

ASSESSING THE WORKING CONDITIONS OF WOMEN RESEARCHERS WITHIN THE NCCR ROBOTICS, SUMMARY OF A SERIES OF INTERVIEWS

June 8 2021

FOREWORD – SUMMARY OF THE STUDY PROTOCOL

In accordance with the feedback received from the SNSF reviewers, the NCCR Equal Opportunities (EO) committee conducted a qualitative study with the women researchers in NCCR, aiming at (1) assessing their general feeling about working conditions and visibility within the NCCR and (2) obtaining their feedback on the initiatives put forth by the NCCR EO committee. The study was designed as a structured interview including both multiple choice questions and open-ended questions, presented in the same order and wording to all participants. The list of questions, which was finalized and approved by the whole NCCR EO committee, was the following:

- What is your general feeling about your working conditions and visibility within NCCR? [very positive, positive, neutral, negative, very negative]
- Do you feel treated differently?
- If yes, do you feel treated negatively, positively, or both?
- Do you feel provided with the right work-life balance?
- What is your opinion about the initiatives of the EO committee? What could be added or removed?
- Should we introduce a women-specific spin-fund to promote women's role in tech transfer? Or do you have other suggestions to increase the number of women in tech transfer?
- What could be a suitable balance between additional visibility vs additional workload for women in robotics (e.g. demos/talks, committee work, management, leadership, ...)?
- Do you have suggestions on how to improve working conditions for women within the lab and the NCCR?
- What are the obstacles that girls face when considering/following robotics-related studies (STEM in general, but T & E specifically)?
- Do you have suggestions on how to increase the number of women entering robotics-related studies and careers?

Three members of the NCCR EO committee (a professor, a postdoc and a PhD student) were chosen to conduct the interviews. A number of measures were put in place to protect the privacy and comfort of the participants:

- 1) Participants were split among the three researchers by the three researchers, ensuring that each participant would interact with one researcher only. The split aimed at maximizing participants' comfort by (1) assigning participants to a same-level researcher (or close) and (2) avoiding assigning participants to a researcher from the same lab.
- 2) Participants were contacted by their assigned researcher via email, with at most one follow-up reminder in case they didn't reply to the first email.
- 3) Interviews took place in private, one-on-one zoom calls. The calls were not recorded: participants' responses were manually registered by the researchers during the interview, reviewed and validated by the participant a posteriori (this option was offered to all participants, with some choosing to immediately validate the notes without reviewing them), and then inserted by the researchers on a shared Google Form. The order of participants' responses was reassigned randomly between questions.
- 4) During the interview, participants could leave at any time and skip any question, with no need for explanation.

The study took place between February 8 and March 8, 2021, involving the 21 female researchers at the time affiliated with NCCR. Among them, 14 participants accepted to be interviewed, 2 refused and 5 did not respond. Interviews lasted 30-120 minutes, with most lasting approx. 45 minutes.

This document is organized as follows: the "Discussion" section summarizes, for each survey question, considerations and trends observed by the researchers in the participants' responses. **A "Conclusion" section (P8) provides a series of objectives and action items to follow-up on the suggestions collected during the interviews.** The original responses are provided in the "Results" section.

DISCUSSION – GENERAL THEMES EMERGING FROM THE RESPONSES

General feeling about your working conditions and visibility within NCCR

The interviewees are generally quite satisfied both with the working conditions and the visibility that they are receiving within their respective laboratories (lab) and NCCR Robotics in general (Fig 1). However, most of them have specific grievances that could be addressed by the NCCR Equal Opportunities (EO) committee.

The interviewees, who are generally positive about their lab environments, attribute this to the success of the lab's diversity and internationalism, and the Principal Investigator's (PI) conscious efforts to foster a lab environment in which they could grow and feel included.

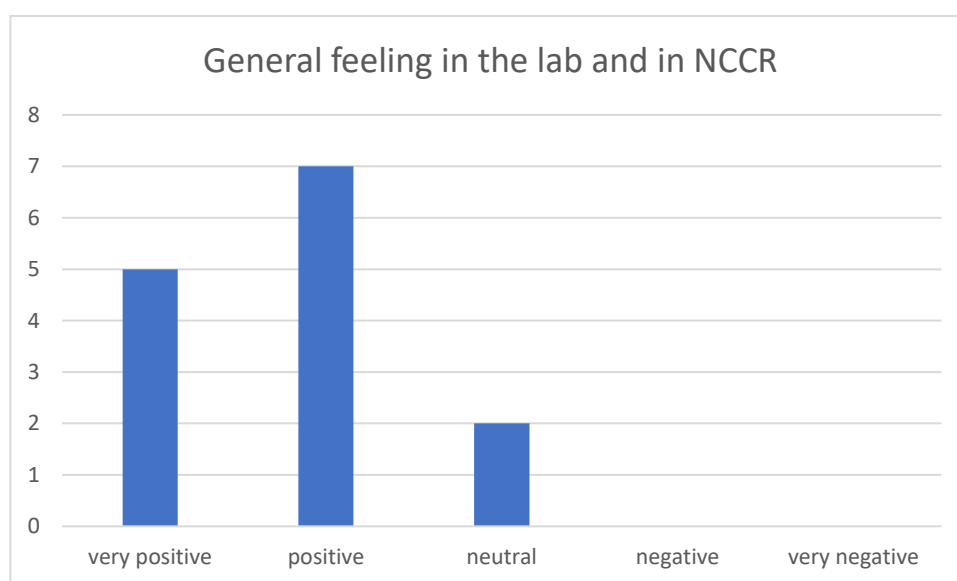


Figure 1. Responses to the question 1, “What is your general feeling about your working conditions and visibility within NCCR?”

The ill-effects of the converse are also true. Some of the interviewees are the sole visible minority in their labs. Their PIs and/or their lab colleagues either deny or are oblivious of the changes of lab dynamics upon their recruitment. These interviewees feel burdened with the responsibility of having to make certain accommodations to make sure that they fit in.

Generally, the interviewees feel that being part of the NCCR network is personally quite beneficial for them as well as for the community at large because they can apply for funding opportunities and establish collaborative projects. However, some interviewees feel disconnected and a lack of alignment with NCCR's activities. This is due to their perceived imbalance in the coverage of certain Grand Challenges compared to Educational Robotics. In addition to a perceived lack of importance given to educational initiatives, they also feel that there is very little synergy between Educational Robotics and the other Grand Challenges within NCCR. As a result, they feel only marginally involved in the consortium and prefer to find other avenues where they can showcase their research.

Another concern that they express is regarding competitiveness within NCCR – members who joined the consortium in more recent years might have disadvantages compared to “established members”, who have a better chance of securing funds from new collaborative grants. This is probably truer for female PIs, who endure the compounded

effect of intersectional problems - being both female and early career in academia. This may manifest itself as gender and age-related biases as well as systemic inequalities in the power structure within NCCR Robotics, where the Grand Challenges are often steered by male PIs.

