Travel: Student Travel for the Programming Languages Mentoring Workshop (PLMW) at the International Conference on Functional Programming (ICFP)

Overview:

In September each year, the International Conference on Functional Programming hosts an instance of the Programming Languages Mentoring Workshop (PLMW). In September 2023, PLMW will be colocated with the ACM's 28^{th} International Conference on Functional Programming (ICFP '23) in Seattle, Washington. This proposal requests funding to support travel and expenses for approximately 5–20 American-based students each year over the course of three years.

Intellectual Merit:

ICFP is a top SIGPLAN conference and a premiere venue for work in functional programming including its theory and implementation. PLMW aims to acquaint students to key concepts and skills necessary to maximize their understanding of the talks and papers presented at ICFP. Attendance at ICFP and PLMW may be crucially-influential for students working in functional programming and areas of peripheral interest.

Broader Impacts:

The purpose of PLMW is to encourage undergraduate students, women, and underrepresented minorities to pursue research in programming languages. Travel support will be prioritized for first-time workshop attendees, and focus will be placed on funding students who would be otherwise financially unable to attend.

Key Words: student travel support, mentoring, diversity.

1 Project Description

In order to inform early-career computer scientists, particularly those in underrepresented groups, about research in Programming Languages the Programming Languages Mentoring Workshop (PLMW) was created. Each instance of PLMW is associated with one of the flagship ACM SIGPLAN conference, this instance will be co-located with the International Conference for Functional Programming (ICFP), i.e. PLMW at ICFP.

Speakers at PLMW are a mix of well-established and junior researchers in the field, discussing their research and providing small-group mentoring. The majority of the audience is made up of undergraduates and early-stage graduate students. Students from historically underrepresented groups are encouraged to attend, in particular. The selection of speakers and the set of topics being discussed are specifically chosen to help those from these underrepresented groups navigate the landscape of PL research and form connections with more established colleagues.

By providing early-stage students with a high-level view of the research landscape, as well as insight into the realities of conducting research and working with advisors, we hope to minimize the feelings of intimidation that often come with starting a research career.

ICFP The International Conference of Functional Programming is the leading venue for work on the theory and application of functional programming. For 2023 the conference, and its co-located events run from Monday, September 4^{th} to Saturday, September 9^{th}. ICFP is a single-track conference with 3 days (Monday, Tuesday, and Wednesday) of research talks. PLMW is always held on the day *before* the beginning of ICFP, this is in order to ensure that the attendees have adequate context for the conference and a set of familiar faces whom they can approach with questions. The other co-located events often relate to a sub-discipline of functional programming or revolved around a particular functional language (OCaml, Haskell, Scheme, and Erlang all have scheduled events).

PLMW PLMW, always being co-located with a ACM SIGPLAN event, has been held dozens of times since its inception, including seven iterations at ICFP [1, 2, 3, 4, 5, 6, 7]. Building on this success and maintaining this momentum is an important goal of the PL community. We aim to continue this work through focus on the following:

- **Research.** Programming languages, and functional program in particular, can involve challenging technical formalisms to which few students are exposed during the course of their undergraduate careers. For example, inductive definitions, proofs-as-programs, and intuitionistic logic are used pervasively in the literature but see relatively little coverage within the US undergraduate curriculum. Our experience is that this divide creates barriers to cultivating a large and diverse cohort of junior researchers in programming languages.

  A specific goal is PLMW is to introduce students to some technical topic apropos the conference proper. We do this via technical sessions delivered by prominent researchers—for example, during PLMW at ICFP 2021, Bridgitte Pientka presented an "Introduction to Mechanized Metatheory." Students find sessions engaging because they are targeted directly to a senior undergraduate audience and give participants a common baseline of ideas to discuss with peer attendees throughout their time at ICFP. For example, one student "attended my first PLMW in 2017, having previously taken one programming languages course. I definitely did not understand most of the technical talks given at PLMW. However, since the talks introduced different areas of research, I felt much more prepared for the ICFP research talks." Beyond the technical talks, PLMW places an emphasis on helping students develop confidence and skills to grow their knowledge via self-exploration throughout their research careers.

- **Mentoring.** We see mentorship as a central aspect of cultivating the next generation of researchers in programming languages. Our experience is that many PLMW participants are questioning whether to pursue science (often research in programming languages specifically) as a career. We have observed that participants being able to interact with leader of the field in a mentorship-focused environment has significantly helped shape their outlook on science and our field, with one student saying "it was incredibly enlightening to see how experienced people in the PL field were sharing their research experience and other stories of building their (research) career in non-technical, everyday English during PLMW mentoring sessions."

