University of Minnesota Secures $2.5 Million Grant to Improve Quality of Life in Cities

National Science Foundation's Smart and Connected Communities Program includes outreach to K-12 teachers and students

The National Science Foundation (NSF) announced today that it has awarded a $2.5 million grant to a multi-disciplinary team of researchers led by the University of Minnesota for a new project to advance access, wellbeing, health, and sustainability in cities. The project will focus on multiple “smart” infrastructure sectors—water, energy, food, shelter, transportation, waste management—that converge in cities.

The grant is part of the NSF’s Smart and Connected Communities initiative, which is investing $19.5 million nationwide to develop interdisciplinary and community-engaged research to revolutionize the nation’s cities and communities with more responsive and adaptive infrastructures, technologies and services.

The research effort will be co-directed by lead investigator Professor Shashi Shekhar, a computer science and engineering professor in the University of Minnesota’s College of Science and Engineering, and co-investigator Professor Anu Ramaswami, a professor in the University of Minnesota Humphrey School of Public Affairs. The project spans four academic institutions and includes co-investigators Florida State University Professor Rick Feiock, University of Washington Professor Julian Marshall, and Purdue University Professor Venkatesh Merwade.

With transformative new infrastructures coming on the horizon—such as autonomous vehicles, smart and distributed energy systems, novel green infrastructure, and urban farms—the physical fabric of our future cities will be very different from what exists today.
The research team will provide new insight on how the future spatial deployment of these new infrastructures in cities will shape access, wellbeing, health, and environmental sustainability in different neighborhoods in the cities of Minneapolis and St. Paul, Minn., as well as Tallahassee, Fla.

The new project will advance basic research in multiple disciplines including environmental and civil engineering, computer science, urban planning and public policy. It will create a unique public database, establish citizen science protocols, and advance the science of smart sustainable urban systems through knowledge co-production with cities engaged in infrastructure planning.

“Infrastructure is one of the pillars of our economy—and sustainable, smart infrastructure systems allow our cities, towns, and communities to thrive as 21st century hubs of innovation and prosperity,” Sen. Al Franken (D-Minn.) said in a news release about the NSF grant.

He was joined by other members of Minnesota’s congressional delegation, including Sen. Amy Klobuchar and Reps. Keith Ellison and Betty McCollum, who added their political support to the goals of the initiative.

The research team will also engage K-12 students, university researchers, and citizen scientists to develop the first comprehensive public database on infrastructure, environment, health, and wellbeing at the neighborhood level in cities. They will use innovative techniques such as crowdsourcing campaigns using low-cost sensors to characterize air pollution and flooding risks, K-12 engagement in mapping well-being and infrastructure satisfaction at the neighborhood level, and the development of related cyber-infrastructure.

The resulting rich database then will be analyzed to identify novel, interesting, and useful spatial patterns and to develop urban models. Researchers will work with city partners to help better plan future cities considering emerging smart grid, smart mobility, and smart food system transitions.

The project’s educational activities will also connect graduate students from the fields of engineering, urban planning, policy, and sustainability with K-12 teachers and students, with particular attention to underserved populations. Research insights will be broadly disseminated to U.S. cities through partnerships with ICLEI-USA, the National League of Cities, and the MetroLab Network, a city-university collaborative, and through the National Science Foundation’s Sustainable Healthy Cities Network.

“Minnesota leads the nation in STEAM education that integrates the creativity of the arts with science, technology, engineering and math to address our critical infrastructure needs,” Rep. McCollum said. “This grant reflects the excellence of the University of Minnesota in educating the next generation to meet these challenges.”

Additional collaborators at the University of Minnesota include professor Julie Brown of the College of Education and Human Development, Diana Dalbotten of the College of Science and Engineering’s St. Anthony Falls Laboratory, Len Kne of U-Spatial, along with professor Jason Cao and senior fellows Frank Douma and Robert Johns of the Humphrey School of Public Affairs.

NSF’s Smart and Connected Communities initiative is part of a multipronged strategy for investing in foundational research and education on smart and connected communities. For more information about NSF’s Smart and Connected Communities, visit the NSF website.