Amsterdam Institute for Advanced Metropolitan Solutions (AMS Institute),[261] Singapore-MIT Alliance, MIT-Politecnico di Milano,[258][262] MIT-Zaragoza International Logistics Program, and projects in other countries through the MIT International Science and Technology Initiatives (MISTI) program.[258][263]

The mass-market magazine *Technology Review* is published by MIT through a subsidiary company, as is a special edition that also serves as an alumni magazine.[264][265] The MIT Press is a major university press, publishing over 200 books and 30 journals annually, emphasizing science and technology as well as arts, architecture, new media, current events, and social issues.[266]

MIT Microphotonics Center and PhotonDelta founded the global roadmap for integrated photonics: Integrated Photonics Systems Roadmap – International (IPSR-I). The first edition has been published in 2020. The roadmap is an amalgamation of two previously independent roadmaps: the IPSR roadmap of MIT Microphotonics Center and AIM Photonics in the United States, and the WTMF (World Technology Mapping Forum) of PhotonDelta in Europe.[267] In 2022, Open Philanthropy donated $13,277,348 to MIT to study potential risks from AI.[268]

Libraries, collections, and museums

The MIT library system consists of five subject libraries: Barker (Engineering), Dewey (Economics), Hayden (Humanities and Science), Lewis (Music), and Rotch (Arts and Architecture). There are also various specialized libraries and archives. The libraries contain more than 2.9 million printed volumes, 2.4 million microforms, 49,000 print or electronic journal subscriptions, and 670 reference databases. The past decade has seen a trend of increased focus on digital over print resources in the libraries.[269] Notable collections include the Lewis Music Library with an emphasis on 20th and 21st-century music and electronic music,[270] the List Visual Arts Center's rotating exhibitions of contemporary art,[271] and the Compton Gallery's cross-disciplinary exhibitions.[272] MIT allocates a percentage of the budget for all new construction and renovation to commission and support its extensive public art and outdoor sculpture collection.[273][274]

The MIT Museum was founded in 1971 and collects, preserves, and exhibits artifacts significant to the culture and history of MIT. The museum now engages in significant educational outreach programs for the general public, including the annual Cambridge Science Festival, the first celebration of this kind in the United States. Since 2005, its official mission has been, "to engage the wider community with MIT's science, technology and other areas of scholarship in ways that will best serve the nation and the world in the 21st century".[275]

Research

MIT was elected to the Association of American Universities in 1934 and is classified among "R1: Doctoral Universities – Very high research activity";[276][176] research expenditures totaled $952 million in 2017.[277] The federal government was the largest source of sponsored research, with the Department of Health and Human Services granting $255.9 million, Department of Defense $97.5 million, Department of Energy $65.8 million, National Science Foundation $61.4 million, and NASA $27.4 million.[278] MIT employs approximately 1300 researchers in addition to faculty.[279] In 2011, MIT faculty and researchers disclosed 632 inventions, were issued 153 patents, earned $85.4 million

in cash income, and received $69.6 million in royalties.[280] Through programs like the Deshpande Center, MIT faculty leverage their research and discoveries into multi-million-dollar commercial ventures.[281]

In electronics, magnetic-core memory, radar, single-electron transistors, and inertial guidance controls were invented or substantially developed by MIT researchers.[282][283] Harold Eugene Edgerton was a pioneer in high-speed photography and sonar.[284][285] Claude E. Shannon developed much of modern information theory and discovered the application of Boolean logic to digital circuit design theory.[286] In the domain of computer science, MIT faculty and researchers made fundamental contributions to cybernetics, artificial intelligence, computer languages, machine learning, robotics, and cryptography.[283][287] At least nine Turing Award laureates and seven recipients of the Draper Prize in engineering have been or are currently associated with MIT.[288][289]

Current and previous physics faculty have won eight Nobel Prizes,[290] four ICTP Dirac Medals,[291] and three Wolf Prizes predominantly for their contributions to subatomic and quantum theory.[292] Members of the chemistry department have been awarded three Nobel Prizes and one Wolf Prize for the discovery of novel syntheses and methods.[290] MIT biologists have been awarded six Nobel Prizes for their contributions to genetics, immunology, oncology, and molecular biology.[290] Professor Eric Lander was one of the principal leaders of the Human Genome Project.[293][294] Positronium atoms,[295] synthetic penicillin,[296] synthetic self-replicating molecules,[297] and the genetic bases for Amyotrophic lateral sclerosis (also known as ALS or Lou Gehrig's disease) and Huntington's disease were first discovered at MIT.[298] Jerome Lettvin transformed the study of cognitive science with his paper "What the frog's eye tells the frog's brain".[299] Researchers developed a system to convert MRI scans into 3D printed physical models.[300]

In the domain of humanities, arts, and social sciences, as of October 2019 MIT economists have been awarded seven Nobel Prizes and nine John Bates Clark Medals.[290][301] Linguists Noam Chomsky and Morris Halle authored seminal texts on generative grammar and phonology.[302][303] The MIT Media Lab, founded in 1985 within the School of Architecture and Planning and known for its unconventional research,[304][305] has been home to influential researchers such as constructivist educator and Logo creator Seymour Papert.[306]

