

# **Vehicular Network Communication and the Wireless City of the Future**

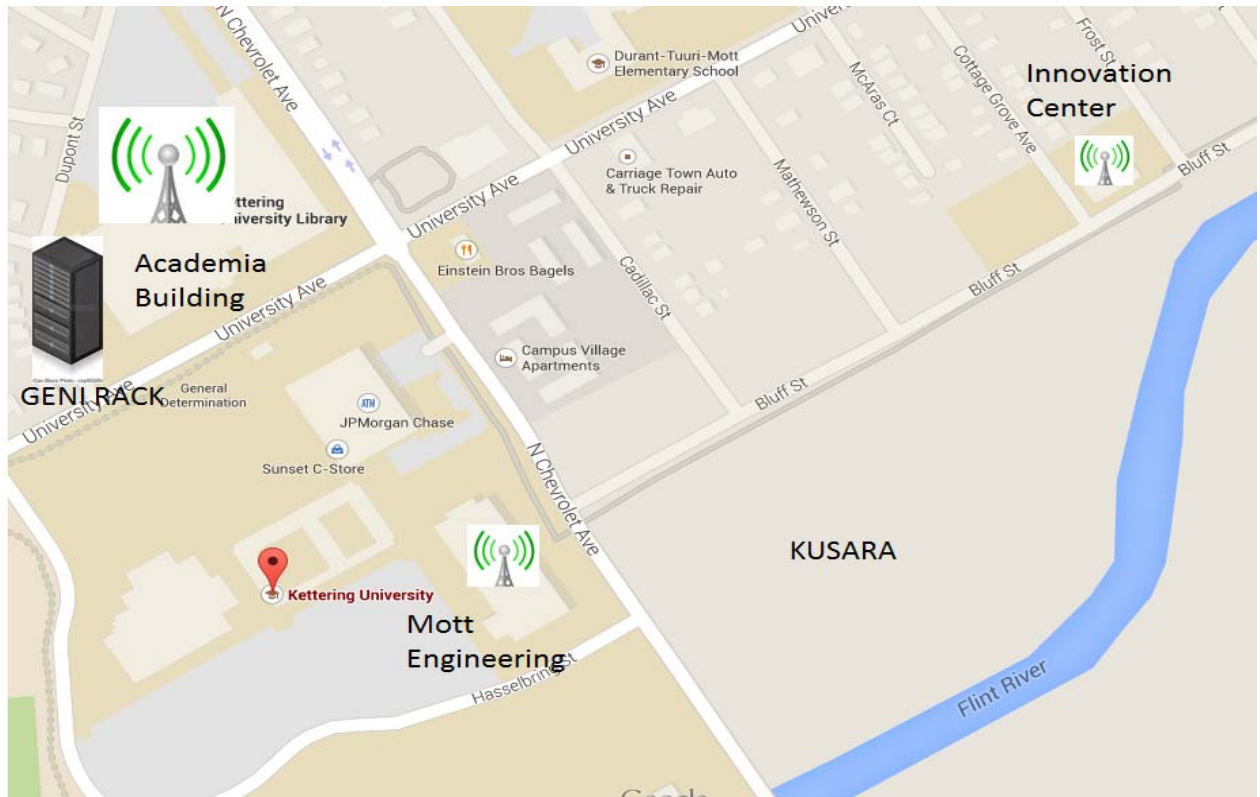
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The wireless city of the future will be a complex spectrum of technologies, protocols, and competing (and possibly interfering) real-time communication. Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communication is a rapidly emerging area of development, as well as the more well documented autonomous vehicles (or semi-autonomous virtual-reality enhanced vehicles). The automobile, as the ultimate mobile device, will present a very dynamic communication problem in any large, congested metropolitan area. We are creating at Kettering University a unique test-bed to support V2V and V2I development and testing.

We have created, through an NSF-MRI grant, a 4G-LTE test bed has three sectors of Air4G from AirSpan deployed on the roof of Academia Building (MacroCell 360 degree coverage), and two AirSynergy also from AirSpan deployed on the roofs of Mott Engineering Building and Innovation Center, respectively (FemtoCell 120 Degree coverage). All of these base stations are connected to our GENI rack and is available for other researchers.

In addition, the University is constructing the Kettering University Student Automotive Research Area (KUSARA) -- an outdoor lab space on a 19-acre parcel of land that was part of the historical "Chevy in the Hole." KUSARA will have the full coverage of our 4G LTE, with potential upgrade to LTE-Advanced. In addition, it will also be covered by more traditional Ethernet-based wireless system.

The emerging research, development, and testing environment is shown in the following diagrams.



Dr. Yunsheng Wang has extensive experience on deploying wireless test beds, having served as PI to deploy a 4G-LTE network, which is an NSF funded project. He is also experience in vehicular network communication using 4G-LTE networks.

Dr. John Geske has extensive experience in software defined networking (SDN) design and development. He was part of a winning Mozilla-Ignite Application Challenge that developed a reliable communication protocol utilizing SDN (a collaborative effort with Purdue University, Ohio State, San Leandro CA, and Kettering University). He is the Program Lead for US Ignite; Flint was a founding partner in US Ignite and is part of the US Ignite NSF-funded Connected Cities Project. He is active GENI community, as well as Co-PI to deploy an on campus 4G-LTE network.