Institute of Electrical and Electronics Engineers

"IEEE" redirects here. It is not to be confused with IEE (disambiguation).

Not to be confused with the Institution of Electrical Engineers (IEE, I-double-E).

Not to be confused with Institution of Electrical and Electronic Incorporated Engineers.

This article **relies too much on references to primary sources**. Please improve this by adding secondary or tertiary sources. *(November 2018) (Learn how and when to remove this template message)*

Institute of Electrical and Electronics Engineers

Founded	January 1, 1963; 57 years ago
Type	Professional association
Tax ID no.	13-1656633[1]
Legal status	501(c)(3) nonprofit organization
Focus	Electrical, Electronics, Communications, Computer Engineering, Computer Science and Information Technology[2]
Location	• Piscataway, New Jersey, US
Origins	Merger of the American Institute of Electrical Engineers and the Institute of Radio Engineers
Method	Industry standards, Conferences, Publications

Members	420,000+
Key people	Stephen Welby (Executive director & COO) Toshio Fukuda (President & CEO)
Revenue	US$413 million
Website	www.ieee.org

The **Institute of Electrical and Electronics Engineers** (**IEEE**) is a professional association for electronic engineering and electrical engineering (and associated disciplines) with its corporate office in New York City[3] and its operations center in Piscataway, New Jersey. It was formed in 1963 from the amalgamation of the American Institute of Electrical Engineers and the Institute of Radio Engineers.[4]

Due to its expansion of scope into so many related fields, it is simply referred to by the letters I-E-E-E (pronounced Eye-triple-E), except on legal business documents. As of 2018, it is the world's largest association of technical professionals[5] with more than 423,000 members in over 160 countries around the world.[6] Its objectives are the educational and technical advancement of electrical and electronic engineering, telecommunications, computer engineering and allied disciplines.[3][7]

Contents

History

Origins

The IEEE traces its founding to 1884 and the American Institute of Electrical Engineers. In 1912, the rival Institute of Radio Engineers was formed. Although the AIEE was initially larger, the IRE attracted more students and was larger by the mid 1950s.

Growth

The AIEE and the IRE merged to create the IEEE on 1 January 1963. At that time, the combined group had 150,000 members, 93% in the United States. By 1984 there were 250,000 members, 20% of whom were outside the U.S. Today, IEEE has over 420,000 members in 160 countries, with 44.5 percent outside of the U.S This international growth continues today.[8] The IEEE headquarters is in New York City at 3 Park Ave, but most business is done at the IEEE Operations Center[9] in Piscataway, NJ, first occupied in 1975.

Controversies

Huawei Ban

In May 2019, IEEE banned Huawei employees from peer-reviewing papers or handling papers as editors. As members of its standard-setting body, Huawei employees can also continue to exercise their voting rights, attend standards development meetings, submit proposals and comment in public discussions on new standards.[10][11][12]

The IEEE ban has sparked outrage among Chinese scientists on social media. Some professors in China decided to quit from IEEE.[13][14]

On June 3, 2019, IEEE released a statement, in which it proactively lifted restrictions on Huawei's editorial and peer review activities.[15][16][17]

Publications

IEEE produces over 30% of the world's literature in the electrical and electronics engineering and computer science fields, publishing well over 100 peer-reviewed journals[18][19] and magazines; it also sponsors over 1800 conferences and events.

The published content in these journals as well as the content from several hundred annual conferences sponsored by the IEEE are available in the IEEE online digital library and research database, IEEE *Xplore*,[20] for subscription-based access and individual publication purchases.[21]

In addition to journals and conference proceedings, the IEEE also publishes tutorials and standards that are produced by its standardization committees. The organization also has its own IEEE format paper. In writing IEEE papers, it is not just a matter of mentioning the author's name or the page number or the date an article was published. The most important aspect is referring to the source by indicating its number in a square bracket and ensure it corresponds with the full citation as mentioned in the reference list.[22]

Educational activities

The IEEE provides learning opportunities within the engineering sciences, research, and technology.

