Who Are the Women Authors in NIME?—Improving Gender Balance in NIME Research

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ABSTRACT

In recent years, there has been an increase in awareness of the underrepresentation of women in the sound and music computing fields. The New Interfaces for Musical Expression (NIME) conference is not an exception, with a number of open questions remaining around the issue. In the present paper, we study the presence and evolution over time of women authors in NIME since the beginning of the conference in 2001 until 2017. We discuss the results of such a gender imbalance and potential solutions by summarizing the actions taken by a number of worldwide initiatives that have put an effort into making women's work visible in our field, with a particular emphasis on Women in Music Tech (WiMT), a student-led organization that aims to encourage more women to join music technology, as a case study. We conclude with a hope for an improvement in the representation of women in NIME by presenting WiNIME, a public online database that details who are the women authors in NIME.

Author Keywords

women in music technology, women in NIME, meta-review, gender balance

CCS Concepts

•**Applied computing** → **Sound and music computing;**
•**Social and professional topics** → **Women;**

1. INTRODUCTION

New Interfaces for Musical Expression (NIME) is an international conference that started as a spin-off of a workshop held at the ACM (Association for Computing Machinery) Conference on Human Factors in Computing Systems (CHI) in 2001, which counts as the first edition of the conference [12]. With a clear connection to CHI, the conference specializes in the design and evaluation of new interfaces for musical expression and performance. The conference has reached a state of maturity as evidenced by the number of meta-review papers presented in the last years [2, 9, 11] and by publication of the first *A NIME Reader* [8] highlighting the most representative works and giving some perspectives on new directions.

Lately, there has been an increase in awareness of the underrepresentation[1] of women in the sound and music computing fields as highlighted by a number of meta-review studies presented in neighbouring conferences [1, 6, 7, 10]. NIME is not an exception, with a number of open questions remaining around the underrepresentation of women in our field and how we can improve the situation. Specifically, we need to ask ourselves as a community: (1) how can we incentivize women authors to come to the NIME conference?; (2) how can we raise awareness throughout the community about the issue of women's underrepresentation at NIME?; (3) how can we involve the NIME community in the mission of bringing more diversity to this field?

This paper is in line with the above papers, but with a focus on the NIME community. In particular, we survey and reflect on the proportion and persistence of women authors that have had works in the conference proceedings from 2001 until 2017. We summarize the actions taken by a number of worldwide initiatives oriented towards making women's work visible in our field, with a close-up view of the organization WiMT, presented as a case study. This paper concludes with a set of suggestions on how to improve the representation of women in NIME, including presenting WiNIME, a public online database of the women authors in NIME.

2. RESEARCH QUESTION

Our main research question is: how can we improve the representation of women in NIME? In particular, we are interested in understanding what has been the level of representation of women authors in NIME over the course of the years (and has there been any improvement?); and what can successful organizations of women, related to sound and music computing, tell us about how our NIME community could improve the level of women's participation and a greater visibility of their work. Our objectives are to identify who are the women authors in NIME and to strengthen the community of women in our field.

3. METHODOLOGY

This study is in line with reflective meta-studies of the NIME conference (see Section 1). For the database, we used the online proceedings of the NIME conference, hosted on GitHub.[2] This study focuses on identifying who are the women authors in NIME. One of the limitations of this approach is that we exclude women performers, and also in this first exploration, we also excluded geographical and institutional information.

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[1] *Underrepresentation* refers here to the low percentage of women participating and the low visibility of their work.
[2] http://github.com/NIME-conference/ NIME-bibliography
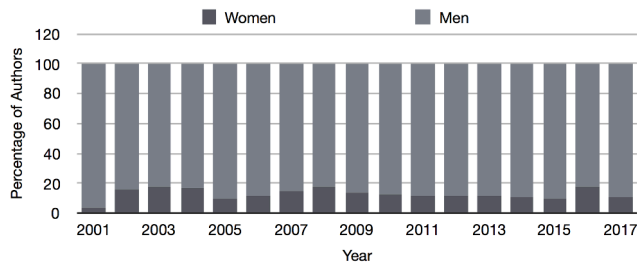
Figure 1: Percentage of unique authors by year.

