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Dissertation Defense

Doctor of Philosophy in Information Science (Telecommunications)

"**From Sensors to Stories – Enabling Community-driven, Actionable Data Collection for Air Quality Advocacy**" by **Abhishek Viswanathan**

Date: July 15, 2024
Time: 10:00 AM – 11:30 AM
Place: Room 828, IS Building, 135 N Bellefield Ave, Pittsburgh PA 15213

Committee:

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Abstract:

Environmental justice communities often face resource constraints and high levels of environmental pollution. They have limited opportunities to document and collectively understand their environment and may lack the tools and resources needed to advocate for healthier living conditions. My dissertation addresses the problem of producing reliable, accessible multi-modal data and sustainably maintaining socio-technical infrastructure for community-driven air quality monitoring in environmental justice areas. I collaborate with local community organizations to implement citizen science environmental monitoring projects in Pittsburgh. My approach integrates a low-cost physical distributed sensor network with a social network of *community scientists* to ensure long-term data collection, avenues to share context that isn't captured by sensors, and a way for residents to access and interpret this data. Residents interact with the physical sensor network to help overcome the technical challenges that come with the devices, and sensing devices collect long-term environmental data that is used by residents to better understand and validate their lived experiences.

I use mixed-methods to analyze the collected environmental data, participant feedback, and reflections using qualitative and quantitative methods to identify how to ensure reliable, actionable data through participatory research approaches. I use the frameworks of Engaged Scholarship and Participatory Action Research to build sustainable partnerships between institutions and residents, and to find ways of making community science data actionable through data literacy and storytelling workshops. By making residents the owners of socio-technical infrastructure, and supporting them with technical aspects (installing devices, troubleshooting, accessing data) we build community stewardship of the system. My dissertation contributes to the fields of citizen science, science communication, and socio-technical systems by developing a holistic participatory approach to infrastructure development. It demonstrates that inclusive collaborations and real-time data can empower residents to make informed decisions about their health and drive community initiatives to address environmental concerns. This work advances environmental justice by providing a platform for data-driven solutions to air pollution challenges, fostering equitable and impactful change through collaborative sensing initiatives.

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