IEEE offers educational opportunities such as *IEEE e Learning Library*,[23] the *Education Partners Program*,[24] *Standards in Education*[25] and *Continuing Education Units* (CEUs).[26]

IEEE eLearning Library is a collection of online educational courses designed for self-paced learning. Education Partners, exclusive for IEEE members, offers on-line degree programs, certifications and courses at a 10% discount. The Standards in Education website explains what standards are and the importance of developing and using them. The site includes tutorial modules and case illustrations to introduce the history of standards, the basic terminology, their applications and impact on products, as well as news related to standards, book reviews and links to other sites that contain information on standards. Currently, twenty-nine states in the United States require Professional Development Hours (PDH) to maintain a Professional Engineering license,[27][28] encouraging engineers to seek Continuing Education Units (CEUs) for their participation in continuing education programs. CEUs readily translate into Professional Development Hours (PDHs), with 1 CEU being equivalent to 10 PDHs. Countries outside the United States, such as South Africa, similarly require continuing professional development (CPD) credits, and it is anticipated that IEEE Expert Now courses will feature in the CPD listing for South Africa.

IEEE also sponsors a website designed to help young people better understand engineering, and how an engineering career can be made part of their future. Students of age 8–18, parents, and teachers can explore the site to prepare for an engineering career, ask experts engineering-related questions, play interactive games, explore curriculum links, and review lesson plans. This website also allows students to search for accredited engineering degree programs in Canada and the United States; visitors are able to search by state/province/territory, country, degree field, tuition ranges, room and board ranges, size of student body, and location (rural, suburban, or urban).

Through the Student Activities Committee, IEEE facilitates partnership between student activities and all other IEEE entities.[29]

Membership grades

Most IEEE members are electrical and electronics engineers, but the organization's wide scope of interests has attracted people in other disciplines as well (e.g., computer science, software engineering, mechanical engineering, civil engineering, biology, physics, and mathematics).

An individual can join the IEEE as a student member, professional member, or associate member. In order to qualify for membership, the individual must fulfill certain academic or professional criteria and abide to the code of ethics and bylaws of the organization. There are several categories and levels of IEEE membership and affiliation:

- **Student Members**: Student membership is available for a reduced fee to those who are enrolled in an accredited institution of higher education as undergraduate or graduate students in technology or engineering.
- **Graduate Student Members**: Graduate Student Membership is discounted but members at this level have greater privileges than do Student Members.
- **Members**: Ordinary or professional *Membership* requires that the individual have graduated from a technology or engineering program of an appropriately accredited institution of higher education or have demonstrated professional competence in technology or engineering through at least six years of professional work experience. An associate membership is available to an individual whose area of expertise falls outside the scope of the IEEE or who does not, at the time of enrollment, meet all the requirements for full membership. Students and Associates have all the privileges of members, except the right to vote and hold certain offices.
- **Society Affiliates**: Some IEEE Societies also allow a person who is not an IEEE member to become a *Society Affiliate* of a particular Society within the IEEE, which allows a limited form of participation in the work of a particular IEEE Society.
- **Senior Members**: Upon meeting certain requirements, a professional member can apply for *Senior Membership*, which is the highest level of recognition that a professional member can directly apply for. Applicants for Senior Member must have at least three letters of recommendation from Senior, Fellow, or Honorary members and fulfill other rigorous requirements of education, achievement, remarkable contribution, and experience in the field. The Senior Members are a selected group, and certain IEEE officer positions are available only to Senior (and Fellow) Members. Senior Membership is also one of the requirements for those who are nominated and elevated to the grade *IEEE Fellow*, a distinctive honor.
- **Fellow Members**: The Fellow grade is the highest level of membership, conferred by the IEEE Board of Directors upon persons "with [extraordinary records] of accomplishments in any of the IEEE fields of interest". It cannot be applied for directly by the member; the candidate must be nominated by others, and of the Institute's voting membership no more than one in one thousand can be selected as Fellows in any given year.[30]
- **Honorary Members**: Individuals who are not IEEE members but have demonstrated exceptional contributions, such as being a recipient of an IEEE Medal of Honor, may receive *Honorary Membership* from the IEEE Board of Directors.[31]
- **Life Members**, **Life Senior Members** and **Life Fellows**: Members who have reached the age of 65 and whose number of years of membership plus their age in years adds up to at least 100 are recognized as *Life Members*, *Life Senior Members* or *Life Fellows*, as appropriate.