Figure 2: Frequency of papers published by authors.

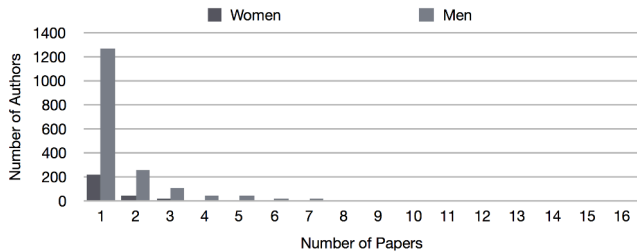Figure 3: Percentage of papers with at least one woman author vs papers with only men.

Figure 4: Percentage of papers led by each gender.

The data was sanitized, which included: (1) elimination of redundancies in author names (names spelt differently but pointing to the same person, and also nick names of the same person); (2) correction of errors in author names (e.g., typos or uncomplete names); (3) replacement of names of collectives with the author names; (4) added missing authors in mismatches between the authors listed in the papers and the bibliography file from the online repository. After this process, we ended up with a total number of 2,110 authors and then identified manually the women vs men authors.

4. RESULTS

We analyzed 1,562 documents and 2,110 authors in total, of whom 291 were identified as being women authors, with the other 1,819 identified as men authors. Therefore, the percentage of unique women authors, from 2011 to 2017, represented 14% of the total. Figure 1 shows the percentage of unique female and male authors over the years. This percentage is in line with similar communities, such as the International Computer Music Association (ICMA) and the Audio Engineering Society (AES), with reported ranges between 14.5% and 19.6% in the former, and less than 10% in the latter [10]. The results are also consistent with the automatic calculation of the NIME authors in [6], where the percentage ranged from 7.4% to 17%. Interestingly, in the *NIME Reader*, the percentage of women authors was 15% of the total, which shows this percentage was consistent.

Figure 2 illustrates the frequency of papers published by authors, showing an exponential shape from many authors just publishing one paper (215 of a total of 291 women; 1,277 of a total of 1,819 men), and fewer authors publishing two papers (41 women; 263 men) or three papers (20 women; 103 men). Two women and three men authors have published 16 papers each, which implies almost one per year. Beyond this threshold value, only 11 men authors have published a larger amount from 17 (2 authors) up to 42 papers (1 author).

Figure 3 shows the percentage of papers with at least one women author involved (M=24.4%, SD=6.6%) vs papers written by only men. Similarly, Figure 4 shows the percentage of papers with women first-authors (M=11.9%, SD=5%) vs men first-authors. The percentage shows that the around half of the papers that involve women had
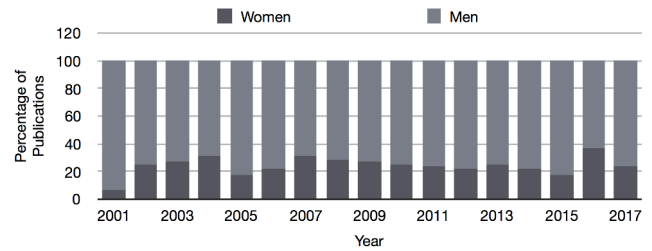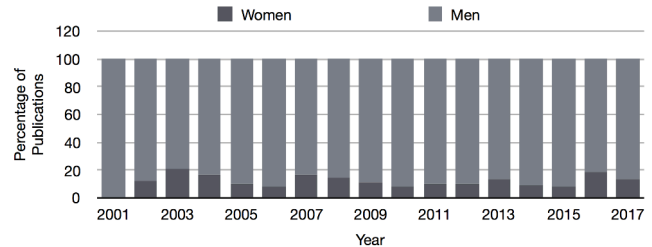
women as the first author, which means that for the other half of papers with women involved, the women authors collaborated in the papers without necessarily leading them.

