Overview:

The Group 2 proposed project is a weather monitoring station controlled by a master communicating with two slaves over an EtherCAT network. **EtherCAT** (Ethernet for Control Automation Technology) is a real-time Industrial Ethernet technology originally developed by Beckhoff Automation. The EtherCAT is a master/slave protocol that's suitable for hard and soft real-time requirements in automation technology, in test and measurement and many other applications. The master will gather sensor data from each slave regarding the temperature, humidity, air pressure, and current ambient light. Based on the sensor data the Master will turn on various LED's at each slave that correspond to the sensor data provided.

Scope of Work:

The largest part of the project will consist of developing the EtherCAT protocol to map out the linear topology of the network. This will consist of creating an object dictionary that maps the signal plane each slave to the master. The system will update the object dictionary every 1ms which will provide the master with the information to run the algorithms in the background to trigger responses to the weather information.

The entire system will be written in C and run on RT Linux operating system which is provided via TI's website. As for the hardware implementation the master will run on a TI Eval board AM335x processor-based ICE EVM TMDSICE3359. The master will communicate with two slaves implemented on the XMC4800 which is a microcontroller built on the ARM Cortex-M4 processors. We will also need to evaluate the boards and connect various sensors over analog or SPI communication. Each slave will have an implementation that will access various registers to retrieve the data and scale it before sending it to the master over the network.

The following diagram is an outline of the network we plan to implement: