

Gender Diversity of Conference Leadership

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Robotics research is shaped by the people who hold leading roles in robotics conferences. Individuals who hold these roles select organizing committees, choose speakers, and make final decisions on paper publication. The leaders in these roles are highly visible—they are the researchers that the robotics community sees as important. Consequently, who is represented in these positions matters.

The IEEE Robotics and Automation Society Women in Engineering (RAS WIE) Committee set out to understand one aspect of representation: that of women in the primary conference leadership and speaker roles at RAS-supported conferences. We found that 1) despite recent improvement, the representation of women remains low (about 20%); 2) a small pool of women tends to hold these roles; and 3) there is a correlation between increased gender diversity in the leadership roles and a woman appointed as general chair.

Data Collection Methodology

We collected data from June to December 2019 for the conference years spanning 2002–2018. The data for this report include the archived webpages for 11 RAS conferences including the following 10 fully RAS-sponsored conferences:

- IEEE International Workshop on Advanced Robotics and its Social Impacts (ARSO)

- IEEE International Conference on Automation Science and Engineering (CASE)
- Joint EuroHaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems/World Haptics Conference (Haptics/WHC)
- IEEE RAS International Conference on Humanoid Robots (Humanoids)
- International Conference on Robotics and Automation (ICRA)
- IEEE International Symposium on Assembly and Task Planning/International Symposium on Assembly and Manufacturing (ISATP/ISAM)
- IEEE International Conference on Micro-Electro-Mechanical Systems (MEMS)
- IEEE International Conference on Soft Robotics (Robosoft)
- IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAN)
- IEEE International Symposium on Safety, Security and Rescue Robotics (SSRR).

We also included the partially supported IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

For each year and conference, we recorded the number of people on the organizing committee and senior program committee (when available) along with their perceived gender. Furthermore, we recorded the names and perceived gender of all plenary and keynote speakers, general chairs, program chairs, and workshop chairs. We classi-

fied an individual's gender based on first names; pronouns (if available) in bios or articles; and images, mainly from personal websites. When we were unsure (three individuals), we left the gender unspecified.

We note two potential sources of errors from this approach to gender categorization. First, we realize that gender is not binary, so we will, by design, be unable to correctly classify any individuals with nonbinary genders. Second, since our gender classifications are derived from a mix of imperfect signals, rather than self-identification, there is potential for misclassification.

The anonymized data set as well as a detailed set of charts is available on the IEEE RAS website at <https://www.ieee-ras.org/women-in-engineering/>.

Representation of Women Is Low but Slowly Improving

Between 2002 and 2005, women held leadership roles only five times (just over 4% of roles). Thirteen years later (2015–2018), women held 67 leadership roles (20%). While there was a 16% growth in women holding leadership roles, this change in representation was just over 1% per year, and the representation of women is still low (Figure 1).

Consequently, only a limited number of women have held leadership roles. Over the whole time period, only 38 different women were plenary speakers compared to 311 different men. The picture is similar for general chairs and program chairs, with just 25 and 29 women, respectively (Table 1). The small pool of women in leadership

