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Laying the Foundation for Smart and Connected Cities and Communities

Experts predict that the world's urban population will double by 2050. To handle this large scale of urbanization, finding new ways to manage complexity, increase efficiency, and improve quality of life has become an important issue nowadays. The idea of smart city is to use digital, information and communication technologies to enhance quality and performance of urban services, reduce costs and resource consumption, and engage more effectively and actively with its citizens. Therefore, people should begin laying the foundation for smart and connected cities and communities immediately.

The National Science Foundation (NSF) announced 12 new projects, in the domain such as public safety, transportation, health, and so forth, to help set a vision for smart and connected cities and communities. Their goal is to effectively integrate networked computer systems and physical devices, with a focus on applications to benefit the public. Within these 12 projects, "Population Analytics through a Wi-Fi-based Edge Computing Platform," "Fingerprinting for Internet of Things Authentication: Accelerating IoT Research and Education Under the Global City Teams Challenge," and "Detecting and Addressing Adverse Dependencies Across Human-in-the-Loop In-Home Medical Apps" have drawn my attention.

The project "Population Analytics through a Wi-Fi-based Edge Computing Platform" aims to create new Wi-Fi based technology for understanding population analytics. Some stores now still use manual people counters to track how many persons there are in a shop. However, Wi-Fi-based technology can not only count number of people but also track their route in the store, so it can be more convenient and save more labor works. Moreover, using this technology to gain population analytics will enable officials to

effectively provide useful services. For instance, set up floor plans and information desk at where people congregate in a mall. Additionally, to demonstrate the feasibility of this project, University of Wisconsin-Madison has begun to deploy a version of the system in an urban downtown area of Madison and collaborate with a number of local partners. In short, this technology will definitely allow people to enhance their services and reduce their cost in a more effective and convenient way.

Authentication and identification has been recently cited as one of the most challenging issue facing the Internet of things. “Fingerprinting for Internet of Things Authentication: Accelerating IoT Research and Education Under the Global City Teams Challenge” will develop a machine learning framework that enables the IoT to dynamically identify, classify, and authenticate devices based on their cyber-physical environment and with limited available prior data. In fact, with the popularizing of Internet of Things application, the security of IoT has become a major concern. One of the most common IoT application is, for example, Amazon dash button; imagine if someone accidentally presses the dash button for ten times. The open-access nature of IoT product inevitably makes it vulnerable to users’ incaution and insiders’ attacks. People always want their product to be convenient but not causing trouble. Therefore, the success of this project will secure the application of Internet of Things and tomorrow's smart cities.

Since Smartphone has become a necessity in modern world, millions of mobile applications have been developed in domains such as energy, health, security, and entertainment. Actually, apps are developed independently without knowing how other apps work and some may even control its target parameters. Since it is becoming more common for people to use multiple apps, the intervention of multiple apps, which can

cause dependency problem, has become inevitable. However, research has shown that this issue can increase or decrease each other's effects and even be harmful to the users. Therefore, “Detecting and Addressing Adverse Dependencies Across Human-in-the-Loop In-Home Medical Apps” is dedicated to detecting and resolving these dependencies especially for medical apps, which are directly related to users. It will develop EyePhy, a new approach to primary and secondary dependency analysis for wellness, and this kind of tool will be the key factor to significantly improve the safety of mobile medical apps and home health care.

From the 12 projects that the National Science Foundation announced, we can see that Internet and Internet of things have become the trend, and these new projects and technology are really close to us, such as Wi-Fi, Amazon dash button, and mobile app. Brainstorming how to improve the technology around us can be our first step to lay the foundation for smart and connected cities and communities.