Differential Treatment

A majority of the interviewees did not feel that they were being treated differently on the basis of their gender identity (35.7% - Yes, 64.3% - No)

Interviewees point out that while it is true that within NCCR spaces, men are amongst the majority in most rooms, there is at least a growing awareness of the existing inequalities that women often face. Furthermore, these problems may also arise due to discrimination on other grounds as well, such as ethnicity, religion, research topic, age, etc... In the most egregious instances, male colleagues rationalise the systemic problems faced by women, ignore historical injustices, and engage in gaslighting.

Work Life Balance

A majority of the interviewees cite exceptionally long working hours as a general demand of the work ethic that is perpetrated in academic spaces and not a feature of NCCR Robotics activities alone. While this work ethic is largely adopted as a necessary evil, it poses major problems for those who have additional family responsibilities. The interviewees that express a higher-level satisfaction about their work-life balance are employed in labs where the PI consciously encourages a healthy work ethic by asking employees to take vacations and not work on weekends. Interviewees also highlight the importance of not planning meetings at hours that clash with family time, and of providing flexibility in working hours and in choosing between home and office work.

Equal Opportunities Activities Assessment

The interviewees unequivocally express appreciation for the EO activities and the level of awareness that the EO committee has raised within NCCR Robotics.

Many of them believe that the most important initiatives should be pre-university focused. Some of the interviewees who have had experience in pre-university outreach activities, emphasized that these initiatives should be inclusive and non-gender specific. Furthermore, they say that the stereotypes that the children internalise may come from teachers and parents, who imbue the young students with their own societal biases. Therefore, anti-bias initiatives could be facilitated to help teachers and/or parents tackle the prejudices they harbour.

For the initiatives aimed at bachelor's and master's students, an almost unanimous recommendation is to publicize the initiatives on a much larger scale. One of the proposals is to highlight the initiatives during the Master's robotics courses and/or facilitate discussions for master's students with the NCCR robotics members about the same.

Some interviewees expressed the concern that the initiatives are exclusionary and mostly aimed at EPFL/ETHZ students alone and may be viewed as a case of the "privileged helping the privileged". Instead, these initiatives should be open to students from all universities within Switzerland. Furthermore, what would be more suitable for early career researchers are professional mentoring opportunities involving training

programs. Given that “imposter syndrome” is pervasive in academic spaces, especially amongst young researchers, initiatives aimed at helping them handle and confront this problem could be greatly beneficial.

In addition to workshops to tackle implicit bias, interviewees recommend organizing workshops that would help those at the receiving end of the bigotry to call people out when they make prejudiced statements. There is also a suggestion to facilitate discussions with people who do not necessarily share the same ideas of the EO committee in a bid to help understand each other’s perspectives.

Finally, some interviewees point out that while spotlighting the problems that the EO committee wants to tackle, the initiatives should be implemented carefully so that they do not entrench and aggravate these problems.

Women Specific Spin Funds

Most interviewees are against the introduction of a women-specific spin fund. Some do not believe that monetary preferential treatment is inherently fair and may be inappropriate incentivization, especially for those who may need to face major challenges as an entrepreneur. One suggestion is to provide more active verbal encouragement to young women researchers, with the possibility of allowing them to foster their entrepreneurial ambitions while in the employ of their lab as a means to mitigate some of the financial risks of establishing a start-up venture. In addition, information sessions about the opportunities in this sphere can be relayed to women PhD students in their first year to help them shape the remainder of their PhD in anticipation of seeking out these opportunities.

Alternative/complementary suggestions to the spin fund include the facilitation of entrepreneurial training and mentorship programs, organization of panel discussions with women business leaders, and provision of a support structure for women with families through coalitions with day care centres.

Lastly, interviewees who are favourable to the idea of the spin-fund suggest expanding its scope to allow members belonging to minoritized populations to apply, citing the current narrow scope.

Visibility and added workload – striking a balance

The question of striking a balance between added workload and visibility is viewed as purely subjective by most interviewees. There are some who have come to accept the additional workload as a necessary responsibility arising from problems stemming from existing inequalities and some amongst them have also pointed out the advantages of networking with like-minded individuals. However, many of them do not gain anything personally in the near-term and are frustrated because they invest unpaid labour that they would much rather avoid if the inequalities did not exist.

Moreover, some of the internal NCCR Robotics events are only an added workload and do not give much visibility at all. Another sentiment they share is being asked to be the token minority (“because I am a woman”) at events. They find this demeaning as their research accomplishments are treated only as a secondary reason for being given a platform, thus reinforcing any pre-existing imposter syndrome.

One of their suggestions to balance the workload is to expand the scope of the EO committee to focus on both visible and invisible minorities (gender, race, religious

minorities, and other aspects). This sentiment is shared by other interviewees who have invested efforts to tackle different forms of bigotry, especially against communities that have been historically minoritized by academic institutions.

One other suggestion is to ensure implicit (“intrinsic”) balanced representation i.e., when organizing events, impose unwritten norms in which the representation of people based on gender is balanced.

Improving working conditions within labs and NCCR

In a bid to improve the working conditions of women NCCR robotics members, the interviewees provided multiple suggestions that would help all members within the consortium and its affiliated labs.

One of the suggestions is to have NCCR robotics advocate for concrete actions to SNF to create a stronger support infrastructure for women researchers – longer maternity and paternity leaves, coalitions with day centres, introduction of menstrual leave. Some interviewees present the idea of allowing members to attend training workshops without having to sacrifice their vacation time. A common demand is to have more casual and frequent interactions amongst the women within the community, including alumni. Yet another suggestion is to have more flexibility in choosing the location of work and having the option to work from home even after the pandemic has ended. For those interested in gaining experience in managing labs, one interviewee suggests allowing more PhD student participation in the decision-making processes within the lab. Related to this, there is a growing concern about the mental well-being of members during the COVID-19 crisis, with a few PhD students having joined and quit within the year because they did not have a community that they could depend on. Finally, there is anxiety about the inordinate amount of teaching work that certain members must shoulder, in addition to the research workload.

Obstacles that girls face during the life span of STEM

Based on interviewee responses, the main obstacle for girls and young women seem to be stereotypes about their abilities and possible career choices, which are often fed to them by parents and teachers, who may have implicit societal biases. Hidden figures - there is also a lack of visible role models in STEM spaces, even if there are several prominent women researchers working in these spaces. Many interviewees say that both personal and vicarious experiences indicate that women of all ages in traditionally male-dominated fields feel compelled to have to prove their self-worth to gain any form of validation from their colleagues. Furthermore, they feel scrutinised to a far greater extent compared to their male colleagues. Some say that this distressing situation is worsened by the self-imposed need to downplay their research contributions. This may stem from societal biases, perfectionism, sense of modesty etc... In some instances, there is a culture of PIs valorising hypermasculine confidence during lab presentations and treating that as a yardstick for the quality of results presented. These experiences compel some women to develop a thick skin, robbing them of any affordance to be vulnerable within academia.

When these types of personal struggles become insurmountable, interviewees mention that some women may pursue fields of study where they are not a minority. At least in these fields of study, they can rely on a community that understands their concerns and can collectively try to address them.