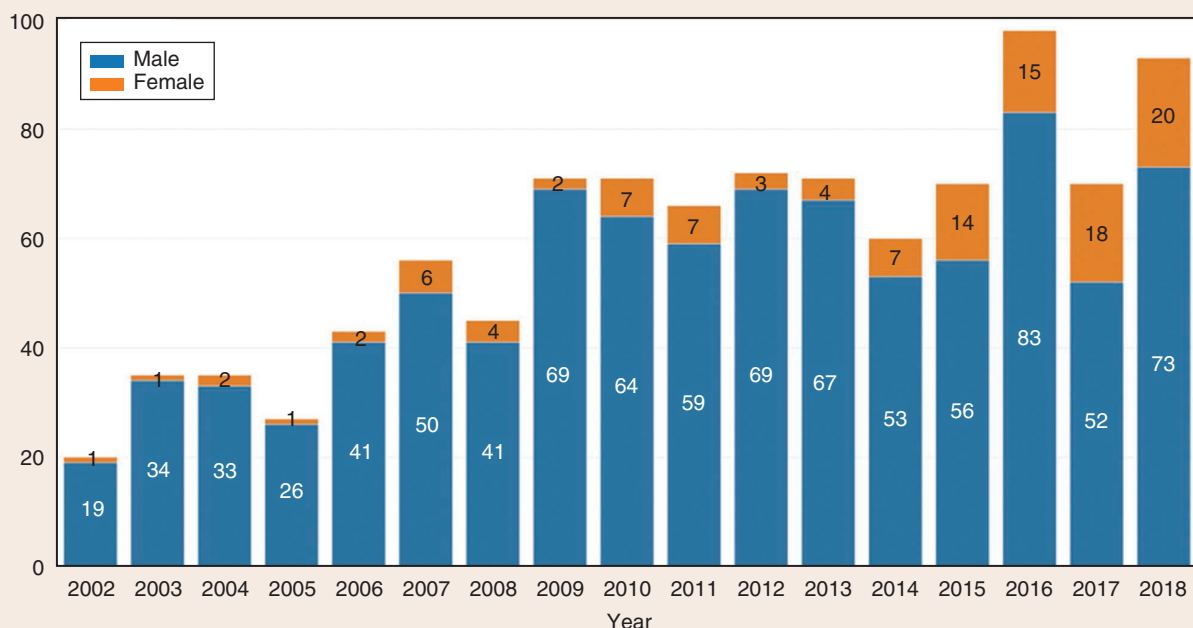


Figure 1. The number of leadership roles (general chair, program chair, and plenary speaker) by year by perceived gender across conferences.

positions poses difficult questions that must be considered. Were there only 29 women worldwide over the course of 16 years who were qualified to be a program chair? Were there only 38 who could give a plenary talk? Additionally, there are some individuals who have held leading roles several times. For example, three men were general chair on five to seven different occasions and three other men were program chair six to eight different times. This suggests that one way to increase representation is to limit the number of times that the same people are asked to serve.

Significant Differences by Conference and Geography

Statistics on gender diversity vary significantly by conference and geogra-

Table 1. The number of unique individuals who held leadership roles compared with the total number of available roles.

	Unique Men	Unique Women	Total Roles
General chair	158 (68%)	25 (11%)	233 (79%)
Program chair	207 (59%)	29 (8%)	346 (68%)
Plenary	311 (74%)	38 (8%)	423 (83%)

Note: A unique individual is defined as a person who has served in a role one or more times. An individual is only counted once irrespective of how many times that individual served in a role.

phy. Splitting the data by conference shows that Haptics/WHC was the most balanced from a gender diversity perspective, while IROS, Humanoids, and MEMS were the least balanced (Figure 2). Of all the conferences, Haptics/WHC was the only conference to achieve gender balance in the general chair role. In most other conferences, fewer than 20% of general chair

roles were held by women, with IROS notably appointing only one female general chair in 41.

Overall, the variance in gender diversity is lower for program chairs and plenary speakers compared to general chairs. For example, no conference had more than 20% female program chairs or plenary speakers on average. Fortunately, this improved

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More information may be found here: <https://www.ieee-ras.org/educational-resources-outreach/distinguished-lecturer-program>.

