

Diversity and Inclusion in EE, the IEEE, and the ITSoC

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Women in EE



Are things better than when we were in college?

- Students: % of women undergrads
 - 12% EE, 17% CS, 19% engineering
 - Peak for CS: 36% in '84, decreasing since
 - MSEE: 20%, Ph.D in EE: 14%
- Academia:
 - 16% of EE/CS faculty are women
 - Less than 10% at Stanford, not unusual
- Industry:
 - 13% of the engineering workforce are women
 - 56% of women leave careers in tech. Leaky pipeline moving up company ladder
- Patents: Less than 3% of patent holders are women
- Startups: 8% of Bay Area Series A startups had women founders last year
 - In dozens of funding pitches for my 2 startups, the only other women in the room were serving the coffee





Does it Matter?

- Not using half the talent pool
- Diverse organizations are more creative, perform better, and have higher job satisfaction
- Women-led startups have great track records
- Girls and women are missing out on great careers



Is this an intractable problem?

There are effective methods to move the needle

How is the IEEE doing on diversity/inclusion?

- Awards statistics (IEEE-wide awards and within societies) abysmally low (**low single-digit %** in nominations and winners)
- Lack of women representation in publications (as EiCs, within committees and on editorial boards)
 - As well as in papers published and citations
- Low representation of women in conferences (general chairs, TPC chairs, and technical program committees)
- Low number of women as Distinguished Lecturers
- Process issues regarding leadership and committee selection, peer review, etc.
 - Processes often not transparent, not inclusive, and are subject to implicit bias and even abuse.

Award Statistics



- Women have won a total of 19 TFAs and 9 Medals over all time (out of 30 TFAs and 9 Medals given annually)
 - **21 out of 29 TFAs and 8 out of 16 medals have never had a female recipient** (including Sumner TFA and Bell/Hamming Medals)
 - Some TFAs have multiple female recipients.
- In 2017 there were no female medal recipients (**0%**) and 2 female TFA recipients (**6.6%**)
 - From 2014-2016: Percentage of female medal recipients ranged from (**0-22%**) and percentage of female TFA recipients ranged from (**0-6.6%**)
- Nominations:
 - From 2011-2015, **4%-6% of the TFA** nominations were female, and **1%-7% of the medal** nominations were female.
 - In 2015, two-thirds of all TFAs and half of all medals **did not have a single female nominee.**
 - In 2011-2014, only 1-4 medals (out of 16) had a female nominee in that timeframe, and only 5-8 TFAs had a female nominee (out of 29).

Why is Diversity important for the IEEE

- Diverse organizations are more creative, perform better, and have higher satisfaction of their members
- IEEE can be a role model for the profession, which is currently struggling to attract/retain diverse members (**retention of women in tech under 50%**)
- The IEEE is losing women members
 - % of women (self-report): All member grades (**12.1%**); Student members: (**30.3%**), Graduate Student Members (**8.8%**), Members (**8.7%**), Senior members (**7.8%**); Fellows: (**4.4%**)
 - Women are 12% of EE ugrads, 16% of EE profs, 13% of EE workforce
 - Likely the case with URM as well, but that data isn't collected.
- The IEEE is not providing the same benefits to its women/URM members as to other members
- The IEEE can make things better for the next generation of women and URM technologists (today **12% EE ugrads** are women)

IEEE TAB Ad Hoc Committee on Women and Underrepresented Groups: Recommendations

- Form TAB standing committee with sufficient resources and power to implement recommendations and track impact
- Require women/URM data collection and metrics reporting on all society and IEEE activities; set targets and track progress
- Repository for society best practices; society reviews should collect data about diversity metrics, bylaws language, activities related to diversity and inclusion
- Training for IEEE/society/committee leadership and staff addressing diversity, inclusion, and best practices, incl. implicit bias training
- Create implicit bias briefing to raise awareness in IEEE and beyond
- Make the “face” of IEEE and its marketing more inclusive
- Create IEEE-wide initiatives for URMs
- Support creation of a climate survey for all IEEE members



Diversity/Inclusion Committee Annual Goals

2017

- ▶ Establish standing committee on diversity, phase out ad-hoc
- ▶ Recommend what data must be gathered annually
- ▶ Collect and summarize best practices used by societies to support diversity/inclusion
- ▶ Create a draft implicit bias briefing for possible posting on an IEEE website

2018

- ▶ Recommendations approved and action plan in place
- ▶ Develop diversity metrics and plan for tracking and accountability
- ▶ Plan to raise awareness of implicit bias throughout IEEE
- ▶ Creation of implicit bias-free marketing guidance
- ▶ URG IEEE-wide initiatives in place
- ▶ Develop proposal for climate survey

TAB MOTION: Approved Last Friday

Approve the formation of the IEEE Technical Activities Board (TAB) Committee on Diversity and Inclusion

PROs: Provides for the formation of the subcommittee under established TAB structure of Strategic Planning; risk reduction and oversight.