There is also concern about conflating the struggles of all women in STEM and not acknowledging their varied experiences of being a minority within a minority. A tacit refusal to do so could result in further alienating these women from STEM fields.

For robotics specifically, one hurdle is that there are young women who may not identify themselves with the narrow scope of sub-fields in robotics that are often highlighted disproportionately compared to the otherwise vast spectrum of robotics sub-fields that get very little coverage.

In addition, one interviewee suggests that it is incumbent upon robotics researchers to educate younger students about AI ethics during their bachelor's studies given the growing global interest in the field of Artificial Intelligence.

Increase more women in robotics-related careers

Authenticity underlies all the suggestions that the interviewees make to address the challenge of making the gender ratio within robotics-related careers equitable.

For girls and young women in the pre-university setting, this begins by normalizing the presence of women in STEM and giving them complete freedom to choose what they wish to do in their future. One interviewee expresses concern that though well-intentioned, there is a movement to compel girls to pursue STEM fields ("make women engineers") even if they are somewhat reluctant to do so. The problem of having fewer women in the field should not be treated as a numbers game as it may have the unfortunate consequence of exercising control over women's choices.

Bachelor's students could gain immensely by having robotics professors teach courses about their research and provide periodic tours of their labs. Similarly, master's students should be awarded more internships.

Workshops to address implicit bias should take place during their education and not left to much later when the problems have aggravated.

When positions for early career researchers are advertised, wording is crucial. Instead of restricting the application to women alone, the advertisements could be framed to encourage women to apply. Artificially changing the demographics will not change the systemic problems. It is also important to acknowledge the importance of good women role-models (PIs) in robotics, as their labs attract applicants from young women researchers as well. Casual and informal meetups for young researchers could foster more organic mentoring opportunities.

Another important factor to study is how the population of women within robotics diminishes and to what fields they migrate to. Perhaps the answer lies in knowing why those fields might be more appealing and making amends to ensure that would feel just as valued and included within the diverse robotics community.

CONCLUSIONS AND ACTION ITEMS WITHIN THE NCCR ROBOTICS

The interviews were very informative and the EO committee is extremely grateful to all interviewees for their useful and constructive feedback. Here is a summary of objectives and action items for the future. Namely, we (the EO committee and the whole NCCR Robotics) should

- **Improve the advertisement of equal opportunity initiatives.**
 - Action items: **increase the number of EO-related posts and their visibility** in all NCCR communication channels. **Regularly ask all PIs to transmit information to women master students and researchers in their labs** (including those who are not paid by NCCR).
- Keep a **strong focus on pre-university actions.**
 - Action item: **resume and strengthen the EO initiatives targeting pre-university students**, that could not be pursued during the lockdown.
- Make sure to **be inclusive for universities other than EPFL and ETHZ.**
 - Action item: **promote the EO initiatives in other partner institutions.**
- Contribute to **improve the links between Educational Grand challenge and the others.**
 - Action item: **try to promote such links through the newly launched Collaborative Grants.**
- Make sure to **always have a positive message.**
 - Action item: pursue an **internal validation process for all of the NCCR EO communications**, to ensure the messages' tone is positive, aiming to share the advantages that EO bring and promote a constructive culture.
- **Be careful about potentially counterproductive initiatives.**
 - Action item: try to **establish quantitative and qualitative assessment metrics for all the NCCR EO initiatives** (when possible) and regularly revise them based on their evaluation.
- Organize **NCCR mentorship meetings between women PIs and women researchers.**
 - Action item: organize a "lunch with leaders"-like event for NCCR women researchers at the next Swiss Robotics days. Also encourage more casual and frequent interactions amongst the women within the community, including alumni.
- **Address the "imposter syndrome".**
 - Action item: include a discussion on this topic in the agenda of the round-table discussion about implicit biases.
- **Promote women involvement in tech transfer**, not through a specific spin fund, but through better information.
 - Action item: inform recently hired PhD students and postdocs about options for tech transfer and provide training early on during PhD studies.

- **Improve the visibility of women’s research, with a focus on quality.**
 - Action item: aim at quality rather than quantity when highlighting research done by women researchers.
- **Make people aware of implicit biases as early as possible** (even pre-university if possible).
 - Action item: encourage all NCCR members to follow the newly created robotics implicit bias course, and the follow-up round table in June 2021. Make the course open to all online.
- **Promote healthy work ethics.**
 - **Action item: encourage PIs to establish in their labs a healthy culture of no meetings after 5pm**, no pressure for work over the weekend, encouragement of taking vacation, **flexibility of working hours** (at the office and at home), and **allow remote working even post covid**.
- **Propose to SNSF to create a stronger support infrastructure for women researchers** – with longer maternity and paternity leaves, coalitions with day care centers, and introduction of menstrual leaves.
 - Action item: share this report with SNSF, and with our institutions.

RESULTS – PARTICIPANT-VALIDATED RESPONSES

Section 1 : General feeling about working conditions and visibility within the lab and within NCCR

1.1 What is your general feeling about your working conditions and visibility within NCCR? [very positive, positive, neutral, negative, very negative]

- Neutral. I don't feel treated differently in general, but being a woman makes a difference. Most of the times it's nice, but sometimes it's annoying to always be the only woman.
- Very positive Within the lab that's very good. I don't feel any difference between females and males. At the level of NCCR it's more difficult to tell, I feel only marginally involved in it. I feel that I know how I could make myself more visible there, but I don't find it necessary for me now.
- Very positive.
- Positive. It is good that professors continue to hire women in the lab, because otherwise, they may 'forget' to take that into consideration. In an NCCR lab where the professor does not have the experience working with women, especially hiring women to work in their lab, they must be aware that the lab environment must and will change when they do hire women.
- Very positive. I am quite comfortable in the lab that I work in, it is an environment that I like and appreciate very much, especially because the lab is very diverse and international. Furthermore, my PI is a very considerate advisor. I get along well with my colleagues. There is no major problem that I have with any of them. I am satisfied with the visibility that I am getting presently. I believe that when I can get more results, I will have the opportunity to present it to my research community and the public at large.
- Positive. Overall, it is good to be part of this network. It allows me to get to know people and establish collaborations. It is also a nice opportunity to get funding. One slightly negative aspect: it is difficult for new members to compete with well-established members. For instance, it is difficult to cooperate at the same level and established members tend to take the lead within projects, removing some control for more recent members. Also established members have already created their connections, so it is easier for them to apply to new internal collaborative grants. Female are among the younger PIs, they are therefore possibly disadvantaged.
- Very positive
- Positive. I feel that people mean well. It is a bit difficult to discriminate between being a young professor and woman. I feel there is willingness to integrate and to promote. But there are still biases, so I feel it is important for NCCR members to go through the implicit bias training that will soon be organized. Biases indeed exist, in men and women.
- Positive
- Positive. I do not feel the need for a particular treatment. I feel that NCCR is very conscientious about women's working conditions.