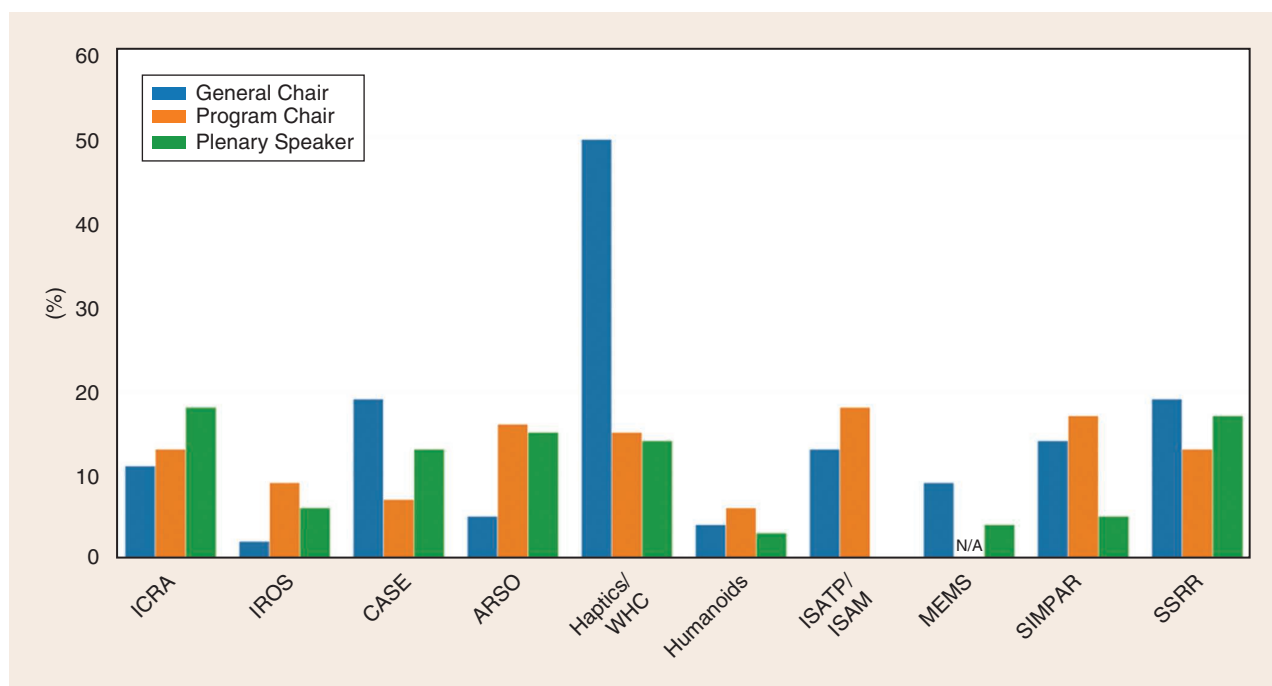


Figure 2. Women in leadership roles by conference. This chart excludes Robosoft, which, being a new conference, occurred just once and had 1/1 (100%) female general chair, 2/10 (20%) female program chairs, and 0/4 (0%) female plenary speakers.

Table 2. Women in leadership roles by conference location.

	All Roles	General Chair	Program Chair	Plenary Speaker
Americas	17%	22%	17%	14%
EME	11%	13%	10%	11%
Asia	6%	3%	7%	6%
World	11%	13%	11%	10%

Note: Locations are Americas (North America and South America), EME (Europe and the Middle East), Asia, and World (all locations).

recently in most conferences. From 2015 to 2018, three conferences (ICRA, SIMPAR, and SSRR) had more than 30% female program chairs on average, and another two (IROS and Robosoft) had at least 20%. This change has also been seen in the selection of plenary speakers. Notably, 43% of plenaries were given by women at ICRA between 2015 and 2018.

Gender representation is also highly dependent on conference location. For example, women held the role of general chair only 3% of the time for conferences held in Asia but held the role 22% of the time for conferences held in the Americas. Conferences held in Europe and the Middle East had women serve as general chairs 13% of the time. This representation pattern—highest in the

Americas, at a midlevel in Europe/the Middle East, and lowest in Asia—is also seen in the selection of program chairs and plenary speaker roles, with lower variance than general chair statistics (Table 2). It should be noted that the largest conferences, ICRA, IROS, and CASE, have never had a female general chair for an Asia meeting.

