Recently machine-to-machine (M2M) communications (M2MCom) has emerged as an enabling technology for the practical realization of Internet-of-Things (IoT). Successful implementation of an M2MCom network demands high reliability, low latency, real-time operation and handling of huge amount of data, which, in turn, offers several challenges like connectivity among large number of machines with diverse functionalities, wide coverage area, resource and quality of service (QoS) constraints.

In the research project FD-M2Mcomm, a cross-layer full-duplex (FD) design will be proposed to address the above-mentioned challenges of M2MCom systems. Adaptive FD MIMO (multiple-input-multiple-output) beamforming in the physical (PHY) layer will be combined with a request to send (RTS)/full-duplex clear to send (FCTS) mechanism based FD scheduling in the medium access (MAC) layer. The potentials of this design will be studied against two major applications of M2MCom, which are Smart Grids and Intelligent Transport System, and its performance will be evaluated through both numerical analysis and quantitative simulations. This project will also investigate the applicability of the proposed design for M2MCom in the millimeter-wave (mm-wave) frequency band using realistic mm-wave outdoor and indoor propagation models. Finally, the FD cross-layer PHY-MAC design will be validated practically through implementation on an IoT-based testbed.