Force Base, was designed with a rapid prototyping focus for radar and communications systems development.

There are five indoor test ranges: a small shielded chamber for electromagnetic induction measurements; two small utility ranges consisting of a tapered anechoic chamber covering and a millimeter-wave anechoic chamber; a compact range; and a systems development chamber that works in conjunction with an instrumentation laboratory. In addition to the chambers, multipurpose signal generation, data acquisition, and control and recording instrumentation in a systems integration laboratory provide a supporting role in the rapid prototyping of RF systems. A high-bay staging area and machine shop are used in supporting the development of rapid prototype antennas. The smaller utility chambers are used in developing antennas and subsystems that can be tested in an integrated RF system in the larger compact range and system test chambers.

Airborne Test Bed Facility

The Laboratory operates the main hangar on the Hanscom Air Force Base flight line. This ~93,000 sq ft building accommodates the Laboratory's airborne test bed and a complex of state-of-the-art antenna test chambers. The facility houses several Lincoln Laboratory–operated aircraft.

Lincoln Laboratory Grid

The Lincoln Laboratory Grid is an interactive, on-demand parallel computing system that uses a large computing cluster to enable Laboratory researchers to augment the processing power of desktop systems with high performance computational cluster nodes to process larger sets of sensor data, create higher-fidelity simulations, and develop entirely new algorithms.

Optical Systems Test Facility

The Optical Systems Test Facility was established at Lincoln Laboratory to support a broad scope of program areas, encompassing tactical ground-based sensors through strategic space-based sensors.

The Optical Systems Test Facility comprises several separate ranges developed as a coordinated set of test sites at the Laboratory. Currently, four separate ranges are housed in the facility: an active range (Laser Radar Test Facility), a passive range (Seeker Experimental System), an aerosol range (Standoff Aerosol Active Signature Testbed), and an optical material measurements range.

Environmental Test Laboratory

The Environmental Test Laboratory is one of the Engineering Division's facilities used by coalition project teams for demonstrating novel ground-based, sea-based, airborne, and space-based systems. This laboratory supports both small rapid development efforts and large systems development. The laboratory's vibration systems

are used for sinusoidal, random vibration, and shock-response testing. The vacuum systems test high-altitude and satellite hardware. Thermal chambers test hardware limits at hot and cold temperatures.

Polymer Laboratory

The Engineering Division's Polymer Laboratory supports Lincoln Laboratory's prototype building efforts. It is used for composite assemblies, adhesives and elastomeric molding, priming and painting, circuit board conformal coating, material property testing, heat treatment, and vacuum bagging.

Net-Centric and Cyber Center

The Lincoln Net-Centric and Cyber Center, used by researchers in multiple mission areas, is a facility that enables rapid deployment and demonstrations of network-centric and cyber architectures.

Air Traffic Management Laboratory

The Air Traffic Management (ATM) Laboratory is used to test and demonstrate a variety of air traffic surveillance, aviation weather, and decision support systems. Systems currently integrated in the ATM Lab include the Corridor Integrated Weather System, the Enhanced Regional Situation Awareness system, a Runway Status Lights system, and the Enhanced Traffic Management System. Each of these systems is connected to live data from various field sites and national systems.

Integrated Weather and Air Traffic Test Facility

The Integrated Weather and Air Traffic Test Facility supports the Laboratory's work on improvements in flight safety and efficiency. Among the facility's resources is a real-time operations center for various live prototype tests, including tests of the Federal Aviation Administration's (FAA) Corridor Integrated Weather System. The facility

is also connected to the FAA's Enhanced Traffic Management System, which supplies flight track information for all aircraft in the country. The facility's computer room houses a 200+-node computer cluster and 300 terabytes of data storage used to keep the real-time systems running, as well as a large complement of computers used for analysis.

Decision Support Laboratories

The Decision Support Laboratories provide development, evaluation, and visualization capabilities for decision support activities in a number of areas, including intelligence, surveillance, and reconnaissance; integrated sensing; space situational awareness; air traffic management; and air and missile defense.

Field Sites

Reagan Test Site, Kwajalein Atoll, Marshall Islands

Lincoln Laboratory serves as the scientific advisor to the Reagan Test Site at the U.S. Army Kwajalein Atoll installation located about 2500 miles WSW of Hawaii. Twenty staff members 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 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.

