RESEARCH STATEMENT ANDRÉS MONROY-HERNÁNDEZ

My research aims to revolutionize how people connect and collaborate through computing systems, making contributions both inside and outside academia. My team and I have published and received best-paper awards at the top human-computer interaction venues and created social computing systems used by millions of people around the world. I am excited about the possibility of returning to a university context, where I can focus on technologies aimed at tackling large societal challenges.

SOCIAL COMPUTING FOR CREATIVE EXPRESSION

I began my research career trying to turn end-user computer programming into a more creative and social experience for children and novices. Inspired by the literature on commons-based peer-production (2) and the emergence of participatory culture (10), I created the Scratch Online Community as a space for young people to create and share computational media projects, such as animations and video games (12). The goal of the system was to support a learning philosophy focused on creating instead of consuming (14; 15) and to do this in the context of a community (17).

I led a team of undergraduate students and contractors to grow the Scratch community from zero to over a million users from around the world in five years. Today, the community I created has more than forty million users and is arguably the most widely used online space for children to learn programming.

The Scratch community also became an online laboratory. Along with my social science collaborators, I ran several studies of collaboration at scale. For instance, we analyzed the activity of one million Scratch users and 2.5 million projects, finding evidence to suggest that people who engage in remixing, i.e., building on prior work, learn a wider range of computational thinking skills (4).

In another study, we found that when young people's creative work is remixed or reused by others, they are as likely to react positively as they are to accuse remixers of plagiarism (8). To address this tension and to promote positive views toward remixing, I performed a design intervention by changing the system to automatically detect and add an attribution statement on all remixes, e.g., "this project was created by Joan, but it is based on Alice's project."

In the spirit of the Open Science movement, and excited by the possibility of enabling other researchers to study online human behavior through Scratch, my collaborator and I published a dataset of five years of public activity in the Scratch online community. The dataset comprised information on more than 1 million users, nearly 2 million projects, and more than 10 million comments (7). The dataset has been used by dozens of researchers and students.

SOCIAL COMPUTING FOR COLLECTIVE ACTION

As the adoption of Scratch and other social computing platforms grew, I became increasingly fascinated by how these online communities enable collective action offline. I then spent two years studying how people in Latin America used social media to circumvent drug cartel censorship (13; 5) and organize protests against their governments (16).

For example, my collaborators and I analyzed millions of tweets from four Mexican cities afflicted by drug cartel violence. We found that people in these communities self-organized on social media to alert one another while violent events occurred. These communities created a distributed information ecosystem that filled in the void left by journalists who were threatened or murdered by the cartels. We also saw the emergence of individuals that acted as "war correspondents" by aggregating, verifying, and spreading timely information on social media (13). Through qualitative research, we learned that residents often had more trust in these curators than in traditional institutions

like the government or the press. Lastly, we observed how people's activity on social media mapped onto offline violence and revealed their affective desensitization over time (5). This research received extensive media coverage and allowed me to engage with policy-makers on both sides of the border.

Furthermore, this research helped me identify new opportunities for designing novel social computing systems to support local news. For example, my team and I created Whoo.ly, a system that automatically identified tweets from a city's neighborhood, and highlighted events, topics, people, and places nearby (9).

Systems like Whoo.ly and others performed well in dense young urban areas with high Twitter adoption but not well in suburban neighborhoods where Twitter was not popular. To address this, my team and I created several systems aimed at not just aggregating, but also producing hyperlocal news reports. One such system was Eventful, a crowdsourcing workflow application designed to create on-demand reports of local events, like festivals and city council meetings. The system recruited crowd workers to show up in person to collect information at physical locations, while online crowd workers performed curatorial tasks remotely. We deployed the system at eleven events across the US (1).

SOCIAL COMPUTING AND AUTOMATION

As I worked on several crowdsourcing systems, some of which I described above, my team and I began to examine how these systems might help redefine the workplace. We were especially interested in the possibilities enabled by hybrid intelligence systems, i.e., that combine human-powered workflows and automation to enable the creation of digital assistants.

Although there is a long history of AI research focused on how to build digital personal assistants, none of the early work on AI scheduling has taken off partly because there is little tolerance for mistakes in real-world settings. Another concern with these systems is the chicken-and-egg problem: good automation needs a lot of data, and to get a lot of data we need real usage. My team and I spent over two years developing and deploying Calendar.help, a virtual scheduling assistance service that could handle the conversational back-and-forth required for scheduling meetings, much the same way that administrative assistants schedule meetings. The system we designed worked from day one because common scheduling scenarios were broken down using well-defined workflows and completed as a series of microtasks that are automated when possible (e.g., using off-the-shelf NLP). Unusual scenarios fell back to a trained human assistant executing an unstructured macrotask (3).

Over time the system has been able to scale and automate more than 70% of its tasks. Also, the system turned into a Microsoft Office product and is used by real-world organizations every day.

FUTURE WORK

As social computing systems have become ubiquitous, society has seen some of their adverse effects too: from the spread of misinformation to compulsive use. I am interested in exploring ways of addressing these issues, not only by mitigating these challenges, but by developing novel systems that support in-person interactions that help people strengthen existing connections or establish authentic, new connections with one another. For instance, by using wearables, like smartwatches and smart glasses, that might enable novel user experiences that shift our attention away from screens, and devices, and focus more on the people, moments and the physical environment around us.

For example, the research team I lead at Snap and I have started to explore these ideas through the use of Augmented Reality (AR) to support in-person creative collaboration in the physical space (6) and through the creation of systems that leverage biosignals to support more intimate communication (11).

Also, I am interested in exploring the application of social computing technologies to address pressing problems in the Global South. For example, building on past projects like Sana, a mobile application I designed to help nurses in Zambia share medical images with remote doctors. I believe social computing can help individuals and organizations address pressing human development issues including, health, education, and civic participation. This is something that I want to do not only in my research, but in my teaching, pairing students with non-profit organizations to use technology to improve the lives of people around the world.

I have created effective teams at MIT, Microsoft Research, and Snap Research able to work on research with real-world impact. I would look forward to the opportunity of bringing these experiences to collaborations with Princeton students and faculty, if given the chance to join the computer science department.

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