Positive Cascades

Representation matters because the people in leading roles influence representation in other roles. We see evidence for this in the relationship between gender diversity in different leadership roles (see Figure 3). Gender diversity first improved in the general chair role, followed a few years later by rapid improvements in the program

chair and plenary speaker roles. We know that general chairs are responsible for selecting program chairs and that program chairs select plenary speakers. We hypothesize that, when the people in the most senior roles are more diverse, they are more effective at increasing the diversity of other roles compared with a less diverse group. This creates positive cascades.

We can look at the changes in more detail over time. The percentage of female general chairs increased in a series of steps. First, from 2005 to 2007, this percentage increased from 0% to around 10%. Then, from 2008 to 2017, it increased from 10% to 15%, on average. Finally, representation jumped to 30% in 2018. Meanwhile, from 2002 to 2013, little changed in program chair and plenary speaker gender diversity. Only in 2014 did the percentage of female program chairs start to grow consistently. Improved gender representation in plenary speakers followed. We observe that the percentage of female plenary speakers is highly correlated with that of program chairs across the whole period [Pearson correlation coefficient = 0.75, max = 1 (perfectly positively correlated), min = -1 (perfectly negatively

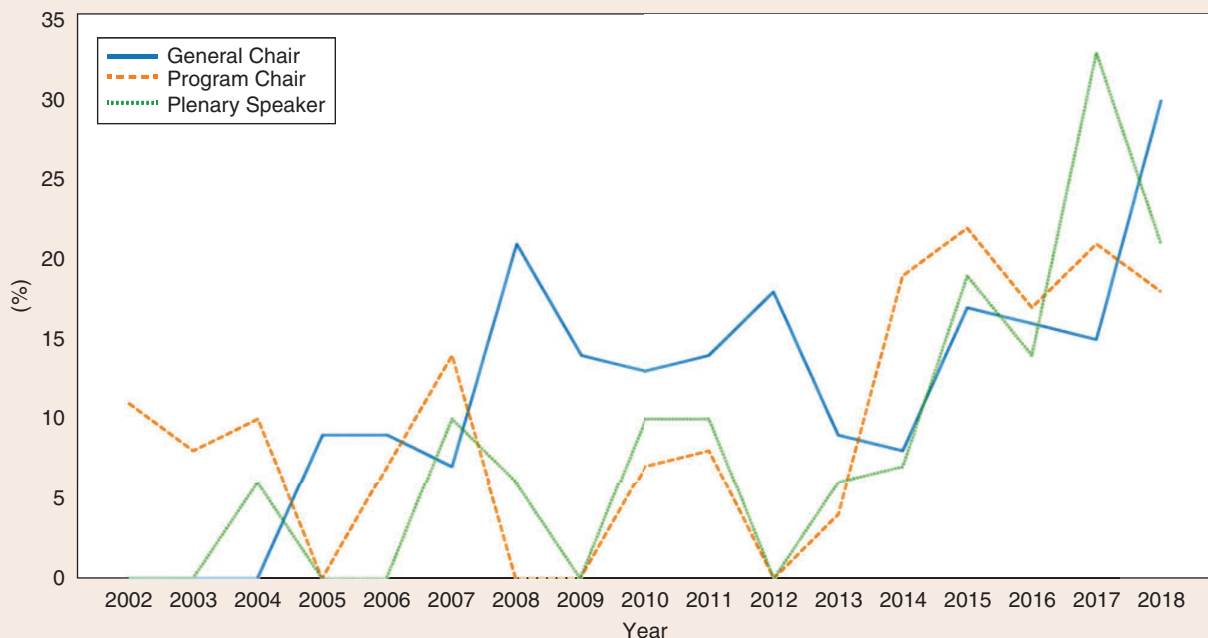


Figure 3. The percentage of women in leadership roles by year across all conferences.

correlated)]. It is striking that, in three of the four years when there were no female plenary speakers in any of the studied conferences, there were also no female program chairs. More positively, in four of the five years when more than 10% of program chairs were women, women held more than 10% of plenary speaker roles. It is also interesting to note that 2015 was the year that the entire ICRA organizing committee was composed of women.

