

# SMART Weather Station

Ian Anderson, Alex Comeaux, Kushagra Dashora, Aarshon George



## Mission Statement:

Our goal is to build an interactive, STEM-focused weather station to engage K-12 students through real-time environmental data and hands-on learning. The system will highlight key meteorological concepts using an energy-efficient, modular, and user-friendly design. Aligned with educational standards, our solution aims to inspire curiosity in meteorology and embedded systems while helping us grow as engineers and educators.

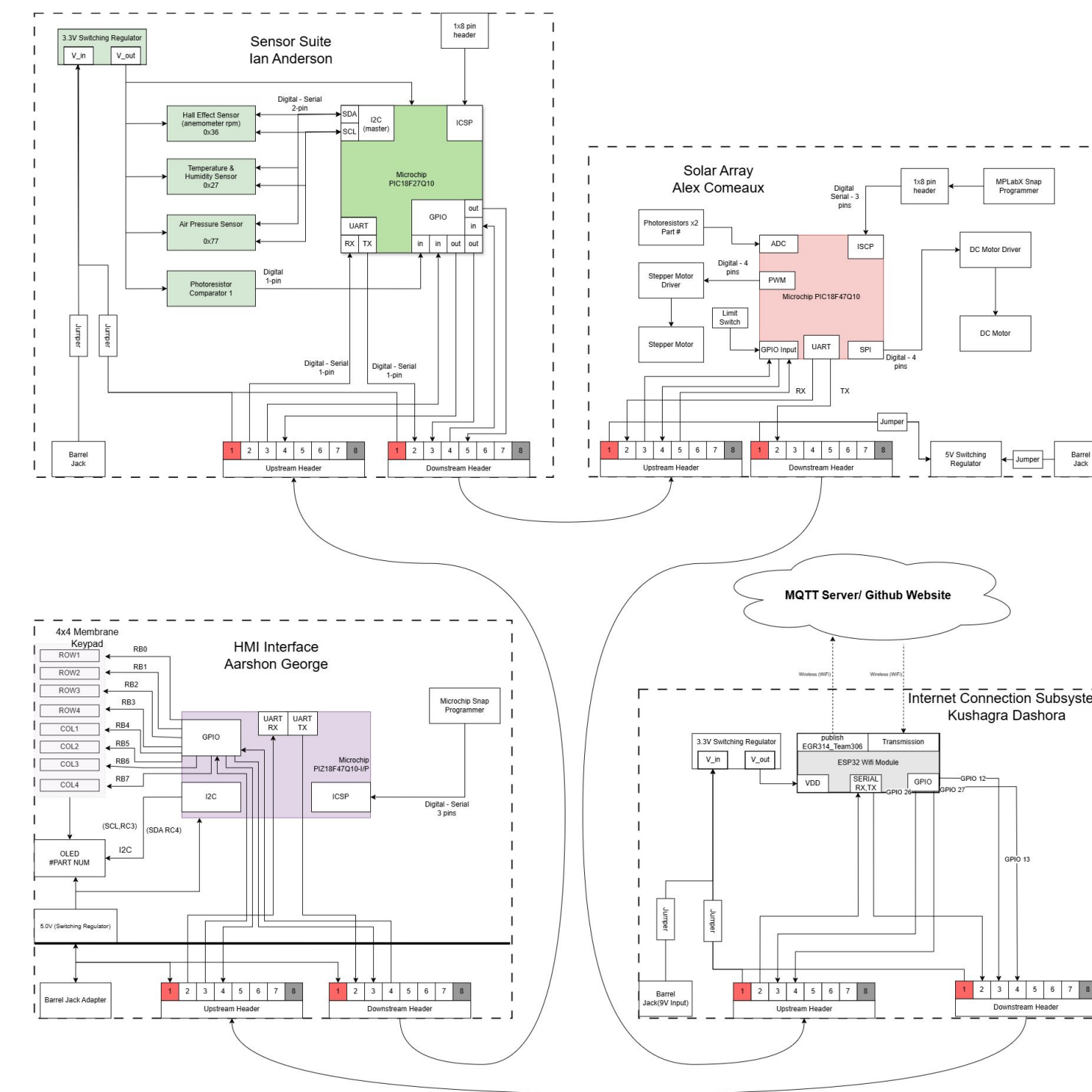


**Scan to  
know  
more!**

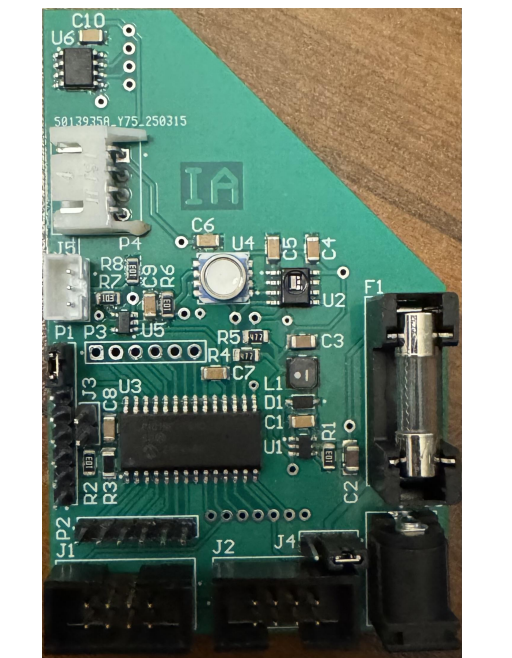
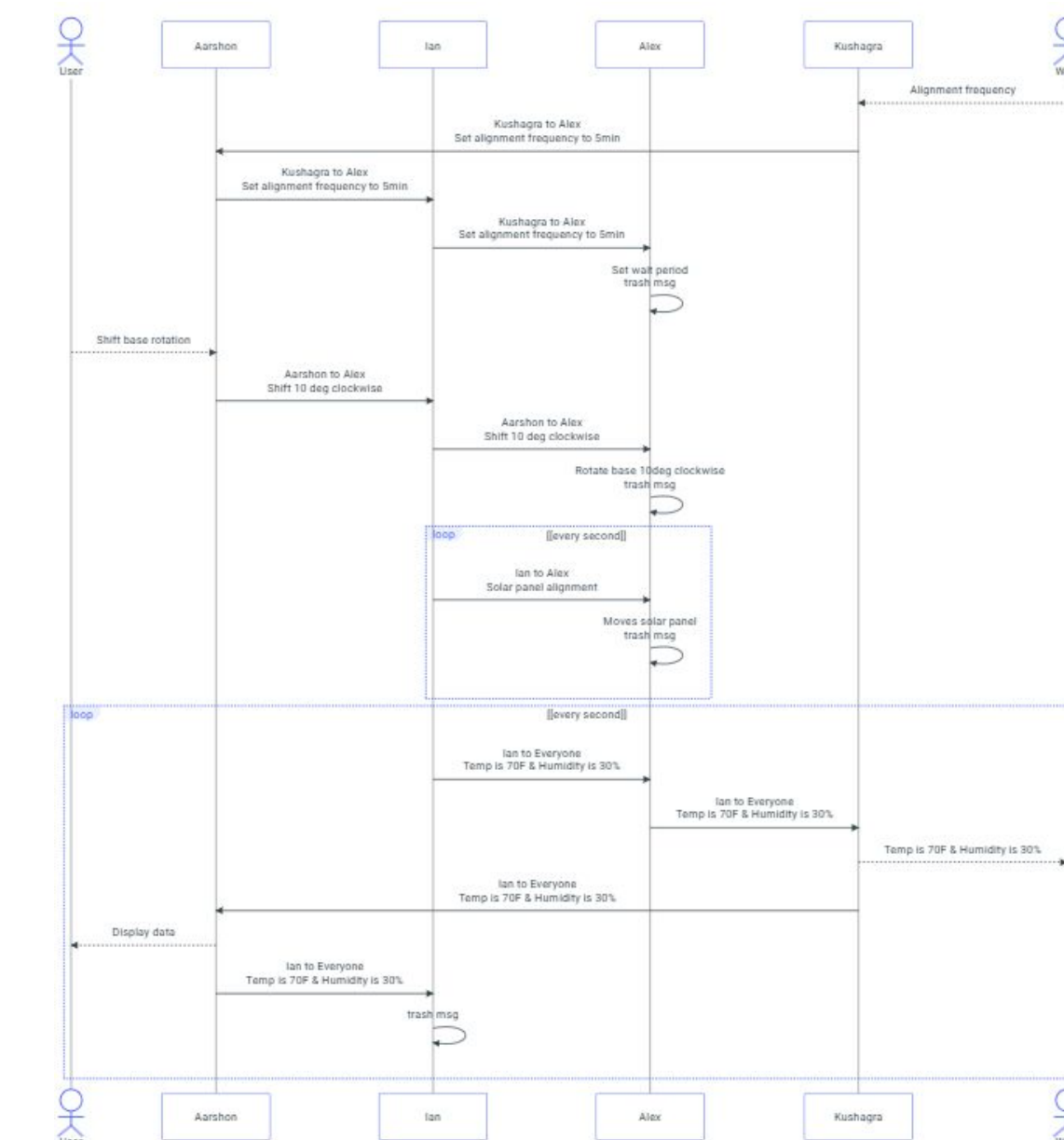
# EGR314 Spring 2025

## Embedded Systems Design Project

### **Team 306**



This system-level diagram represents the **Automated Weather Monitoring System** designed by Team Macrochip, comprising four interconnected subsystems: the **Sensor Suite** (Ian) gathers environmental data from 3 different sensors via I2C. The wind speed, temperature, pressure, and humidity data is transmitted down the UART chain to other subsystems; the **Solar Array** (Alex) uses photoresistors and a stepper motor to orient panels based on sunlight via PWM and SPI motor controllers; the **Internet Communication Subsystem** (Kushagra) employs an ESP32-WROOM-S3 to publish data wirelessly to an MQTT server; and the **HMI Interface** (Aarshon) enables user interaction through a keypad and OLED display. All subsystems interface via 8-pin headers with independent power regulation for modularity and reliability.



## Our Communication Protocol

The message structure pictured above shows a diagram of how each message will be processed by each individual subsystem. The structure of each message determines where the message is going, where it comes from, and contains the necessary data or command.