Experimental Test Site, White Sands Missile Range, New Mexico

The Experimental Test Site (ETS) is an electro-optical test facility located on the grounds of the White Sands Missile Range in Socorro, New Mexico. Situated next to the U.S. Air Force's Ground-based Electro-Optical Deep Space Surveillance field site, the ETS is operated by the Laboratory for the Air Force. The principal mission of

the ETS is the development, evaluation, and transfer of advanced electro-optical space surveillance technologies. It is a national resource that supports measurements and operational surveillance tasking for programs such as those involving near-Earth and deep-space objects.

Pacific Missile Range Facility, Kauai, Hawaii

The Pacific Missile Range Facility (PMRF) on the Hawaiian island of Kauai is one of the Pacific ranges supporting experimental and developmental testing of the Ballistic Missile Defense System. Lincoln Laboratory personnel at PMRF provide technical advice, consultation, and analysis support as requested by government leadership at the Range. The Laboratory has provided significant inputs into sensor designs and implementations for PMRF.

Field Offices

Air and Missile Defense Field Site
Arlington, Virginia

Aviation Liaison Office
Washington, D.C.

Ground-based Electro-Optical Deep Space Surveillance and Space Surveillance Telescope Field Sites
Socorro, New Mexico

High Energy Laser Systems Test Facility Field Site
White Sands Missile Range, New Mexico

Huntsville Field Office
Huntsville, Alabama

MIT Lincoln Laboratory
Joint National Integration Center (JNIC)
Schriever Air Force Base, Colorado

MIT Lincoln Laboratory
Missile Defense National Team Office
Washington, D.C.

Nevada Field Site
Henderson, Nevada

Space and Missile Systems Center Liaison Office
El Segundo, California

346th Test Squadron Support
Lackland Air Force Base, Texas

Vandenberg Air Force Base Field Office
Vandenberg Air Force Base, California

National Air Intelligence Center
Wright-Patterson Air Force Base, Ohio

MIT Lincoln Laboratory
at National Radio Astronomy Observatory
Green Bank, West Virginia

MIT Lincoln Laboratory
Airborne Laser Program Office
Kirtland Air Force Base, New Mexico

Technology Transfer

Lincoln Laboratory has a long history of promoting technology transfer for application in the defense and the civil sectors. Many technologies initially developed to meet defense requirements have been re-adapted for commercial use. For example, under the U.S. Air Force's Semi-Automatic Ground Environment air defense program of the 1950s, Lincoln Laboratory's expansion of the capabilities of MIT's Whirlwind computer, the first to operate in real time and to use video displays for output, led to the development of the IBM 704 business computer. Future developments led to minicomputers in the 1960s.

Lincoln Laboratory's focus on adapting and demonstrating new, advanced capabilities to enhance existing systems results in important technology transfer opportunities. A common strategy for achieving transition is to share the "architectural recipe" and work with commercial component and subsystem suppliers to assure that technology advances demonstrated by the Laboratory can be duplicated by industry.

One reason for the Laboratory's success in transferring technology is its participation in sponsor-supported programs with industry. Such programs complement the Laboratory's work on developing and prototyping new device concepts.

Transfer of technology is accomplished in several ways as circumstances allow:

- Direct transfer of designs and specifications
- Funded industrial development of Lincoln Laboratory–designed subsystems
- One-on-one technical meetings
- Open technical seminars
- Industry-wide workshops in areas of the Laboratory's expertise
- Establishment of advanced test bed systems against which industry can develop systems and verify performance

Spin-off Companies

One measure of the Laboratory's contribution to the nation's economy is its success in transferring technology to spin-off companies. Since the Laboratory's inception, more than 90 high-technology companies have evolved from the Laboratory's technology development. These companies' services and products range from multimedia software services to advanced semiconductor lithography. The spin-off companies are large organizations such as MITRE, a not-for-profit research and development corporation, and small businesses such as TeK Associates, a software consulting firm, and are found not only in Massachusetts but also in states beyond.

Notable Spin-off Companies

MITRE Corporation
Digital Equipment Corporation
American Power Conversion Corporation
Applicon, Inc.
Arcon Corporation
Axsun Technologies, Inc.
Centocor, Inc.
Computer Corporation of America
HighPoint Systems, Inc.
Innovative Biosensors, Inc.

Kenet, Inc.
Kopin Corporation
Lasertron, Inc.
LightLab Imaging LLC
Metric Systems Corporation
Photon, Inc.
TeK Associates
Telenet Communications, Inc.
Tyco Laboratories, Inc.
XonTech, Inc.