  We design PLMW to enable mentorship opportunities at several levels. First, we work hard to recruit a diverse, empathic, and enthusiastic set of speakers for PLMW. We have found that speakers often connect with students and serve as mentors either explicitly (email conversations or similar community) or just by serving as a friendly face at conferences. A specific emphasis is placed upon recruiting a diverse set of speakers both in terms of background but also in terms of career path, to help students relate to the variety of career paths undertaken by those who have studied programming languages.

- **Interaction.** The most mentioned outcome for participants we have noticed is the interactions they have with peers at PLMW. For example, one participant mentions how PLMW helps them understand the community outside of their university, saying "it's really cool to find out that folks all over the world also care about these problems, and that it's not just you and your advisor working on this niche thing." We schedule PLMW to occur the day before ICFP; many participants continue to discuss and spend time together throughout the conference, and some even form lasting friendships. As one student says, "seven years on, I have now finished my PhD and I am still in touch with some of the friends I made at PLMW."

The program for PLMW at ICFP includes well-established researchers as well as early-career faculty and research scientists. Each speaker discusses an important aspect of undertaking PL research, often from professing "hard-earned" wisdom. In the past, our speakers have included Simon Peyton Jones (on how to give a good research talk), Kathleen Fisher (on what career paths are available), Aaron Turon (on taking care of your mental health), and Brigitte Pientka (an Introduction to Mechanized Metatheory). While ICFP and its other colocated events show off the "finished" work in PL research, these talks are meant to elucidate the *process* of PL research.

2 Benefits for Students

Participation in PLMW is often a highlight for attendees. While some students have resources in order to attend PLMW and ICFP, our aims are better achieved by providing some students with the means to attend, regardless of their funding situation. With this funding, we would make 12–20 travel grants (in the US; 4–8 travel grants to Europe) available for students per year that would be unlikely to attend otherwise. Specific number of attendees funded will vary based on changing pricing of flights, precise conference venue, and dates. Over the past decade, ACM SIGPLAN, industrial sponsors, and the NSF have proven instrumental in enabling a large cohort of students to attend PLMW.

3 Past Support from NSF

The PI, Kristopher Micinski, has not received past travel support from NSF, and has one awarded grant unrelated to the work described here. He will maintain and administer the PLMW at ICFP grant during the years 2023–2025.

Over the past several years, NSF has partially-sponsored PLMW at each of the major conferences in programming languages [1, 2, 8, 9, 3, 10, 4, 11, 5, 12, 6, 13, 7, 14, 15]. NSF support has

supplemented support from SIGPLAN and industry. However, NSF's funding has been crucial to PLMW's success in enabling a broad pool of participants to attend.

4 Need for Student Travel Support

Funding for PLMW from NSF is crucially-helpful in the workshop's success because it enables students to attend regardless of their ability to fund their trip. We believe this is especially beneficial for undergraduates and students who may struggle to find funding sources locally (e.g., from their university or department) to fund their trip. We believe the success of these students is crucial for achieving PLMW's goals of long-term diversity and mentorship impact.

5 Spending Plan

We request $15,000 annually to fund travel for ICFP. ICFP alternates its location each year between the United States and non-US locations, with 2023's ICFP held in Seattle, Washington, and the following ICFP to be held in a non-US-based location (pending decision by the steering committee). Proposed funding will be used to fund *only* students who are currently enrolled at higher-education institutions based in the United States (separate funding supports students based in locations outside of the US).

Students are given instructions prior to ICFP to track their receipts to later give to the PLMW staff. PLMW staff, in coordination with ICFP staff (and members the PLMW steering committee) work with students to communicate details regarding procedures for reimbursements and allowable expenses and flights. The PI, Kristopher Micinski, will work locally with the hosting, Syracuse University, to process receipts and reimburse students.

6 Recruitment and Outreach Plan

PLMW at ICFP has leveraged a variety of recruitment methods in the past, and we plan on continuing with our varied approach. The aim is to reach as many students in underrepresented groups as possible.

1. **Institution-based recruitment:** Many of our target students are already members of institutions that serve underrepresented groups. We will reach out to faculty at these institutions (HBCUs, Public Universities, etc.) and encourage them to broadcast our application to their students. We have already had conversations with faculty at Howard University about this and we plan to expand this outreach to other institutions.