Medals and awards

Main article: List of IEEE awards

Technical societies under the IEEE

Various technical areas are addressed by IEEE's 39 societies, each one focused on a certain knowledge area. They provide specialized publications, conferences, business networking and sometimes other services.[32]

- IEEE Aerospace and Electronic Systems Society
- IEEE Antennas & Propagation Society
- IEEE Broadcast Technology Society
- IEEE Circuits and Systems Society
- IEEE Communications Society
- IEEE Components, Packaging & Manufacturing Technology Society
- IEEE Computational Intelligence Society
- IEEE Computer Society
- IEEE Consumer Electronics Society
- IEEE Control Systems Society
- IEEE Dielectrics & Electrical Insulation Society
- IEEE Education Society
- IEEE Electromagnetic Compatibility Society
- IEEE Electron Devices Society
- IEEE Engineering in Medicine and Biology Society
- IEEE Geoscience and Remote Sensing Society
- IEEE Industrial Electronics Society
- IEEE Industry Applications Society
- IEEE Information Theory Society
- IEEE Instrumentation & Measurement Society
- IEEE Intelligent Transportation Systems Society
- IEEE Magnetics Society
- IEEE Microwave Theory and Techniques Society
- IEEE Nuclear and Plasma Sciences Society
- IEEE Oceanic Engineering Society
- IEEE Photonics Society
- IEEE Power Electronics Society
- IEEE Power & Energy Society
- IEEE Product Safety Engineering Society
- IEEE Professional Communication Society
- IEEE Reliability Society
- IEEE Robotics and Automation Society
- IEEE Signal Processing Society
- IEEE Society on Social Implications of Technology
- IEEE Solid-State Circuits Society
- IEEE Systems, Man & Cybernetics Society
- IEEE Ultrasonics, Ferroelectrics & Frequency Control Society
- IEEE Technology and Engineering Management Society
- IEEE Vehicular Technology Society

Technical councils

IEEE technical councils are collaborations of several IEEE [societies](#) on a broader knowledge area. There are currently seven technical councils:[33]

- [IEEE Biometrics Council](#)
- [IEEE Council on Electronic Design Automation](#)
- [IEEE Nanotechnology Council](#)
- [IEEE Sensors Council](#)
- IEEE Council on Superconductivity
- IEEE Systems Council
- IEEE Council on RFID (CRFID)[34]

Technical Committees

To allow a quick response to new innovations, IEEE can also organize technical committees on top of their [technical societies](#) and [technical councils](#). There are currently over twenty such technical committees.[35]

Country and Local Chapters

A large number of countries have their own IEEE chapters. These chapters can then result into multiple local chapters to unite local members with similar technical interests.[36]

IEEE Foundation

The **IEEE Foundation**[37] is a charitable foundation established in 1973[38] to support and promote technology education, innovation and excellence.[39] It is incorporated separately from the IEEE, although it has a close relationship to it. Members of the Board of Directors of the foundation are required to be active members of IEEE, and one third of them must be current or former members of the IEEE Board of Directors.

Initially, the role of the IEEE Foundation was to accept and administer donations for the IEEE Awards program, but donations increased beyond what was necessary for this purpose, and the scope was broadened. In addition to soliciting and administering unrestricted funds, the foundation also administers donor-designated funds supporting particular educational, humanitarian, historical preservation, and peer recognition programs of the IEEE.[39] As of the end of 2014, the foundation's total assets were nearly $45 million, split equally between unrestricted and donor-designated funds.[40]

Legal issues

In May 2018, Intellitech Corp., an [EDA](#) [software](#) company from [Dover, New Hampshire](#), filed a suit against IEEE to the [United States District Court for the District of New Hampshire](#), claiming

that the IEEE had copied, used and modified technical documents which contained Intellitech's watermark, and moved for summary judgment, requesting to establish IEEE's liability for copyright infringement. The court denied Intellitech's request for summary judgment and concluded that the doctrine of implied license put forth by the IEEE is highly fact-specific, thus precluding summary judgment.[41] The court also denied the IEEE's motion for summary judgment, which sought to preclude Intellitech from recovering statutory damages, attorney fees, and injunction, based on Title 17 of the United States Code § 412(1).[41]