Patents

Lincoln Laboratory has contributed to the nation's and the world's technical knowledge base through the U.S. patents issued for its technologies. Laboratory technical innovations licensed to industry have enabled many commercial-sector applications, from air traffic management systems to semiconductor processing to biological-agent sensors. In the last 58 years, approximately 696 U.S. patents have been issued for advancements and inventions developed by Lincoln Laboratory researchers.

Recent Patents for Lincoln Laboratory–Developed Technology

- *Device for Subtracting or Adding Charge in a Charge-Coupled Device*
  U.S. Patent No.: 7,750,962; 6 July 2010
- *GPS-Based Attitude Reference System*
  U.S. Patent No.: 7,760,139; 20 July 2010
- *Method and Apparatus for Simultaneously Measuring a Three-Dimensional Position of a Particle in a Flow*
  U.S. Patent No.: 7,772,579; 10 August 2010
- *Cube Coordinate Subspaces for Nonlinear Digital Predistortion*
  U.S. Patent No.: 7,808,315; 5 October 2010
- *Method and Apparatus for Measuring a Position of a Particle in a Flow*
  U.S. Patent No.: 7,821,636; 26 October 2010

- *Digital Photon-Counting Geiger-Mode Avalanche Photodiode Solid-State Monolithic Intensity Imaging Focal-Plane with Scalable Readout Circuitry*
  U.S. Patent No.: 7,858,917; 28 December 2010
- *System and Method for Providing a High Frequency Response Silicon Photodetector*
  U.S. Patent No.: 7,880,204; 1 February 2011

Subcontracts with Business and Universities

Lincoln Laboratory contracts with companies to design and fabricate developmental hardware and material. The technical expertise developed by companies during the Laboratory-funded proof-of-concept phase is carried forward to the production phase. Often, this prototype work results in business for companies who later produce the hardware/material commercially. The Laboratory also contracts with universities for basic and applied research; the collaborations forged through these partnerships also promote the exchange of technology and knowledge.

Cooperative Research & Development Agreements and the Small Business Technology Transfer Program

Lincoln Laboratory engages in a limited number of Cooperative Research and Development Agreements (CRADAs) and Small Business Technology Transfer Program (STTR) arrangements. Both these arrangements are mechanisms for increasing interactions with industry, thus promoting mutual knowledge exchange and technology transfer, and benefiting both partners by providing them with R&D they might not readily accomplish within their budgets and facilities.

Technologies investigated through these arrangements are those consistent with the Laboratory's defined mission areas and are frequently ones that enable advancements to processes and devices.

Small Business Office

Lincoln Laboratory has a strong program designed to afford small business concerns, as defined by the U.S. government, the maximum opportunity to compete for purchase orders. The Small Business Office (SBO) ensures that small business, veteran-owned small business, service-disabled veteran-owned small business, HUBZone small business, small disadvantaged business, and woman-owned small business concerns, as well as historically black colleges or universities or minority institutions, are given the maximum possible opportunity to participate in Laboratory acquisitions.

The Lincoln Laboratory SBO can be reached at SBLO@ll.mit.edu or 781-981-SBLO (781-981-7256).

For more information on the SBO, visit the web at http://www.ll.mit.edu/about/SmallBusiness/smallbusiness.html.

Collaborations with MIT Campus and Other Universities

Programs

Advanced Concepts Committee

The Lincoln Laboratory Advanced Concepts Committee (ACC) supports the development of innovative concepts that address important technical problems of national interest. Collaborative efforts between Lincoln Laboratory and research universities are encouraged. The ACC provides seed funding, as well as technical and programmatic support, to investigators with new technology ideas.

Integrated Photonics Initiative

A unique collaboration between Lincoln Laboratory and the MIT campus is the Integrated Photonics Initiative (IPI), a multiyear, Laboratory-funded effort that enhances the research experience for PhD candidates working on integrated photonics devices and subsystems for potential insertion into advanced communications systems. The Laboratory's specialized facilities and expertise in applied research add another dimension to the students' thesis development. Monthly IPI status meetings rotating between the Laboratory and the campus foster interaction between the students, Laboratory staff, and campus faculty.

New Technology Initiatives Program

The New Technology Initiatives Program (NTIP) supports initiatives that significantly extend the application of new technologies and approaches to our nation's current and future problems. The NTIP works with the Laboratory community and outside resources to identify user needs, capability drivers, and enabling technologies.