Spanning many of the above fields, MacArthur Fellowships (the so-called "Genius Grants") have been awarded to 50 people associated with MIT.[307] Five Pulitzer Prize–winning writers currently work at or have retired from MIT.[308] Four current or former faculty are members of the American Academy of Arts and Letters.[309]

Allegations of research misconduct or improprieties have received substantial press coverage. Professor David Baltimore, a Nobel Laureate, became embroiled in a misconduct investigation starting in 1986 that led to Congressional hearings in 1991.[310][311] Professor Ted Postol has accused the MIT administration since 2000 of attempting to whitewash potential research misconduct at the Lincoln Lab facility involving a ballistic missile defense test, though a final investigation into the matter has not been completed.[312][313] Associate Professor Luk Van Parijs was dismissed in 2005 following allegations of scientific misconduct and found guilty of the same by the United States Office of Research Integrity in 2009.[314][315]

In 2019, Clarivate Analytics named 54 members of MIT's faculty to its list of "Highly Cited Researchers". That number places MIT eighth among the world's universities.[316]

Summer program

Massachusetts Institute of Technology holds a "MIT Introduction to Engineering and Science (MITES), a six-week summer program for rising high school seniors. Its purpose is to expose students from underserved and underrepresented backgrounds to the fields of science and engineering. The program also aims to foster an interest in these subject matters and prepare students for the pressures and lifestyle of college life.

MITES was founded in 1974 as the MITE (Minority Introduction to Engineering) Program with the purpose of increasing the number of people from underrepresented backgrounds in the engineering profession. It started out as a two-week intensive program, and later evolved into what is now a six-week program for 60-80 students.

Discoveries and innovation

Natural sciences

- Oncogene – Robert Weinberg discovered genetic basis of human cancer.[317]
- Reverse transcription – David Baltimore independently isolated, in 1970 at MIT, two RNA tumor viruses: R-MLV and again RSV.[318]
- Thermal death time – Samuel Cate Prescott and William Lyman Underwood from 1895 to 1898. Done for canning of food. Applications later found useful in medical devices, pharmaceuticals, and cosmetics.[319]
- Electroweak interaction – Steven Weinberg proposed the electroweak unification theory, which gave rise to the modern formulation of the Standard Model, in 1967 at MIT.[320]

Computer and applied sciences

- Akamai Technologies – Daniel Lewin and Tom Leighton developed a faster content delivery network, now one of the world's largest distributed computing platforms, responsible for serving between 15 and 30 percent of all web traffic.[321]
- Cryptography – MIT researchers Ron Rivest, Adi Shamir and Leonard Adleman developed one of the first practical public-key cryptosystems, the RSA cryptosystem, and started a company, RSA Security.[322]
- Digital circuits – Claude Shannon, while a master's degree student at MIT, developed the digital circuit design theory which paved the way for modern computers.[323]
- Electronic ink – developed by Joseph Jacobson at MIT Media Lab.[324]
- Emacs (text editor) – development began during the 1970s at the MIT AI Lab.[325]
- Flight recorder (black box) – Charles Stark Draper developed the black box at MIT's Instrumentation Laboratory. That lab later made the Apollo Moon landings possible through the Apollo Guidance Computer it designed for NASA.[326]

- GNU Project – Richard Stallman formally founded the free software movement in 1983 by launching the GNU Project at MIT.[327][328][329]
- Julia (programming language) – Development was started in 2009, by Jeff Bezanson, Stefan Karpinski, Viral B. Shah, and Alan Edelman, all at MIT at that time, and continued with the contribution of a dedicated MIT Julia Lab[330]
- Lisp (programming language) – John McCarthy invented Lisp at MIT in 1958.[331]
- Lithium-ion battery efficiencies – Yet-Ming Chiang and his group at MIT showed a substantial improvement in the performance of lithium batteries by boosting the material's conductivity by doping it[332] with aluminium, niobium and zirconium.[333][334]
- Macsyma, one of the oldest general-purpose computer algebra systems; the GPL-licensed version Maxima remains in wide use.[335]
- MIT OpenCourseWare – the OpenCourseWare movement started in 1999 when the University of Tübingen in Germany published videos of lectures online for its *timms* initiative (Tübinger Internet Multimedia Server).[336] The OCW movement only took off, however, with the launch of MIT OpenCourseWare and the Open Learning Initiative at Carnegie Mellon University[337] in October 2002. The movement was soon reinforced by the launch of similar projects at Yale, Utah State University, the University of Michigan and the University of California, Berkeley.[338]
- Perdix micro-drone – autonomous drone that uses artificial intelligence to swarm with many other Perdix drones.[339]
- Project MAC – groundbreaking research in operating systems, artificial intelligence, and the theory of computation. DARPA funded project.[340]
- Radar – developed at MIT's Radiation Laboratory during World War II.[341]
- SKETCHPAD – invented by Ivan Sutherland at MIT (presented in his PhD thesis). It pioneered the way for human–computer interaction (HCI).[342] Sketchpad is considered to be the ancestor of modern computer-aided design (CAD) programs as well as a major breakthrough in the development of computer graphics in general.[343]
- VisiCalc – first spreadsheet computer program for personal computers, originally released for the Apple II by VisiCorp. MIT alumni Dan Bricklin and Bob Frankston rented time sharing at night on an MIT mainframe computer (that cost $1/hr for use).[344]
- World Wide Web Consortium – founded in 1994 by Tim Berners-Lee, (W3C) is the main international standards organization for the World Wide Web[345]
- X Window System – pioneering architecture-independent system for graphical user interfaces that has been widely used for Unix and Linux systems.[346]