- Very positive. I would like to clarify that I earned my PhD fellowship and hence, my funding does not come from NCCR.
- Positive. My PI proactively shares information about NCCR Robotics events (primarily through the newsletter). The PI specifically pointed me towards the activities of Equal Opportunities committee. Generally, my work gets the exposure I want it to receive and my PI tries to encourage me by providing me platforms where I can showcase my work. Hence, I am quite satisfied with the overall working conditions and visibility.
- Neutral. I have attended two NCCR events, both swiss robotics industry days. The second time I attended, I was presenting. At that point of time, my main grievance was that not nearly enough attention was being paid to educational robotics. However, the situation might have improved since this was a few years ago. While this is not a major complaint, I felt that my work was not getting enough exposure after I left EPFL to my other university (I am part of a joint program where I spent half my time at each home university).
- Positive. I do not have anything negative in particular to say about working with my PI and my postdoc. However, I do believe that NCCR Robotics educational initiative is quite small and sometimes seems out of place in the larger NCCR initiative, as compared to the other grand challenges.

1.2 Do you feel treated differently?

Yes – 5, No – 9

1.3 If yes, do you feel treated negatively, positively, or both?

- While my PI does not treat me any differently compared to my colleagues, the same is not entirely true about my colleagues. I am the first woman of colour in my lab's history. As a result, there are biases that my colleagues exhibit, which may be unconscious. Often, this takes the form of excluding me from conversations. This may be partly due to the fact that they all speak a language that I am still learning.
- I find it frustrating, at times, to always be "the woman in the lab". I would like my gender to not be a topic anymore.
- I do not feel treated differently on the basis of gender, but I do feel treated somewhat differently on the basis of my topic of research within NCCR. Difficulties stem from being part of a large project with a lot of collaborations, different approaches to research with those who are not used to it (although this is not specific to NCCR). I appreciate the rather flat hierarchical structure in my work environment. This allows me to approach my advisors easily and openly. I must say though that in general: one, due to the lack of importance given to the educational initiatives, personally, I do not feel connected or even aligned with the NCCR Robotics and two, I think there is very little synergy between the educational robotics and the other grand challenges.
- Within the lab I feel no difference at all. At NCCR meetings you see there are way more men than women, but this is not a problem. it is visible, and I am happy to see that there is awareness concerning EO themes within NCCR.
- Yes, sometimes.
- Personally, I did not feel treated differently because I was a woman, but because I am in the joint program, I felt that I did not have completely equal status in the lab.

Furthermore, I speak my mind and I am direct. A combination of these factors might have stressed me about my self-worth and quality of my work. Women may in general, may downplay their contributions because of a variety of reasons - sense of modesty, societal biases, personal perceptions, need for perfectionism. This is not helped by the presence of implicit biases that the advisor might develop about them, as opposed to male colleagues, who might present their research work with a certain level of unwarranted over confidence. Thus, it seems like the latter behaviour is rewarded, even though it should not be. Some of the problems are not about being women only. However, issues like gatekeeping by elitists in research communities become worse when they are gendered. Some male colleagues have a certain fixed mindset. They try to rationalise the very real problems faced by women, engage in gaslighting. When they are called out on their behaviour. they become defensive and non-receptive, without considering historical injustices committed against minoritized populations. These colleagues use “feminism” as a derogatory term.

- I feel no difference whatsoever
- Yes. But it I understand the reasons. I often get questions about how I am doing, which I think my male colleagues would not get. Our generation is going through a transition phase. In terms of gender equality, researchers (and society in general) probably need to overshoot a bit before the situation is normalized. It is important that women can be heard despite not having a loud voice and I think there are efforts to make this happen from all directions.
- Yes, but everyone is treated differently. It may be due to the gender but there are many other aspects , such as different origins, different fields of research, age, etc.
- No. Except maybe that I am asked a bit more for contributions (like we are doing now in fact!). But that is ok.

1.4 Do you feel provided with the right work-life balance?

- I think that there is so much that we cannot change, and the idea of having to accept that the status quo won't dramatically change, at least within my career, frustrates me. As a woman, I feel that at one point I will have to choose between career and family. Some women just accept this, but I struggle.
- In general I am happy, especially since the home office started I have a lot more time for myself
- I am overflowed with work, but this is not from NCCR requests. My NCCR tasks are reasonable.
- The atmosphere in a lab trickles down from the PI. A work life balance is strongly encouraged in mine. Certainly, no work is expected to be done over the weekend, not even subtle hints made at working during the weekend. There is plenty of encouragement when it comes to pursuing opportunities. There is a strong culture of preserving a diverse, international environment as is evident by the different backgrounds of the lab members. Of course, there is an understandable expectation from the PI that we must meet our deadlines.
- I over-work, but I think that this has nothing to do with my gender

- My professor provides a good work life balance environment. However, given the work culture that exists across the board in our community, I have a tendency to become obsessed to finish unfinished work and hence, I feel like I need to push myself constantly.
- My work-life balance is better than what I expected since I had a less equitable work-life balance during my Master's. It is quite reassuring that my PI tells the lab members to take vacations from time to time,
- I do not have any particular problems with the current balance. While it would be nicer if the balance were more equitable, I do realize that the prevailing lab culture as it relates to work-life balance is not dissimilar to other high-functioning labs across the world. I also do not observe any discrimination in this regard based on my gender identity.
- Generally good. I am encouraged to have a good work-life balance.
- I am quite aware of the fact that I invest a considerable amount of time for work-related reasons but this stems from a strong work ethic. The PhD is demanding, but I think I add more to my plate than what is required of me.
- Meetings after 5pm conflicts with my family schedule.
- Absolutely.
- The quick answer is no. If you have to be in front, work and life cannot be balanced. But this is not specific to the NCCR. NCCR work does not take up a disproportionate time with respect to the rest of my responsibilities.
- It is fine. There are no impositions from NCCR.

Section 2 : Assessment of Equal Opportunities Activities

2.1 What is your opinion about the initiatives of the EO committee? What could be added or removed?

- I think that EO initiatives should aim at highlighting common elements between different groups, rather than highlighting differences. Moreover, sometimes I get the impression that these initiatives aim at including everyone (i.e., representatives from all minorities), when actually in my opinion they should aim at making the differences not matter anymore. I think that additional EO initiatives should aim at making male privileges visible (especially to the men themselves). I honestly don't see myself applying for most of the NCCR EO initiatives. Many initiatives aiming at increasing the number of women in robotics are targeted at women. This way it seems that we are (the sole) responsible for fixing the problem! We are not!
- I am generally positive on the awareness about EO within NCCR and I especially liked the pre-university initiatives because I think that they are the most important ones. I think it's particularly important to show our career as an opportunity to young girls. Later on, people have already made a choice. I was positively surprised that there were also courses for, or including, boys! Giving both boys and girls the opportunity to experience something, and then share it with the others, gives all a sense of empowerment. I am not sure whether women-specific financial opportunities are important at the level of PhD students and postdocs, I rather appreciate much more

the visibility and bias-awareness events. I would also like a lot to meet with mentor women. I believe that women tend to be more shy than men, so preparing comfortable scenarios for women to speak up, learn and share experiences, would be a great help. I only see financial help worthy for the invitation of women keynote speakers, because it might give the chance to invite someone you wouldn't have had the budget for otherwise. During my studies I wouldn't have expected that there are grants for women. If I needed financial support, I would have looked for financial support in general. Why should this be an issue of the EO committee?