Technical Seminar Series

Members of the technical staff at Lincoln Laboratory present seminars to interested college and university groups. The 55 currently available seminars from which interested university groups can choose include ones in air traffic control, solid-state devices and materials, communications systems, and space control technology.

Collaboration with the MIT Department of Aeronautics and Astronautics

Students from two courses in the MIT Department of Aeronautics and Astronautics built an unmanned aircraft that will carry a Lincoln Laboratory payload for measurement of ground-based antenna patterns. The two-semester project required students to design, construct, and flight test the vehicle. Staff from the Laboratory's Tactical Defense Systems Group provided design guidance and test-range support while acting as the "customer" for the aircraft. This project afforded students a real-world experience of developing a product to meet customer specifications. After payload integration, the Laboratory will demonstrate the system's operational capability in spring 2011.

Visit the web at http://www.ll.mit.edu/college/techseminars.html to see a complete list of available seminars.

Student Programs

MIT Undergraduate Research Opportunities Program

Lincoln Laboratory is one of the centers with which undergraduates may partner under MIT's Undergraduate Research Opportunities Program (UROP). UROP cultivates research partnerships between MIT undergraduates and faculty, offering students the chance to work on cutting-edge research and participate in each phase of standard research activity.

MIT VI-A Master of Engineering Thesis Program

Lincoln Laboratory is an industry partner of MIT's Department of Electrical Engineering and Computer Science VI-A Master of Engineering Thesis Program, which matches industry mentors with undergraduate students who have demonstrated excellent academic preparation and motivation. Students in the VI-A program spend two summers as paid interns, participating in projects related to their fields. Then, the students move on to developing their master of engineering theses under the supervision of both Laboratory engineers and MIT faculty.

MIT Research Assistants

As part of the research collaboration between MIT campus and Lincoln Laboratory, MIT graduate students are supported as research assistants while working on Laboratory programs.

University Cooperative Education Program

Technical groups at Lincoln Laboratory employ students from MIT, Northeastern University, and other area colleges as co-ops working full time with mentors during the summer or work/study semesters and part time during academic terms.

United States Service Academy Program

Lincoln Laboratory offers summer internships to cadets from the U.S. Military Academy and the U.S. Air Force Academy.

Graduate Fellowship Program

Lincoln Laboratory offers a limited number of graduate fellowships to science and engineering students pursuing MS or PhD degrees at partner universities. The fellowship program awards funds to support a Fellow's stipend, supplement a graduate assistantship, or subsidize other direct research expenses during the final phases of students' thesis research.

Summer Research Program

Lincoln Laboratory offers undergraduate and graduate students the opportunity to gain hands-on experience in a leading-edge research environment. Program participants contribute to projects and gain experience that complements their courses of study. Each summer, the Laboratory hires, on average, approximately 100 paid interns from top universities.

WPI Major Qualifying Project Program

Lincoln Laboratory collaborates with Worcester Polytechnic Institute (WPI) in its Major Qualifying Project (MQP) program, which requires students to complete an undergraduate project equivalent to a senior thesis. The MQP demonstrates the application of skills, methods, and knowledge to the solution of a problem representative of the type encountered in industry. Students participating in the program spend nine weeks during the fall term working on their projects full time at Lincoln Laboratory.

Undergraduate Diversity Awards

Lincoln Laboratory established the Undergraduate Diversity Awards to expand opportunities for women and minorities pursuing bachelor's degrees in engineering and science. The award, as determined by the recipient's college, is typically in the form of tuition assistance, support for technical paper presentations, or funds for independent research projects.

For more information on student programs, visit the web at http://www.ll.mit.edu/college/studentprograms.html.

Workshops and Seminars

Lincoln Laboratory hosts annual conferences, workshops, and seminars that bring together members of technical and defense communities to share advancements and ideas. These events foster a continuing dialogue that enhances technology development and provides direction for future research.

Workshops and Seminars

Advanced Technology Joint Advisory Committee (JAC) Technical Seminar

The AET Seminar provides an overview of the solid-state device and electronic subsystems efforts within the Advanced Technology Division.

Air Vehicle Survivability (AVS) Workshop

The AVS Workshop presents the air vehicle survivability community with an update on recent analysis and testing, and provides a forum for relevant briefings from the community.

