UH ENGINEERS RECEIVE NSF GRANT TO IMPROVE THE \textit{INTERNET OF THINGS}?

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The National Science Foundation has awarded Cullen College\textquotesingle s Miao Pan, assistant professor of electrical and computer engineering and Zhu Han, professor of electrical and computer engineering, $300,000 to speed up the way your electronic ID badge communicates through the Internet of Things (IoT).

As life-changing events occurred over the last couple decades, the order seems simple. First came the Internet. Then there were smart devices and then - linking them together - was the Internet of Things. Take for example the temperature in your home. Perhaps it\textquotesingle s a hot Houston day and you\textquotesingle re toiling from your desk at the University of Houston. As the clock slips closer to the end of the day, you decide you\textquotesingle d like your home cooled off before you walk through the door. So you grab your smart phone, open the app that accesses your smart thermostat, and remotely program it for coolness.

You have not only set yourself up for a night of comfort, you\textquotesingle ve stepped through the magic Internet of Things to do so. Its name is pretty spot on: It\textquotesingle s the Internet connected to your things and it doesn\textquotesingle t need human-to-human interaction nor do your things need to be as grandiose as a thermostat and smart phone. They can be as simple are your card key. According to Gartner, Inc. (a technology research and advisory corporation), there will be nearly 20.8 billion devices on the Internet of Things by 2020.

Through this grant, Han and Pan will zero in on enhancing connectivity and communication of ultra-low power applications.

They will be working alongside colleagues Riku Jantti, Kalle Ruttik and Ruifeng Duan of Aalto University in Espoo, Finland and Jukka Lempainen of Tempere University of Technology in Tampere, Finland.

\textit{The Internet of Things needs to incorporate almost everything, including simple sensors and devices,? said Pan. \textit{We often find ourselves at a paradox between needing high transmission speeds using simple, low-power devices while guaranteeing the sent messages are secure}.

The project will specifically investigate ID card technology and how signals transferring to and from these simple...
cards can be transmitted more efficiently.

?The ID cards make everything more complex because there are a large number of cards communicating on the same network. We need to consider how we will be able to decipher between individual cards and if we want each one to access different things,? said Pan.

The researchers hope to enhance IoT applications by creating new communication systems to pair with the ultra-low power devices, and then uncover the challenges of the signals, performance and security.

?Our team at UH will be developing and analyzing the new communications networks to find the best and most efficient design, while our colleagues in Finland will test if our designs will work in the marketplace,? said Han.

This international project will also serve as a unique opportunity for UH engineering students to gain knowledge and develop their research skills abroad.

?We are excited about the prospect of our students participating to have the chance to learn from such accomplished researchers from other parts of the world,? said Pan.