- The initiatives are good, but they need more publicity. It would be better if the committee publicize them amongst the master's students and have conversations with them about their future.
- These initiatives are great. Since the infancy of EO committee, it could be seen that there is a lot going on. However, I believe this is not the time to "focus" but rather experiment. We should not do less (i.e. not remove anything), but continue to explore as much as possible. This will allow us to get more data points. We should give enough time to evaluate all initiatives. This will provide valuable learning experience, and should be very useful for others in the future.
- I am supportive and admiring of all these initiatives. There are many initiatives and they require a lot of energy. This is very altruistic. I cannot think of any suggestion just now. I think that NCCR Robotics offers a very good example what can be done in the area of equal opportunities.
- In general, the initiatives are good. In particular, I like that they tackle the life span of STEM education. However, they could do with more publicity. One idea would be speaking about them during the introduction class of robotics courses for Master's students, especially if these courses are handled by NCCR professors. I also have mixed feelings about EO initiatives in general. While it is important to shed light on the problems that exist, there is a very real danger of reinforcing these problems if the initiatives are not implemented carefully to avoid that eventuality.
- I find the initiatives very good. I notice that there is no initiative targeting child-care. Also no initiative specific for postdocs, e.g. those wanting to start a family. Access to day care is indeed a problem, with very long waiting lists that are problematic for postdocs. Even some male postdoc had to leave because they could not find day care.
- I didn't know them and I was very positively surprised! I was impressed at the range of activities proposed, that cover all ages and stages from young child to established professor. I think that activities aimed at pre-university students are the most important ones to help more girls choose robotics as a career path.
- The initiatives are good, but they need more publicity. It would be better if the committee publicized the opportunities available to the master's students and have conversations with them about their future. I was one of the facilitators of the robotics outreach initiatives for girls. It was both fun and fulfilling. These outreach events are so important as they help tackle the pre-existing stereotypes. Furthermore, the events that I facilitated had a good mix of students – some who were keen and some who were probably less keen and everything in between. It is good to have such a variety of students as it is reflective of what one might find in a classroom. I honestly believe that these events make a big difference as they help the young girls become more confident and give them some tools to overcome the barriers they might face at that point of time or even in the future. I also think that teaching children about how to relate to technology is very important. By teaching them about why certain technologies are used the way they are, it fosters their creativity and helps them

understand that technology in and of itself is not bad. It is what people choose to do with it that determines whether the application of technology is good or bad. Honestly, the Award for Scientific Visibility seems a little redundant since labs often cover the cost for traveling and presenting at conferences.¹ A better use of money would be to invest in skill development and mentoring for PhD students, who often lack both. It is important to note that at EPFL and ETHZ, money is not the biggest hurdle. Focus more on the bachelor's and master's students. Conduct demos and tours of robotics labs for bachelor's students and provide internships for master's students. These steps will be effective as a means to both help the students in shaping their future as well as creating awareness of NCCR robotics' activities. Anti-bias training should be done before the master's level. By the time, women reach the master's level, they often just learn to live and adapt to the situation. Quite frankly, I do not go about thinking about how work life is affected by my identity as a woman. Instead, by trying to fix the problem of stereotyping at a much younger age, you might be able to create more change. What PhD students need is training for research and analysis. These are more important issues for me that need to be addressed.

- I would add activities (e.g., training sessions, lunch events) open and even encouraging the participation of men. Sometimes it feels that gender equality is a problem of women only.
- It is great. For young ladies / older girls, make sure there is no girl-specific branding. Indeed, I do not like women-specific events or activities. I think they defeat the purpose sometimes as they sound uncool. For example, I feel that people (incl. myself) would like to hear about cutting edge research and not research by females only – cool research is gender free. So I think that a better way to be inclusive at events is to just aim at roughly equal numbers of women's/men's research being presented, but an event itself still should have a theme of its own, entirely research based. One initiative that could possibly be added is mentorship by senior women professors for younger women professors.
- I am part of the global team Women in AI (WAI), leading the education division in Switzerland. As part of this role, I have been in touch with the outreach activities for various camps for young girls. In my opinion, a number of preuniversity initiatives tend to have events for only younger aged girls, and often the problem is that doing this keeps a lot of the boys out of the loop. Men are the ones who are currently mostly sitting in the positions of power, and at that young age, it is important to include younger boys in these workshops, to help shape their mind. This is what I try to advocate in my current non-profit and generally too. It is vital to convey that gender does not determine/connect you with a specific field or occupation. Ideally, these initiatives would include parents as well, as they bring their specific cultural prejudiced mindsets. They are the ones who might be unintentionally feeding their children with stereotypes. Hence, there is a need to target a broader audience to ensure that harmful societal biases start do not affect girls at a young age. Generally I believe the EO initiatives are great and going in the right direction. None of the EO initiatives are counterproductive, but I think they are not complete either, I am quite curious as to why most of the monetary initiatives are only focussed on NCCR robotics institutions (primarily, EPFL and ETHZ) and no other universities within Switzerland. Would it not be better if students at other universities could also benefit from them? The existing scenario seems one of "privileged helping the privileged". "Awareness

¹ Note: there has been a misunderstanding here. the Award for Scientific Visibility is for master students that are first or co-authors of a conference article (not PhD students or postdocs). Not all labs provide funding for them to attend conferences.

programs”, such an implicit bias workshop should target the people who actually need the education and not those who already believe in this. It is important to bring those who disagree with us into the fold. Pose these programs as a discussion, give them also a safe space to discuss their ideas which may be different from us but we need to involve them in the conversation because without involving them, we won't have the chance to convince them.

- The EO initiatives are good, but they severely lack publicity. Lots of people even within Switzerland are unaware of them. Therefore, it would be better if the EO committee were to publicize the same on a much larger scale. In addition, it would be useful if there were workshops to help tackle conversations perpetrated by those who genuinely believe that affirmative action is bad and that a "positive bias towards women" exists. They may also take the form of casual bigotry. These conversations are toxic and maybe addressed to some extent by deconstructing the underlying prejudices that give rise to them. Furthermore, a major problem that exists in academia is imposter syndrome. This complex is worsened when it is gendered. If workshops could be facilitated to help handle and confront it, that would be beneficial for a lot of people.
- I think more work can be done during Pre-University period. Personally, I prefer it when these initiatives are not-gender specific as this makes them more inclusive. Workshops could be organized to ensure that people are trained to call out prejudices. Case in point, there are people who think these initiatives will only result in candidates who attained an opportunity because of quotas alone and would not be able to do so without them. There need to be workshops for those who would like to address their own prejudices and for promoting ways to understand people better. The true equality will be only achieved when men and women both make the effort to understand each other's perspective. Bring more women into the field from the start. That way, conversations about inequity become much more frequent and normalized. While the EO initiatives are nice, more mentoring and coaching initiatives for both gender would be appreciated.

2.2 Should we introduce a women-specific spin-fund to promote women's role in tech transfer? Or do you have other suggestions to increase the number of women in tech transfer?