5. DISCUSSION

It is noteworthy that over the course of the years of the conference, the percentage of papers with at least one woman author and the percentage of women first-authors seem to have stayed steadily low, with a cycle that increases every few years, and with a spike in the last two years. This indicates that there has been no noticeable improvement in terms of the involvement of women over the course of the years according to the published works. It is also noticeable that the number of papers published by women drops exponentially from the number presenting once at the conference to those repeating. Although the count of papers does not reflect whether the same author has presented more than one paper in the same edition, which relates to the fact that some authors have presented more than one paper, it is clear that women authors generally tend to only present once at NIME. An open question then is how can we improve these numbers? That is to say, how can we attract more women authors into NIME?

Interestingly, NIME has embraced studies and discussions on gender in the past. For example, author participation by gender at NIME was previously studied by Georg Essl [5], and NIME 2014 hosted a panel discussion on *Gender, Education, Creativity in Digital Music and Sound Art* by Georgina Born, Kyle Devine, Sally-Jane Norman and Mark Taylor, which led to a follow-up article [3]. There have also been older attempts to articulate and address gender gaps and issues in the field of computer music [13]. More recently, there have been standalone symposiums, such as *New Expressions: Women in Music Technology*,[3] and proposals for interventions, such as [4]. Therefore, there seems to be cycles that should be revisited to avoid starting from a blank page every time.

In the next two sections, we present some possibilities for change to overcome this gender gap. First, we introduce a case study of Women in Music Tech, a student-led

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[3] http://music.arts.uci.edu/icit/
new-expressions-women-in-music-technology-symposium

Figure 5: FLO and WiMT. From top-left to bottom-right: Anna Weisling, Léa Ikkache, Franziska Schroeder, Tuna Pase, Ariane Stolfi, Nela Brown, Anna Xambó, Sonia Wilkie, Magdalena Chudy.

Figure 6: *Music Tech Figures* is a series of posters curated by WiMT and sponsored by the ADVANCE Program. Illustrations by Oscar Martínez Castells.

organization that aims to encourage more women to join music technology (see Section 6). Second, we present cases from a sample of international women music technology groups (see Section 7). Both sections aim to inform the considerations of practical solutions to overcoming the recurrent problem of the underrepresentation of women in our field.

6. WiMT: A CASE STUDY

Women in Music Tech (WiMT) is a student-led organization that started in spring 2016. During the previous months, the author did some research on the underrepresentation of women in the music technology field. The rationale of this research was inspired by Helen Thorington's keynote at the Web Audio Conference (WAC) in 2016, where she expressed concerns about where the women are in music technology. The results of this research were presented in the event *Women in Sound/Women on Sound 2016: Educating Girls in Sound* at the University of Lancaster (UK) in the format of a keynote conversation with Liz Dobson. The main topics of discussion emerged from informal conversations with women working at different stages in the pipeline, which included rationalizing why there is a gender imbalance and an underrepresentation of women in music technology; the effect of male-dominated spaces; the similar underrepresentation of women in science, technology, engineering, and maths (STEM) fields and the pyramid problem (e.g., in academia). We also discussed strategies to succeed in not only getting more women involved, including bringing more interdisciplinarity into the field, giving exposure of the field to a younger age group, the promotion of role models, making visible women's work, but also in encouraging equality and networking with similar organizations.