The positive correspondences between gender diversity in different leading roles leads us to hypothesize that, for the gender diversity of program chairs to improve, representation in the general chair role first needed to increase above a minimum threshold. After a few years, this started to influence program chair gender diversity,

which in turn immediately affects the composition of plenary speakers. We see that change does not necessarily have to happen slowly. Under favorable circumstances, it can accelerate rapidly. This is all the more reason to pay attention to all aspects of representation in leadership roles.

Recommendations

The improvements in gender diversity are encouraging, but there is more work to do. To make further progress, RAS WIE has made the following recommendations to the RAS Administrative Committee with support from several other RAS subcommittees on several points.

To reach these recommendations, we asked ourselves two questions when considering what we need to do as a community. We hope they are use-

ful and inspire you to think about even more ways to improve representation.

Opportunities

How can we support and promote the brilliant, qualified women who are already part of our community?

- Utilize resource lists such as Prof. Maja J. Matarić's "Women in Robotics," RoboHubs' "Women in Robotics You Need to Know About," and other such resources to expand the pool of candidates considered when filling a leadership role.
- We also recommend this approach for other aspects of representation, for example, by utilizing lists such as "Black in Robotics."
- Consider how many times someone has held a role across all conferences when filling a role.

Deadline for RAS Local Chapter Initiative Grants

The RAS Member Activities Board (MAB) awards a limited number of Chapter Initiative Grants to local RAS Chapters for professional development, educational outreach, and other programs. Grant proposals will be reviewed by the MAB at its

meeting in late September 2021 and funds up to US\$2,000 will be awarded on a competitive basis. The deadline for proposals is **15 August 2021**. For submission details, please visit: <https://www.ieee-ras.org/chapters/support-for-chapters>.

- Consider appointing a female general chair to ICRA, IROS, and/or CASE when held in Asia.

Understanding

How can we better understand representation at all levels in robotics, especially that of other underrepresented groups?


- Measure and publicize gender diversity in leadership roles for 2019, 2020, and on an ongoing basis for each of the 11 conferences included in this study. We recommend that the organizing committee collect this information by default each time a conference is held.
- Collect, analyze, and publicize data on other factors of underrepresentation.

- Encourage other conferences to measure and publicize gender diversity in leadership roles.
- Encourage conferences to collect self-reported gender for all roles on the organizing committee.
- Expand data collection to less visible and prestigious roles, and analyze the gender diversity of these roles.

This report is just the beginning for understanding gender diversity in robotics. We firmly believe in the importance of capturing the whole spectrum of different gender identities, beyond the traditional male and female binary. Due to lack of self-reporting data and the difficulty of gathering such data retrospectively, we tried a best effort approach in this study to gather data based on perceived gender. We are very encouraged

that, as a result of this study, the RAS has committed to track self-reported gender identity and LGBTQ representation for future conferences. Beyond gender diversity, we hope that the approach, tools, and recommendations in this report can serve to help understand and address other aspects of diversity and underrepresentation in robotics. It is all of our responsibilities to create a more diverse and representative robotics community and to work together to ensure that it is a place where anyone can thrive.

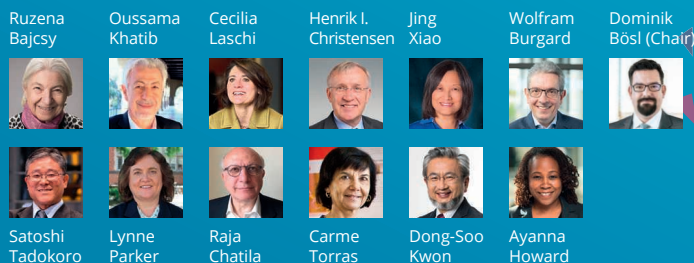
Acknowledgments

We thank Nancy Amato for guidance, the IEEE Robotics and Automation Society for funding, and Emily Denton, Sergio Guadarrama, and Chris Harris from Google for feedback. 

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