

Available Position: Undergraduate Research Student

Topic: 5G Medium Access Control Power Management

PhD Student Supervisor: Pavan Mangipudi

Research overview: In an industry and NSF-supported project, we are developing various 5G Medium Access Control (MAC)-related projects to improve the operation and availability of service in the radio access network. This project involves analyzing 5G OFDM systems using Matlab, machine learning and high-speed computers to improve performance and reduce energy consumption in 5G.

What are 5G and OFDM? 5G is the fifth generation of cellular networks. Faster connectivity speeds (up to 100 times faster than 4G), ultra-low latency and greater bandwidth are features that have the potential to advance societies, transform industries, dramatically enhance day-to-day experiences and bring to reality services that we used to see as futuristic, such as e-health, connected vehicles and traffic systems and advanced mobile cloud gaming. While 4G/LTE focused on ensuring radio network connectivity, 5G delivers connects from radio to cloud and moves data processing closer to the edge of the network to enable faster data processing. 5G networks are virtualized and software-driven, simplify mobility, with seamless open roaming capabilities. 5G technology should improve connectivity in underserved rural areas and in cities with high demand. New 5G networks will also have a dense, distributed-access architecture.

In our OFDM project, we are using Matlab and the UFL HiperGator supercomputer to analyze an Orthogonal Frequency Division Multiplexing (OFDM) system in 5G. The goal is to reduce power consumption and complexity in the symbol coding/decoding and processing.

Undergraduate Project. We are looking for an undergraduate student with Matlab experience and coding experience, C++ to help run supercomputer simulations. The project would consist of learning about the signal processing data sets, and learning about machine learning tools and then learning how to use the HiperGator supercomputer to do the machine learning-related processing. There is a potential opportunity to continue participating in our work beyond the initial scope of this project.

Minimum Qualifications

- Experience in C++ and Python
- Experience in Matlab (Simulink a plus)
- Basic understanding of signal modulation and communications, OFDM specifically
- Desire to learn more about 5G signal processing

Responsibilities

- (1) Attend all required meetings
 - a. Project group meetings and WAM Systems Lab meetings*
 - b. Individual meetings (with Dr. McNair or PhD student supervisor)
- (2) Present progress reports and project updates at project group and lab meetings.
- (3) Maintain and regularly check your gatorlink email
- (4) Submit your reports to WAM Systems Lab MS Teams site, using your gatorlink access.

**Except when lab/individual meetings conflict with SURF scheduled meeting or exam times. Lab, individual and project meeting schedules will be determined at the beginning of the term.*