2. **Member-based recruitment:** Many of the members of the PL (ICFP, specifically) community know of students that would benefit from attendance. Asking these community members, often faculty and industrial researchers, to share the details of PLMW @ ICFP with these students has been a significant source of attendees in the past.

3. **Community-based recruitment:** The PL community has a strong presence on online communities, mailing lists, online forums, and Twitter

7 Application Process and Selection Criteria

Applications are accepted via a Google Form broadly advertised on relevant mailing lists and other sources detailed in the outreach plan. Applications ask for name, email, current institution (along with class year), the student's reason for attending, and their attendance history. Priority

is given to (a) US citizens and permanent residents, (b) first-time attendees of PLMW, and (c) undergraduate students considering graduate school in computer science. PLMW will also fund early-career graduate students, particularly if they have never previously attended PLMW.

8 Anti-Harassment Policies

There are several layers of anti-harassment policies in place at PLMW. First, and most proximately, all attendees at ICFP and any of its workshops must adhere to ICFP's code of conduct [16]. ICFP's policies are consistent with a broader set of anti-harassment and discrimination polices for events held by the Association for Computing Machinery [17]. Recently, a new subcommittee of SIGPLAN, CARES (Committee to Aid REporting on discrimination, harassment, and related ethical policy violations) as another resource for students [18].

9 Reporting

PLMW has standardized upon a reporting process for attendees funded via travel grants. The information collected includes demographic information necessary to understand diversity outcomes for funding but also substantive feedback to help improve PLMW for subsequent iterations. Demographic information collected asks students to provide information (if they choose to answer) relating to their gender and educational background. Survey responses will be anonymous and no personally-identifying information will be kept from attendees.

Along with demographic information, students will report questions that help us understand trends in the field broadly. For example, a past survey included questions that ask about confidence of work/life balance and confidence in their ability to talk about technical subjects with ease [19]. The PI, Kristopher Micinski, will produce a report that aggregates collected data and reports upon relevant trends along with action items for directing PLMW's long-term focus.

10 Sources of Funding

PLMW is supported by several sources, including ACM's SIGPLAN and industry sponsors such as Galois, Microsoft, and others. In 2022, PLMW was supported by SIGPLAN and Galois. In 2023, provisional support (currently $7,500) has been donated for by several industry firms.

11 Intellectual Merit

ICFP is the leading conference dedicated specifically to functional programming, and has been the venue of choice for state-of-the-art work in programming languages and their associated logics and semantics. However, we observe that the technical complexity of the field—often necessitating knowledge beyond the undergraduate discrete mathematics curriculum—can be a challenge for students who lack either confidence or prior exposure to these topics. A key focus at PLMW is providing serious research-focused talks that ground a cohort (and inspire discussion through the course of the conference proper) in a common technical baseline. Students report that this has crucially helped them critically engage with the contents of talks at ICFP.

12 Broader Impacts

PLMW's key goal is to increase participation—particularly focused on underrepresented, minority, and nontraditional groups—in programming languages research. Prior students report that attendance at PLMW has been profoundly influential to their careers. Beyond the technical material

introduced at PLMW, students report PLMW as proximately-helpful because of the mentorship and social networks provided by PLMW. Many students report that, even after working in PL, PLMW has "helped me find my place in this community, and made me excited to continue being a part of it."

Support from NSF for student attendance at PLMW aids a crucial group of students: those who do not have an advisor or department willing to fully-fund their trip. These students are often interested in programming languages research, but have no local connections (or even no local researchers working in programming languages) or support for their interests or passions.

More broadly, we see funding for PLMW as crucial to NSF's mission in growing a high-quality cohort of junior researchers to productively progress in their efforts on sponsored research projects based in the United States. With a robust industrial sector, it is often hard to attract passionate and motivated students; we see PLMW as giving students an anchor in the community, and we argue that this helps grow a diverse cohort of students for the next generation of researchers in programming languages.

13 Budget Justification

PLMW reimburses students for their travel costs at rate based upon a formula which accounts for the distance traveled by the student. For example, a US-based student student flying from East to West coast is allowed to reimburse a ticket price of up to $500. These prices update based on current market trends at the time of the conference. At the time of writing, flights to Seattle from East-coast-based locations during the duration of PLMW and ICFP (traveling on US-based carriers) range from $350 to $550, and hotel stays average around $200 per night, with PLMW attendees allowed to stay for up to six nights (PLMW and ICFP). In years where conferences are held in non-US-locations, NSF funding will necessarily support fewer students. We anticipate funding between four and eight students in years where PLMW occurs in non-US-based locations.

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