Two Electrical & Computer Engineering Ph.D. students, Amritesh Rai and Maruthi Yogeesh, have been selected as finalists for the highly selective $100,000 United States Qualcomm Innovation Fellowship (QInF), along with one other team from The University of Texas at Austin. They are advised by Professor Sanjay K. Banerjee and Professor Deji Akinwande respectively. Rai and Yogeesh will attend the finals at the Qualcomm Research Center located at Qualcomm?s World Headquarters in San Diego, CA on April 5-6. Their proposal is titled ?Ultra-Low-Power Devices based on Van der Waals Heterostructures.?

As with previous years, the selection of the 2017 finalists was highly competitive. This year, the team at Qualcomm, comprising over 200 reviewers, carefully reviewed 116 eligible applications from the 18 participating U.S. schools, out of which 33 finalist teams were selected. The finalists will now present their proposals to a panel of executive judges in San Diego. The winning teams will be mentored by Qualcomm researchers to facilitate close collaboration and interaction with the company?s R&D group. The winners will be announced this summer. Ten of these proposals are expected to be funded.

**Project Description**: There has been a constant effort in the semiconductor industry to strive for energy-efficient electronic devices at ultra-scaled dimensions. The goal of this project is to demonstrate electronic devices based on van der Waals heterostructures of novel atomically thin two-dimensional (2D) semiconductors, such as molybdenum disulphide (MoS$_2$) and molybdenum ditelluride (MoTe$_2$), capable of such ultra-low-power operation. These devices will utilize the general phenomenon of quantum mechanical tunneling of charge carriers (electrons and holes) as their underlying operating principle. Using their van der Waals heterostructure device platform comprising these ultra-thin materials, the team plans to demonstrate the Esaki tunnel diode, based on single-particle inter-layer tunneling, as well as the bilayer pseudospin field-effect transistor (BiSFET), a novel type of ultra-low-power transistor based on many-body
inter-layer tunneling. The possibility of realizing two separate device concepts using the same heterostructure device platform adds an element of uniqueness to their proposal.