- No, I would like to reduce the number of initiatives that target women specifically.
- See above, I see no need to fund women for tech transfer. Instead, tech transfer requires courage, so maybe mentorship events for women would be much better
- I don't think that money makes the difference, especially at this level and context. Also, for me it enforces the idea of different standards, which goes against equality.
- Personally, I might benefit from it, and so, I would support this idea. However, in general, I am unaware of how many women are or want to be in the entrepreneurial space within NCCR to sanction this initiative. It would be great to at least have an information session for the women in NCCR about the initiatives and opportunities that they have at their disposal both through NCCR as well as external resources. Furthermore, if first-year women PhDs are made aware of these opportunities, this will help them shape their PhDs at the beginning of their studies itself.
- Yeah, why not? It would definitely encourage women to apply in my opinion. Additionally, it might be useful to provide guidance to those women interested in

becoming entrepreneurs about the challenges they might encounter and provide them resources (legal support, internships etc.) to tackle these challenges.

- Yes would be very interesting.
- No, I don't like the idea of women-specific grants. EO initiatives should aim at encouraging women to apply for standard grants, participate in standard initiatives. Also, judgement in these grants/initiatives should be fair: I don't want to win something just because I am a woman. It happened to me to hear sentences such as "We need a woman in this project", "we should put a woman as PI". Women should be judged equally as men, and just be encouraged to participate more.
- I would rather suggest providing better advice to all than more women-specific funding. For instance, by providing information from someone who did it.
- Good question. Maybe. We should keep all doors open in order to have more women in tech transfer. But maybe a women-specific fund is too narrow. It might be better to encourage more women to apply to the normal calls, and at equal quality favor applications from minorities (women or others).
- I do not like that. I think that the fact that there are few applications simply reflects the (low) proportion of women in labs. I think that women want to be judged on their excellence, on the same level as men, for their output and their competences. If one is reluctant to apply to the normal call, then this is not a good sign for the next challenges to be faced as an entrepreneur.
- I have mixed feelings about this opportunity. One of the reasons women do not get into entrepreneurship is because often, family responsibilities become a barrier. Owing to these added duties, women might have lesser energy to expend and this is worsened by the absence of a support network to ameliorate the corresponding problems of family responsibilities. This pandemic has made the stark imbalance clear in this regard. Recently conducted surveys show how wildly different the perceptions are between men and women when it comes to shouldering family responsibilities and the perception of their contribution towards the same. So, women specific funds may be good as a short term solution, but apart from monetary support, creches/day care centre for young mothers are needed. It would go a long way if NCCR robotics could form alliances with organisations that facilitate these care centres and help alleviate the burdens associated with family responsibilities. It would also help if events featured more women in business, and young entrepreneurial women specifically.
- Personally, I am not in favour of introducing a women-specific spin fund as the narrative might be twisted to show that women are incapable of going through the same struggles as men. This is fundamentally false and the barriers for women are multi-faceted, but the discrimination will continue to exist. There is also a risk of predominantly male start-ups hiring a woman specifically to avail of this fund, effectively using them as props. Rather than a spin-fund, it would be more useful if training programs were instated that would provide women with the know-how and other resources that would benefit them as they go through the journey of creating their own entrepreneurial venture.
- I fully support more opportunities for women to enter the entrepreneurial sphere, would really help personally, Funding is always a limitation and it is better if there are

more opportunities available. It would be great if NCCR could facilitate panel discussions with women entrepreneurs.

- I find the entrepreneurial space rather terrifying and I would not want to create a start-up without much reassurance. The spin fund may be useful, but I am not the best person to comment on this matter. If possible, facilitate other ways to reduce the risk. For instance, by fostering the start-ups in the labs before students graduate. Alternatively, the tech transfer office can scout for projects that have potential as a start-up.

2.3 What could be a suitable balance between additional visibility vs additional workload for women in robotics (e.g. demos/talks, committee work, management, leadership, ...)?

- It is true that if you want to gain visibility, it often comes with the need to invest time and energy to organize events that make it happen. Women seem to have to prove their worth much harder than men. Personally, I have been fortunate to not have faced direct hurdles, but I know other women who have had to work much harder to prove themselves, especially if they do not fit an "accepted" archetype (geek, nerd). I would like to bring about systemic changes, but that means a lot of additional work. Therefore, I need to set priorities - first is the PhD. If I do well there, my work will speak for itself, and consequently, will provide me a platform. I try very hard to manage my time, allocating a certain amount time for extracurricular work, even though it can be very exhausting. I must point out that I am passionate about all form of bigotry and discrimination, not only gender-based prejudices alone.
- I am not sure I understand this question and the meaning given to "visibility" here. What visibility it is to speak to an internal event, for example? It is just extra workload, in my opinion. I would like to speak to women professors on these themes. Would it be possible to organize a women in NCCR luncheon, for example?
- I don't know, I don't see this being an issue for myself
- If I had a choice, I would solely focus on my work, which is the reason I was hired in the first place.
- The situation is not at all fair, but that is also the existing reality. Hence, it may be inevitable. Raising awareness is important but it can be a major imposition on those who are tasked with raising awareness/ education.
- Visibility is always good. But it is very difficult to find the right balance. Committee work like hiring committees is arduous. Being a part of committees or other duties because of gender quotas generate much work, without direct personal benefit. We do it because we know it could make a difference in the future, definitely not for an immediate reward.
- Currently the balance is not right, there is too much workload. We should also avoid the risk of being judged as favored, e.g. you obtained this or this because you are woman. Maybe the additional work load could be compensated? And we should make sure that the visibility is not just for being woman but also for other things like the quality of research. Also EO should be about all visible and invisible minorities (i.e. not only gender but also race, and other aspects).

- Visibility should be intrinsic. For presentations, this can simply be obtained through a schedule with the right repartition between women and men speakers. Note that I was not shocked by but noticed the imbalance of male speakers for the last review (since it involved grand challenge leaders ; I believe this was due to the exceptional on-line format and time constraints). In general, women are often asked to run an extra mile (but this is in general, not specific to the NCCR).
- I don't know
- I find it annoying when I am given opportunities "because I am a woman". It somehow clouds the assessment of my accomplishments and makes me doubt myself: am I good? am I deserving this? to what extent did my gender weight in the decision? I think this is a dangerous slope, because it can enforce insecurities and the "imposter syndrome", who are unfortunately not uncommon among women in science.
- Good question. Finding the right balance is very difficult. Visibility is good. We need to cut down on committee work. In truth, we just need more women professors to balance this out!
- This is purely subjective and depends on the person's current state at any point of time. Furthermore, women who also come from historically minoritized communities may have additional challenges. Personally, if my work already has enough visibility, I would not need to avail of training workshops. I would like to minimize the additional workload as it takes time away from the work that I am hired to do. I try to do what I can "locally" - facilitate project opportunities to women students and work with them to further my own professional goals as well as provide them with experience. I do what I can provided my actions abide by my principles.
- I am pushed to the brink of collapsing under the strain of the additional workload that I took on, both to further my career as well as improve the visibility of women like myself in the community. Balance is very personal and varies quite a lot depending on how much a person is already doing. The two (visibility and workload) are not entirely separate. It all depends on how much you want to promote your work as well. What is generally agreed upon is the importance of networking. It is absolutely vital to belong to a community that you can depend on.