Ballistic Missile Defense (BMD) Joint Advisory Committee (JAC) Technical Seminar

The BMD JAC Meeting provides the BMD community with an overview of current developments in areas such

as missile defense elements, missile defense architectures, advanced concepts and technology, test infrastructures, and intelligence capabilities.

Cyber and Netcentric Workshop

The Cyber and Netcentric Workshop focuses on cyber security and netcentric operations. The workshop provides the user, acquisition, research, and developer communities with discussions on lessons learned, current trends, technical challenges, and the road ahead.

Defense Technology Seminar (DTS)

The DTS focuses on technologies for the warfighter. Major sessions are devoted to air defense and space situational awareness. New national security challenges in counterinsurgency warfare, homeland security, and network-centric operations are part of the discussion.

High Performance Embedded Computing (HPEC) Workshop

The HPEC Workshop provides U.S. government-funded researchers from academia, industry, and government an opportunity to discuss the impact of multicore processors on DoD high-performance embedded computing systems.

Homeland Protection Workshop Series

The Homeland Protection Workshop Series provides the latest technological developments in homeland air defense, border security, critical infrastructure protection, disaster management, surveillance and detection of chemical and biological agents, and screening systems.

Intelligence, Surveillance, and Reconnaissance (ISR) Workshop

The ISR Workshop is a national forum to present and discuss technology developments and new system concepts in intelligence, surveillance, and reconnaissance.

Lincoln Laboratory Communications Conference

The two-day Communications Conference offers users, developers, and researchers of Department of Defense (DoD) communication systems the opportunity to exchange ideas on current trends and technical challenges in developing future DoD communication architectures. A focus is on the constraints imposed on tactical and strategic communications systems by the emerging needs for greater capacity and robustness.

Space Control Conference

The Space Control Conference brings together the space control community to address current capabilities, future needs, and technology development.

Attendance at workshops and seminars at Lincoln Laboratory is by invitation; participants must complete and submit the Laboratory's security authorization form.

For more information on workshops, seminars, and conferences held at Lincoln Laboratory, visit the web at http://www.ll.mit.edu/workshops/index.html.

Technical Education Courses—Invited

Lincoln Laboratory presents technical courses designed for military personnel and government-employed civilians. These by-invitation courses typically run from three to five days and include seminars and tours at the Laboratory's specialized facilities.

Ballistic Missile Defense (BMD) Technology

The BMD Technology course provides an understanding of BMD systems concepts and technologies to military officers and DoD civilians involved in BMD systems development and acquisition.

Networking and Communications

Through lectures, demonstrations, and tours, the Networking and Communications course provides fundamentals and advanced concepts of networks and communications systems for military officers and DoD civilians.

Introduction to Radar Systems

This course has been developed to provide an understanding of radar system concepts and technologies to military officers and DoD civilians involved in radar system development and acquisition.

Technical Education—Online Courses

Lincoln Laboratory online courses consist of video lectures and accompanying PowerPoint lecture notes and charts.

Introduction to Radar Systems

This ten-lecture video course was excerpted from the three-day radar course listed above.

Adaptive Antennas and Phased Arrays

The 16 lectures in this course cover both theory and experiments; lectures 1 to 7 discuss adaptive antennas, and the remaining nine lectures are on phased arrays.

To learn more about the video courses, visit the web at http://www.ll.mit.edu/workshops/education/videocourses/.

Community Outreach

Lincoln Laboratory Community Outreach (LLCO) encourages community service and promotes K–12 education through a variety of initiatives, many in cooperation with the MIT Public Service Center.

Educational Outreach

Lincoln Laboratory Educational Outreach by the Numbers (2010 Totals)

19	100+	5250	10,000+
K–12 STEM programs	Scientists and engineers volunteering for outreach as mentors, speakers, or tour guides	Hours per year supporting STEM programs	Students seeing STEM demonstrations at Lincoln Laboratory and in area schools

Science on Saturday

Lincoln Laboratory technical staff give lively, interactive demonstrations for local area students, their parents, and teachers, at no charge to attendees. These popular events have ranged from hands-on engineering activities, such as building gumdrop towers, to demonstrations on the "magic" of chemistry, lasers and optics, and computers. Annually, 3500 people attend these sessions.

