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Recent Awards
Presidential and Honorary Awards
About Awards

How to Manage Your Award

Grant Policy Manual
Grant General Conditions
Cooperative Agreement Conditions
Special Conditions
Federal Demonstration Partnership
Policy Office Website

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Award Abstract #1831475

SCC: Community-Based Automated Information for Urban Flooding

NSF Org:	CNS Division Of Computer and Network Systems
Initial Amendment Date:	September 9, 2018
Latest Amendment Date:	September 9, 2018
Award Number:	1831475
Award Instrument:	Standard Grant
Program Manager:	Bruce K. Hamilton CNS Division Of Computer and Network Systems CSE Direct For Computer & Info Scie & Enginr
Start Date:	October 1, 2018
End Date:	September 30, 2021 (Estimated)
Awarded Amount to Date:	$1,500,000.00
Investigator(s):	Mikhail Chester Mikhail.Chester@asu.edu (Principal Investigator) Benjamin Ruddell (Co-Principal Investigator) Thomas Meixner (Co-Principal Investigator) Robert Pastel (Co-Principal Investigator) Christopher Lowry (Co-Principal Investigator)
Sponsor:	Arizona State University ORSPA TEMPE, AZ 85281-6011 (480)965-5479
NSF Program(s):	S&CC: Smart & Connected Commun
Program Reference Code(s):	042Z
Program Element Code(s):	033Y

ABSTRACT

Flooding is the most damaging natural hazard in the U.S. and around the world, and most flood damage occurs in cities. Yet the ability to know when flooding is happening and communicate that risk to the public and first responders is limited. At the same time there is a surge in digitally connected technologies, many at the fingertips of the general public (e.g., smartphones). The need is for new flood information that can be generated from primary observations that are collected in exactly the right places and times to be coupled with the

ability to more effectively communicate this risk to communities. This project will develop the Integrated Flood Stage Observation Network (IFSON), a system that can take in crowd-sourced information on flooding (from cameras, a smartphone app, and social media), intelligently assess flood risk (using machine learning), and communicate those risks in real time. IFSON will be scalable to any community or city and will provide a backbone for new crowd-sourced technologies.

This project will i) integrate several new technologies (each that directly engages with different communities) to provide new insights into and communication capacity around urban flooding hazards, ii) connect a range of communities to each other in near-realtime (from the general public to first responders to infrastructure managers) and develop flood sensing and avoidance capacities that can be used anywhere in the U.S. or even internationally, iii) develop new insights into how urban morphology contributes to flood risk, and iv) leverage prior funding by connecting practitioners from existing sustainability research networks and sending data to CUAHSI and eRams. Additionally, this research will develop outreach activities that will educate the public and practitioners on how flooding hazards occur, their impacts, and how to mitigate risks. The research will directly empower and engage local citizens in flood event reporting and response, and explores a concrete model for what it would mean to have a "smart and connected community" for minimizing flood risk. Although driven by a number of novel technologies and techniques, the central focus of this work is on the interface of community with technology and, in particular, how modern network technologies can engage and bring together ordinary citizens, city planners, first responders, and other local stakeholders within a shared, collaboratively constructed information space; a broad range of educational and outreach opportunities are included to engage stakeholders and amplify project impact. In addition to training students through research positions, the project will create a summer Research Experience for Undergraduates (REU) program. It will also connect with national, state, and local societies across a number of disciplines. For example, the project will work with the City of Phoenix during their Monsoon Preparedness day to educate first responders on how to use project results. Interdisciplinary course modules that show how to engage various communities (including the public, first responders, and infrastructure managers) in mitigating flood risk will be developed and disseminated. Additionally, infrastructure managers will be recruited to participate in workshops on how project data will reveal new insights into the condition of infrastructure and what strategies can be employed to reduce hazards.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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