2.4 Do you have suggestions on how to improve working conditions for women within the lab and the NCCR?

- I have no general suggestions on how to improve working conditions for women, but in general terms I would be happy if PhD students were more involved in project/lab management and decision making. It would make us better prepared for our later career! Men often motivate their interest for the topic of gender-equality because of spouses or daughters in the field. That's ok, but don't forget that as a man in robotics it's probably you who should reflect on your biases and behaviours, and maybe change them. Not the women!
- Personally, I do not ask for much if I am allowed to carry out my work in peace. In general, it would be very helpful if I had more flexibility when it came to choosing my venue of work (home/university). More specific to my lab, our office is an open space. Open spaces do not grant us much privacy. It would be nice if we had an option that would give us more privacy.

- It would be good to give more visibility to women PI in talks, e.g. replacing grand challenge leader presentations. A good example of gender balance was the planned agenda for the cancelled Swiss Robotics day. Note that women have a complicated life but that is not related to NCCR.
- no
- I would like to see more frequent causal interactions happen with women members of the community if possible. This community could encompass current colleagues, alumni, and students. When I joined my lab, I was told that a lot of my colleagues are shy. For some reason, the responsibility of communication fell on my shoulders. I thought that this was a bit unfair as on top of having to deal with being a newcomer, moving to a completely new country, I also had to deal with this major barrier. As I mentioned earlier, more workshops to help tackle imposter syndrome, which I think is a malignant problem.
- If women have children, the existing academic framework is designed such that they fall behind. It is so important to both give women the confidence that this is not the case and ENSURE that this is not the case, ensure true equality. The problem is that sometimes women might need to work from home and policies should be put in place to facilitate this. Overall, it is necessary to break the norm of sexism that pervades our society.
- Not specifically for women but more globally, one concern is the amount of teaching work that PhD students have to do. More specifically, the inequity across the PhDs in terms of their contribution towards teaching. A better balance should be found to equally distribute the load across PhD students. The problem is also that some professors might not factor this in, especially since the official commitment represents 20% of our work time. As mentioned previously, we, PhD student, are lacking skills and what would be beneficial is have a training period, say a month, prior to the commencement of the PhD when we learn the basic skills needed to teach and carry out research. I also feel not enough is being done in regards to PhD students who have joined their programs during the COVID-19 pandemic. The fact that they do not really have much of a community to depend is very difficult for them. Personally, I know at least 4 students who started and quit their PhDs because the pandemic made the experience very strenuous on their mental health.
- The proposed “implicit bias” course is very good. Especially for group leaders, since they influence their groups, but also for all researchers individually.
- It is a fine balance. It is important to improve working conditions for all. We should also make sure that people understand that women have more work load. Already a lot is being done. EO is doing great. We should keep trying different things and evaluate what works.
- We should focus work and meetings during day time (nothing outside). Teleworking helps to keep flexibility in the schedule. In the post-covid future, we should allow people to continue work from home a couple of days per week, as needed.
- Women in general lack a strong support network as there are only a few women in these communities. This can result in neglect, in male-dominated spaces, such as robotics, as they may not have the support that their peers have This is not necessarily the fault of the peers of course. However, it is absolutely vital to first acknowledge this problematic situation and then, understand how to address it. This could be done through providing women with opportunities of networking events without the women having to sacrifice their vacation time. NCCR robotics could make a strong

case to SNF to help address the lack of a strong support structure for women through concrete initiatives, such as increased paternity & maternity leave, and the instatement of monthly menstrual leave.

- I think that the lack of clarity about family planning opportunities could be a reason for women to not choose this career. So, I would advise to give more visibility to family planning opportunities.
- No, in my case they are really good
- No major changes are needed. Provide equity in its truest sense. There is no need for 'special' treatment.

2.5 What are the obstacles that girls face when considering/following robotics-related studies (STEM in general, but T & E specifically)?

- Sometimes people "not pick" a career (e.g. a course in Robotics) because they think they can't or shouldn't do it. Moreover, in my opinion students are not well aware (and often have partial or stereotyped ideas) of what is actually needed by a discipline, so when they have to decide whether that career fits for them, they might reach the wrong conclusions because of this.
- I didn't face any obstacle to pursue my career. I imagine that for some girls the lack of female role models (e.g. math, science, tech teachers at high school level are usually male) could be an issue. Also, parents of my parents' generation might have a more traditional view on the career paths for boys and girls, but I think this is changing with time.
- In my experience, the only obstacle I can speak about is a certain surprise/disbelief when telling others about my career choice. For some girls, the idea that you're doing something "out of the ordinary" might be motivating, but for others it might be discouraging.
- This is a mystery to me. I believe that the biggest factor is family culture (that influences much at the very early age) and society. Girls are less encouraged to be a scientist or engineer ; this is an unfortunate fact that will take time to tilt. Promotion should be done very early, as kids enter school. Later is probably too late. I would also promote STEM more consciously with teachers in primary colleges. Some teachers might still make comments that put girls off. There is also negative peer-pressure.
- I do not know many women in the sciences and that itself is the problem. I wish I could get to know more women. At the very least, this would help us collectively figure out what problems are faced and how to address them. The women that I knows "have confidence" and it becomes necessary to develop a thick skin to make sure that I do not get steam rolled by egoistic male colleagues.
- There are several entry level barriers in preuniversity. Some women might have a specific mindset due to lack of exposure or rather, a skewed exposure to parts of society that do not provide them with a supporting environment for their growth. There is also a very real danger of homogenizing the struggles of all women. It is important to acknowledge the varied experiences women have based on the communities that they come from, especially if they have been historically minoritized. Some women are a "minority within a minority" (ex. Ethnic minority within a gender minority). Failing to respect these distinct experiences can be extremely discouraging for members of those minoritized communities to be a part of the academic system.

