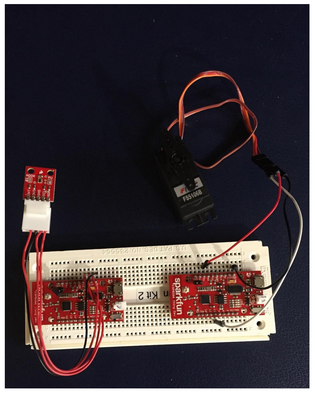
Blind Me With SciEEnce

Caitlin Gruis, Enrick Hinlo, and Christopher Ravasio

From Development…

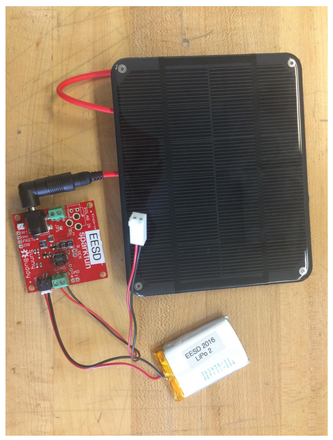


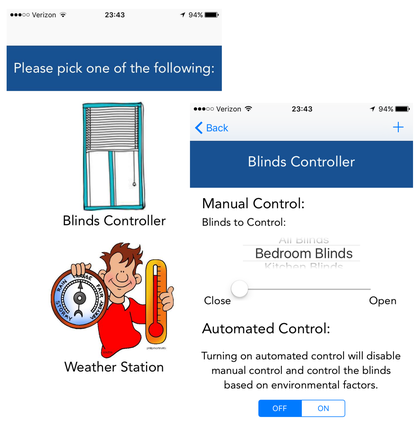
Phase I – Prototyping

- Determined and acquired appropriate sensors (breakout boards) and other hardware for testing purposes
- Learned how to communicate with an ESP Wi-Fi module through an MQTT web-server (publish – subscribe, cloud based communication protocol)
- Sensors include HTU21D, TSL2561, and MPL3115A2 (I2C)

Phase II – Powering

- Performed necessary power calculations
- Decided to power weather station with LiPo battery and solar charger (SparkFun Sunny Buddy – LT3652)
- Implemented TPS61201 DC-DC Converter for regulated voltage to ESP12 and various sensors
- 5V regulated wall adapter power supply was implemented to operate the indoor board (servo motor)





Phase III – App Development

- Used Xcode to develop iOS mobile phone application
- Integrated sensors and blinds motor with user-friendly app displays and controls (manual and automatic)
- Coded ability to add multiple blinds within any home setup

Features

Automated Blinds

- Adjust based on light data from the weather station, or can be controlled by the user via mobile app
- Can control one set of blinds or multiple throughout home

Real-Time Weather Station

- Takes in temperature, humidity, pressure, and light data

Solar Power

- Efficiently powers weather station through MPPT so battery rarely needs replaced

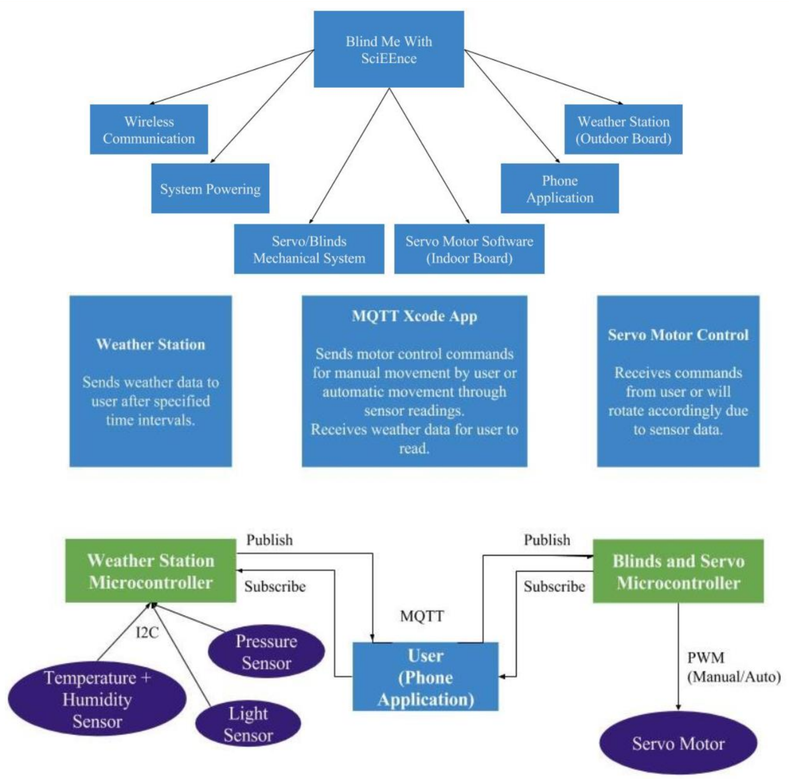
Mechanical Design

- Modified blinds frame altered to accommodate our hardware
- Indoor board fits in blinds, outdoor board mounted outside

Mobile Application

- The iOS app acts as the user interface for the project
- Allows the user to manually rotate blinds or put them in "automation" mode
- Displays weather data in a user-friendly manner

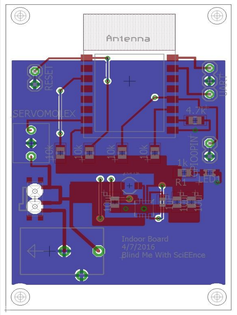
Subsystems and Communication

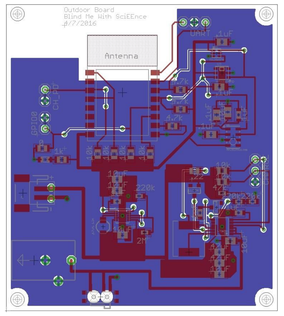


…to the Final Product

Phase IV – Board Design

- Used Eagle to design both boards according to system requirements and layout considerations
- Confirmed list of components for boards and final design





Phase V – Construction

- Obtained materials to construct final blinds frame
- Attached servo and mount to hex rod spline
- Decided on transparent enclosure case for outdoor weather station
- Stained frame and added gloss for aesthetic purposes

Phase VI – Final Product

- Soldered and tested each board's functionality
- Fully integrated all subsystems for demonstration
- Tweaked software design to improve robustness of product
- Created website and wrote final documentation

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