Companies and entrepreneurship

MIT alumni and faculty have founded numerous companies, some of which are shown below:[347][348]

- Analog Devices, 1965, co-founders Ray Stata, (SB, SM) and Matthew Lorber (SB)
- BlackRock, 1988, co-founder Bennett Golub, (SB, SM, PhD)
- Bose Corporation, 1964, founder Amar Bose (SB, PhD)
- Boston Dynamics, 1992, founder Marc Raibert (PhD)
- Buzzfeed, 2006, co-founder Jonah Peretti (SM)
- Dropbox, 2007, founders Drew Houston (SB) and Arash Ferdowsi (drop-out)
- Hewlett-Packard, 1939, co-founder William R. Hewlett (SM)
- *HuffPost,* 2005, co-founder Jonah Peretti (SM)
- Intel, 1968, co-founder Robert Noyce (PhD)

- Khan Academy, 2008, founder Salman Khan (SB, SM)[349]
- Koch Industries, 1940, founder Fred C. Koch (SB), sons William (SB, PhD), David (SB)
- Qualcomm, 1985, co-founders Irwin M. Jacobs (SM, PhD) and Andrew Viterbi (SB, SM)
- Raytheon, 1922, co-founder Vannevar Bush (DEng, Professor)
- Renaissance Technologies, 1982, founder James Simons (SB)
- Scale AI, 2016, founder Alexandr Wang (drop-out)
- Texas Instruments, 1930, founder Cecil Howard Green (SB, SM)
- TSMC, 1987, founder Morris Chang (SB, SM)
- VMware, 1998, co-founder Diane Greene (SM)

Traditions and student activities

The faculty and student body place a high value on meritocracy and on technical proficiency.[350][351] MIT has never awarded an honorary degree,[352] nor does it award athletic scholarships,[353] *ad eundem* degrees, or Latin honors[354] upon graduation. However, MIT has twice awarded honorary professorships: to Winston Churchill in 1949 and Salman Rushdie in 1993.[355]

Many upperclass students and alumni wear a large, heavy, distinctive class ring known as the "Brass Rat".[356][357] Originally created in 1929, the ring's official name is the "Standard Technology Ring".[358] The undergraduate ring design (a separate graduate student version exists as well) varies slightly from year to year to reflect the unique character of the MIT experience for that class, but always features a three-piece design, with the MIT seal and the class year each appearing on a separate face, flanking a large rectangular bezel bearing an image of a beaver.[356] The initialism IHTFP, representing the informal school motto "I Hate This Fucking Place" and jocularly euphemized as "I Have Truly Found Paradise", "Institute Has The Finest Professors", "Institute of Hacks, TomFoolery and Pranks", "It's Hard to Fondle Penguins", and other variations, has occasionally been featured on the ring given its historical prominence in student culture.[359]

Caltech Rivalry

MIT also shares a well-known rivalry with the California Institute of Technology (Caltech), stemming from both institutions' reputations as two of the highest ranked and most highly recognized science and engineering schools in the world.[360] The rivalry is an unusual college rivalry given its focus on academics and pranks instead of sports, and due to the geographic distance between the two (their campuses are separated by about 2580 miles and are on opposite coasts of the United States). In 2005, Caltech students pranked MIT's Campus Preview Weekend by distributing t-shirts that read "MIT" on the front, and "...because not everyone can go to Caltech" on the back.[361][362][363] Additionally, the word Massachusetts in the "Massachusetts Institute of Technology" engraving on the exterior of the Lobby 7 dome was covered with a banner so that it read "That Other Institute of Technology". In 2006, MIT retaliated by posing as contractors and stealing the 1.7-ton, 130-year-old Fleming cannon, a Caltech landmark. The cannon was relocated to Cambridge, where it was displayed in front of the Green Building during the 2006 Campus Preview Weekend.[364][365] In September 2010, MIT students unsuccessfully tried to place a life-sized model of the TARDIS time machine from the *Doctor Who* (1963–present) television series on top of Baxter Hall at Caltech. A few months later, Caltech students collaborated to help MIT students place the TARDIS on top of their originally