FINANCIAL IMPLICATIONS TO TAB ADMINISTRATION: 31K/year

STRATEGIC IMPACT and/or PROJECT RELATIONSHIP TO THE STRATEGIC PLAN: Expand and enable dynamic, nimble, flexible, and diverse communities to help individuals from around the world to share, collaborate, network, debate, and engage with one another.

IMPLEMENTATION TIMELINE: Motion approval; ready to implement 2017/2018 goals.



Implicit Bias? Really? In 2017???

- My awareness of this issue in awards came out of chairing the IEEE Bell Medal Committee
 - Led to co-authoring with D. Messerschmidt a document on implicit bias for IEEE Awards Committees
 - The Royal Society and White House Office of Science and Technology have similar briefings

THE
ROYAL
SOCIETY

Unconscious bias

Equally, all proposals or nominations must be assessed on equal terms, regardless of the sex, age and/or ethnicity of the applicant. Proposals must therefore be assessed and graded on their merits, in accordance with the criteria and the aims and objectives set for each award scheme or call for funding.

Implicit bias:

A briefing for IEEE awards committees

August 2016

Purpose

Your participation in the IEEE Awards program, by encouraging and recognizing outstanding contributions to our profession, is valuable to the careers of engineers. The IEEE Awards Board is working to insure that such contributions are equitably recognized without regard to gender, ethnicity, region, or technical specialization. We recognize that we have a ways to go toward achieving this goal, and one obstacle is implicit bias. This briefing summarizes a body of social science research on implicit bias, hopes to convince you that implicit bias can be a real impediment to fair decision making in the awards process, and suggests some concrete steps that can be taken in committee deliberative processes to mitigate its undesirable effects.

- Many scientific studies have investigated implicit gender bias against women in STEM fields:
 - American Assoc. of University Women found that **stereotypes, gender bias (often implicit), and climate** of university science and engineering depts **block women's progress** in science and engineering fields.
 - A study on implicit gender bias in science/math research awards found that **men win a higher proportion of research awards** than expected based on their representation in the nomination pool.
 - Implicit bias and committee chairs are the dominant contributing factors
 - Science conference **abstracts rated lower for excellence** when (fictitious) author is female versus male
 - Science publications with **women** versus men as dominant **authors are cited less frequently**
 - Women are **underrepresented as invited speakers and authors** in prestigious conferences and journals
 - In **recommendation letters** for science faculty positions, for candidates with similar accomplishments, recommenders used significantly **more standout adjectives to describe male** vs. female candidates
- Most studies in fields of math and science, much higher percentage of women than in EE

How is ITSoC Doing on Diversity/Inclusion?

- Flashback to 2004: that year and previously

- Zero women Presidents/elected officers; 2004 BoG had 3 women members out of 13 (23%)
- Zero Women IT Transactions EiCs; First female AE appointed in 1997 (out of ~30 annually)
 - The next one was appointed in 2001
 - In 2004 there were 2 female AEs out of 29
- Zero female recipients of the Shannon Award, ITSoC paper award, joint ITSoC/ComSoc paper award (only ITSoC awards)
- Two women plenary speakers over all ISITs since 1970
- No women ISIT TP Chairs, ISIT'04 TPC had 5 women (< 10%)
- Awards committee had no women (out of 10 members)
- Zero women had been elevated to IEEE Fellow through ITSoC (first was in 2009)



ITSoC President



And today?

- The ISIT'04 discussions led to formation of the ITSoc Student Committee (first of its kind in any society)
- Outreach subcommittee formed in 2008, WITHITS in 2009
- Distinguished lecturer program founded in 2010
 - 8 women have served in this role out of 40 (20%)
- 3 Women ITSoc Presidents to date, 1 more in the pipeline
- BOG: 3 women officers out of 5, 5 women members out of 16 (31%)
- Awards committee has 3 women out of 9 (including 2 officers)
 - Many more ITSoc Awards than in 2004
- Informal group of senior women formed to help generate award and Fellow nominations for women.
- Several women IEEE Fellows have come up through ITSoc
- 1 female recipient of Shannon Award (Marton in 2013)
- ITSoc paper award has never gone to a women. Joint ITSoc/ComSoc paper award has twice gone to women authors (over 16 years).
- No women ITTrans EiC to date, 4 women AEs out of 48 (8.3%)
- A few women ISIT TPC Chairs
- ISIT'17 TPC has 19 women out of 119 members (16%)

Room for improvement



Much work is needed to make the road ahead for the next generation of women in EE (and IT) a bit easier



To make progress, need to collect statistics, raise awareness, track diversity/inclusion progress, & recruit advocates: *we need the guys*

These activities must take place in professional organizations (IEEE and its Societies), universities and companies