Classroom Presentations

Lincoln Laboratory technical staff members visit local area schools to give presentations and conduct hands-on activities. Since the program's inception in 2007, more than 12,000 students in grades K to 12 have enjoyed presentations on topics such as cryogenics, archaeology, fossils, aerodynamics, chemistry, and physics.

Robotics Outreach at Lincoln Laboratory (ROLL)

ROLL takes advantage of the current popularity of robotics to interest K–12 students in science and technology. ROLL is sponsoring teams in the FIRST (For Inspiration and Recognition of Science and Technology) competitions, hosting robotics workshops at the Laboratory, and providing technical mentors to local area schools and groups. In 2011, Lincoln Laboratory is mentoring 12 teams.

Ceres Connection

Since 2003, Lincoln Laboratory, in partnership with the Society for Science & the Public, has promoted science education through its Ceres Connection program, which names minor planets in honor of students in fifth through twelfth grades and their teachers. Each year approximately 250 students and teachers are selected through the science competitions sponsored by the Society for Science & the Public.

MIT Office of Engineering Outreach Programs (OEOP)

Lincoln Laboratory is collaborating with MIT's Office of Engineering Outreach Programs (OEOP), which runs four enrichment programs for either middle- or high-school students. These programs are aimed at encouraging students, particularly in underserved populations, to pursue careers in science, technology, engineering, and math.

Leadership Initiatives for Teaching and Technology (LIFT²) Teacher Externships

For six years, Lincoln Laboratory has participated in the LIFT² program run by the Metro South/West Regional Employment Board. This professional development program for middle- and high-school science, technology, and math teachers provides teachers with workplace experiences they can then use to relate classroom theory to practical applications.

Armed Forces Communications and Electronics Association (AFCEA) International Program

Lincoln Laboratory participates in an AFCEA educational program by providing summer employment internships for graduating high-school seniors interested in science, technology, math, and engineering. The program fosters interest in science and engineering, and provides opportunities for students to investigate career paths.

Minuteman Career & Technical High School Internship Program

Lincoln Laboratory has established a learning affiliation with nearby Minuteman Career & Technical High School. Under this program, Lincoln Laboratory annually will make available paid, one-semester internships for high-school seniors from the school.

Community Service and Giving

Lincoln Laboratory Giving by the Numbers (2010 Totals)

170	Local families provided with groceries for Thanksgiving
200	"Care" packages sent to deployed troops
300	Gifts donated during the Giving Tree holiday drive
435	Coats collected in the Coats for Kids drive
$600	Raised at the 5K Run for the Veterans' Hospital in Bedford, Massachusetts
$1140	Raised at the used-book sale to support educational programs and Community Giving at MIT
1500	Items collected (socks and undergarments) in the Hannah's Socks drive
$13,000	Raised for the Alzheimer's Association
$15,000	Raised for the Multiple Sclerosis Society in the Bike & Hike the Berkshires fundraiser

Support Our Troops

Lincoln Laboratory runs an ongoing campaign of support for deployed U.S. troops. Donations of food, toiletries, books, and games are collected daily, boxed by volunteers, and mailed weekly. In addition, the program has sent care packages to the children of villages in Afghanistan and Iraq where U.S. troops are serving.

Bike and Hike the Berkshires

The annual fall Bike and Hike the Berkshires event benefits the National Multiple Sclerosis Society Central New England chapter. Teams of bicyclists and walkers gather pledges for completing one of three distance courses up Mount Greylock in western Massachusetts.

Used-Book Drive and Sale

Proceeds from the sale of books and media donated by Laboratory employees are given to Community Giving at MIT to support local charities and to Lincoln Laboratory Community Outreach to fund future educational outreach programs.

Food and Clothing Drives

The LLCO runs food and clothing drives that support local charities. Food items are distributed to food pantries in the area, and clothing is given to a number of shelters and the Salvation Army.

The Holiday Giving Tree

During the winter holiday season, Laboratory employees donate gifts to area residents affected by the economic downturn. The gifts are distributed by Somebody Cares, a national charitable organization with affiliates in the region.

Marshallese Outreach

The Marshallese Outreach program was developed to enrich educational and life experiences of the people of the Marshall Islands, particularly those from Kwajalein Atoll, where Lincoln Laboratory staff work as scientific advisors to the Reagan Test Site located there.

For more about the educational and community service programs of the LLCO, visit the web at http://www.ll.mit.edu/outreach/index.html.

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Communications Office
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MIT Technology Licensing Office
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http://web.mit.edu/tlo/www

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