- The main obstacles stem from stereotyping. This is certainly quite true when you are the only girl in a class full of boys – you will stand out. People do not take you seriously enough in these situations. It seems as if I need to prove myself to gain the validation of my classmates, regardless of whether I need that validation. This was truer at EPFL than at the university, where I completed my Bachelor’s studies. Hence, it made it harder for me to integrate better here.
- I do not really know because I succeeded! There is possibly a lack of role models, and also a lack of self-esteem (as a consequence of a patriarchal education) in a competitive field.
- I think of the stereotype of the "male engineer", who does all hands-on activities. People are often surprised when they hear a woman discuss welding techniques, as if that is something she shouldn't do.
- The biggest obstacle is that we feel like there is a need to prove ourselves for people to take us seriously. There is a good chance that people won't take you seriously if do not prove your "worth". The problem is that we have to always be on high alert and performing to the very best of our capabilities, without showing any insecurities. This situation does not afford us the opportunity to be vulnerable. This is something that affects people of all genders and maybe understanding the struggles that people of each gender go through would help eliminating biases on each side. Indeed, the patriarchy has a way of harming people of all genders in different ways because of normalized sexist ideas about masculinity/femininity.
- Often the problem is stereotyping. This has a cascading effect as it contributes and reinforces a lack of confidence in young women. As it relates to robotics specifically, the problem of hyping some types of robotics and not highlighting the diversity of areas within the field is that it isolates those people who might actually have related to the neglected robotics areas. Many people are attracted by AI (algorithms, computer vision, machine learning) which appears more prominent in other sections than Micro-engineering (which leads to robotics) On another note, I think it is important that students be introduced to AI ethics, through an SHS course for example, at the beginning and end of their bachelor's studies
- It is hard to tell. I think the biggest aspect is the environment (e.g. at home, school, and the friend circle), which defines what is expected of them. In my environment, there was never a question about not being able to work in engineering. In some environments, girls might be pushed to go into more traditional female roles deterring them from studies or a career in STEM. To undo this, it is important to help girls burst their bubble and see all the options that they have, in effect normalizing the effect of the society they grow up in.
- It is hard to tell as there certainly is a generation gap but I think it is important to highlight the "cool factor" rather than the "equality" of the subject. It is very important to highlight that robotics is a cool thing to work on, and that it addresses many interesting problems such as sustainability, human-robot interaction, wearable robots, i.e. robots that bring a better quality of life. We should demystify the word of Robotics, which currently is often linked to something powerful, too fast, unnatural, and inhuman. We should do a better job in educating the young and the public what we think robotics is, with all its positive aspects. Also highlight that robotics is evolving. Finally, there are new interesting approaches mixing art and robotics, e.g. such as kinetic sculptures. This is also an atypical but positive direction of application of technology. After all, it is the future of technology.

- Honestly, I am not sure if there is one single answer to this question. Each person's experience may be treated case-by-case. The gender ratio was quite equitable during my Bachelor's, but not during my Master's. Certainly, the latter is true for several women in some STEM disciplines. The worst part is that the unequitable ratio is so normalized and accepted without questions. It is no surprise then that women would prefer to pursue disciplines they might actually have a community, instead of being perennially exhausted by the burden of being the minority.

2.6 Do you have suggestions on how to increase the number of women entering robotics-related studies and careers?

- Not really, robotics is very multidisciplinary, so the best way into it depends on personality.
- I think that initiatives aimed at young children are the most important ones, and it's important that we enact them at schools to reach everyone (i.e., not on a voluntary basis, otherwise we risk to only reach those already interested).
- I would make EO initiatives more subtle. A conference has 50% female speakers, and nobody comments on that. An initiative for children has 50% female roboticists among the organizers/trainers, and 50% girls among the attendees, and nobody comments on that. Maybe this way we can convey the idea that this is normal, and gender will really stop making a difference.
- This is really difficult and sometimes even quite individual to the country/region we are targeting (for the society impact mentioned above). Mentalities are difficult to change, and some places are indeed very conservative. I feel that our best weapon is to be persistent, make sure we promote the right role models, promoted with sensibility (i.e. based on caliber and not gender only) and care (i.e. overexposure is also harmful) and consult the views of experts in such societal questions.
- It was very important to have the EO committee do this type of brainstorming. We need to take an active role. It takes time. We should not expect immediate impact, but understand that this type of initiatives will have an impact in the long run and keep at it.
- I think it is important to say and show that there are many women in robotics programs. I did not think so initially (at the start of my lab), but I realized that role-model works, and so implicitly. I have noticed that my lab attracts other women. It is of course essential to create a critical mass, which will by itself attract more women
- It would be good to facilitate conversations with other women, both women in robotics as well as those interested in joining robotics related fields, but not at the expense of additional workload. It does not have to be something fancy. Casual, informal meetups would be nicer to gather women in a comfortable space. This could lead to possible mentoring opportunities.
- The problems are often systemic. So, they cannot be solved by just having events or quotas. At times, I feel like there is a movement, though well-intentioned that wants to "make women engineers". It is almost treated as a numbers game and women as monolithic props. In such instances, this movement sometimes feels like an exercise of control on women. Just do not force/influence women to enter any fields. Give them complete freedom to choose and do not place barriers that might hinder their freedom. I believe that quotas do not fix problem. They may even make the problems

worse, focus more on removing the biases, the implementation must be done carefully if needed.

- Having good role-models is key. I am not sure if courses only for girls are a good thing. We should highlight that working in robotics is a top and nice job. We should be careful that some initiatives might have negative consequences, for instance by highlighting "rebel girls" who reached good positions despite difficult conditions. This might give the impression that working in robotics is a continuous fight. I know many people who gave up because did not want to fight anymore, even at postdoc level
- We should overcome the stereotype above. Show that women can be roboticists, and there should be no surprise about that
- Wording is crucial. There is a difference between "Women are encouraged to apply" and "Only women may apply". Personally, I favour the former more and not the latter. This is because we must reckon with the fact that there is a lot of negative perception regarding the credibility of affirmative action policies. Women are increasingly sharing experiences where their success is being attributed as the result of such "women-only" policies and not because they were actually merited. Hence, artificially changing the demographics may seem to solve the issue in the short term but in the long-run it may serve to add to the problems for women, thereby creating new biases. What is the point of a superficial diversity if the outcome is a much larger entangled mess? There is a need to think about these systemic problems more long-term with an intersectional lens to generate solutions that will make long lasting differences. Lastly, I think most significant improvement to increase the number of women entering robotics-related studies and careers can happen by introducing such fields to girls at an early age and making them aware of all the possibilities that are out there to fully utilize their potential.
- Target younger women and normalize the presence of women in science when communicating with them. One can do this without treating them as monoliths. One can do this without resorting to disingenuous glorification.
- Stop treating children differently. Often, the wrongheaded ideas are imbued by teachers and parents who harbour their own biases. Normalize having girls/women in spaces where they are actually present even if the perception is that they are not. Learn how to listen and gauge perspectives. This should help broaden people's minds and have more fruitful conversations. I do not think quotas fix problems. They may not even help solve the problem. If they are absolutely needed, their implementation should be done very carefully to prevent aggravating the existing problems. Instead, it would be better to focus more on removing biases that people have,
- I wonder to what extent there is an issue of women not entering robotics related, or even leaving the robotics community? How does the proportion relate to that of men leaving the robotics community? Either way, we have to figure out if we are actually losing women from the community, and if we are what are we losing them to? Where are they going? Are we losing everyone to data science? Or some other area that is both in high demand and more appealing? While I say that the diversity of sub-fields in robotics is not highlighted, there are a lot of NCCR "robotics affiliated" labs that are not well known by the students who enter the robotics master. Only a few are known by the students in the Micro-engineering bachelor at the point where they have to choose what to specialise in. With a clearer grasp regarding what is encompassed within robotics and how diverse the field is in terms of applications, it will be easier for students, and also women, to discover a domain that they are passionate about and make their decision accordingly. One concrete step that NCCR robotics professors

can take is to engage more in bachelor's level education by teaching courses about their work to the bachelor's students.