**Ethernet Home IoT System**



**Project Objective**:

This project implements a simple home IoT system with a sensor array (client side) and user panel (server side) that communicate with each other over an internal wired network TCP connection. The client PYNQ (1) gathers temperature data via the ADA1782 temperature sensor module and (2) applies brightness and color PWM signals to the KY-016 RGB LED module. The ADA1782 sensor module is a simple breakout board of the Microchip MCP9808 chip, which transmits 12-bit temperature words over I2C. The client code sends I2C temperature-read commands periodically and converts the received word into a string representation of the resulting floating-point equivalent degrees-C value. The client also receives simple strings from the server indicating the desired brightness and color for the home light (RGB LED). Upon initialization of the system, the client requests the connection to the server. Once the socket is bound and the connection is made, the server receives temperature data strings and writes them to the LCD screen using the 1602A command libraries (written by the team). The server also monitors three pushbuttons. With 50% brightness to start, BTN2 decrements the current brightness by 10% and BTN1. This value corresponds to a PWM percentage, which is passed over TCP to the client. In addition to the brightness level is the color, toggled through by pushing BTN0 on the server board. These values are passed together. The ADA1782 temperature data, the brightness, and the current color desired are all displayed on the 1602A LCD screen, which is updated any time those three inputs change.

**Apparatus**:

* Pynq Board Server
* Pynq Board Client
* KY-016 RGB LED
* Adafruit ADA1782 breakout board with MCP9808 Chip Temperature sensor
* LCD screen 1602A display