This research helped us to create WiMT at the Georgia Institute of Technology (Georgia Tech), USA. Both male and female students, academics and staff were involved. Sharing the issue with the department was the key to it succeeding. During the first year, we constituted a committee with monthly meetings and participatory decisions; we met sponsors and collaborators; we created a logo and a webpage; we organized an autumn concert and commissioned a piece to OFFAL, an orchestra for females and laptops; we contributed to changing the website of the department to give more visibility to women's work; we created a newsletter[4] with

interviews with relevant female figures in the field, such as Elaine Chew,[5] Stefania Serafin[6] and Emilia Gómez;[7] we prepared artistic performances (Figure 5); we did a music tech demo for high school students; we commissioned a set of posters with 6 relevant figures (3 women and 3 men) in music tech chosen by a popular vote (Figure 6); we had more female seminar speakers and organized networking lunches; and we helped students from the department to present their work at conferences (for example three of the committee members were sponsored to go to last year's NIME conference).

Keeping an organization functioning effectively at this level involves a huge amount of work, and one of the issues that we faced was to make it sustainable in a transient environment, such as academia. However, this example shows how in one year it is possible to change attitudes and perceptions about the issue by adapting an inclusive approach of welcoming everyone.

7. OTHER ILLUSTRATIVE EXAMPLES

There are a number of international organizations that are relevant to helping improve the gender balance in sound and music computing.[8] The following list of organizations is illustrative rather than exhaustive. A pattern between them is the use of participatory and DIY technologies to organize cultural, artistic and technological events.

7.1 WiMIR

Women in Music Information Retrieval[9] (WiMIR) is an international group of people dedicated to promoting the role of, and increasing opportunities for, women in the music information retrieval (MIR) field. They meet to socialize, share information and discuss topics in an informal setting, with the goal of building a community around women in their field. WiMIR runs a mentorship programme and has a public directory[10] of women in MIR.

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[4]`http://womeninmusictech.gatech.edu`

[5]Elaine Chew's interview: `http://goo.gl/g3642H`

[6]Stefania Serafin's interview: `http://goo.gl/utaFjw`

[7]Emilia Gómez's interview: `http://goo.gl/morstz`

[8]International map available here: `http://goo.gl/bURVvz`

[9]`http://www.ismir.net/wimir.html`

[10]Public directory of women in MIR: `http://goo.gl/3u8hC4`

7.2 YSWN

The Yorkshire Sound Women Network[11] (YSWN) in Huddersfield (UK) is an organization that aims to inspire and enable more women and girls to explore sound and music technology. They organize workshops, provide a mentor-based environment, make equipment available to people and work towards more diversity in the sound technology industry.

7.3 Female:Pressure

Female:Pressure[12] is an online database and international network of female, transgender and non-binary artists in the fields of electronic music and digital arts.

7.4 FLO

The Female Laptop Orchestra[13] (FLO) is a music research project that brings together a group of female musicians, engineers, composers, sound artists and computer scientists to explore collaborative music making.

7.5 OFFAL

The Orchestra For Females And Laptops[14] (OFFAL) is an international collective of women laptop performers who create performances involving multi-location collaborative improvisation. They develop technological systems and organizational structures that facilitate collaboration.

7.6 Sonora

Sonora[15] is a feminist Brazilian organization that makes visible and establishes dialogue about the artistic work of women. It is a collaborative network that invites artists to perform and streams the events over the world.

8. WiNIME

With the aim of improving the representation of women in NIME, we present a directory of the women authors with works published in NIME from 2001–2017, called WiNIME.[16] This directory can be useful when organizing conferences, talks, panels, advisory boards and performances. The list of women authors shows that there is a high level of women professionals in our discipline, at all levels of the pipeline.

9. CONCLUSIONS

This paper outlined the presence and evolution over time of women authors in NIME from 2001 to 2017, and revealed that the percentage of women authors in our field is as low as 14%. Then, we discussed a case study of WiMT, as a successful case of an organization raising awareness about the issue. We briefly introduced a number of international organizations that aim to promote the role of women in the sound and music technology field. We finally presented an online database of women in NIME, WiNIME, with the objective of improving gender balance in NIME research.

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[15]http://www.sonora.me
[16]http://annaxambo.me/directory-of-winime