Test and Measurement Instrumentation for Positioning and Wireless Technologies

Project Summary

Current research projects, awarded from the Department of Defense (DOD), the National Science Foundation (NSF), State of Pennsylvania, and Private Sector to the Center for Advanced Communications, Villanova University, require specific instrumentation for test and measurements of navigation and terrestrial wireless communication data. The CAC, which is directed by the PI, has been funded by the Air Force Research Lab over the past decade to conduct research in interference suppression in wideband communication platforms and anti-jam GPS. The Center is also funded by the Office of Naval Research to examine space-time processing for multipath mitigation in multi-antenna GPS receivers and to apply space-time coding and transmit-receive diversity for high data rate communication channels with application to Unmanned Surface Vehicles (USV). Further, the CAC is in its second phase of conducting extensive research for DARPA on Through the Wall Radar Imaging (TWRI) from both signal processing and antenna perspectives. The CAC is a member of the NATO task Force on “seeing through the wall” initiative. For the above projects, commitments, and involvements, there is a compelling need to establish a wireless communication lab that supports real data measurements and allows testing and comparison of existing and newly devised techniques and methodologies.

The proposed instrumentation is composed of two signal generators and a signal analyzer, which in essence, is a flexible multi-facet two-transmitter single-receiver system, equipped with the capability to generate, store, and analyze data for Global Position System (GPS), Cellular Telephony, Wireless Local Area Networks, and Short Range Connectivity using customized as well as IEEE 802 standards and protocols. The instrumentation provides means to verify innovative algorithms and serve to demonstrate our contributions to advances in the field of signal processing an information technology.