

# SensorCake:

## A Modular IOT Device Stack

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### Problem

Current IOT devices are very specific in what they can do. This makes them unsuitable for a variety of home automation problems.

### Project Goal

Our goal is to make a system to allow users to customize their own IOT modules. This will allow users to more accurately automate their environment and cut down on waste. We aim to use a smart plug to:

- Monitor the power consumption of the user.
- Adjust usage based on user specifications.
- Adapt dynamically to additional iot sensor modules.

Through the app the user will be able to:

- **Track** power consumption
- **Create/**manage a plan to achieve goal energy consumptions levels
- **Collect** stats on consumption habits.

### Hardware Needed

- **ESP8266 x4**
- **Sensor Suite** (thermistor, photoresistor, ACS712-5A Current Sensor, 5A relay, PIR motion sensor)
- **Housing** (prefab or 3d printed material)

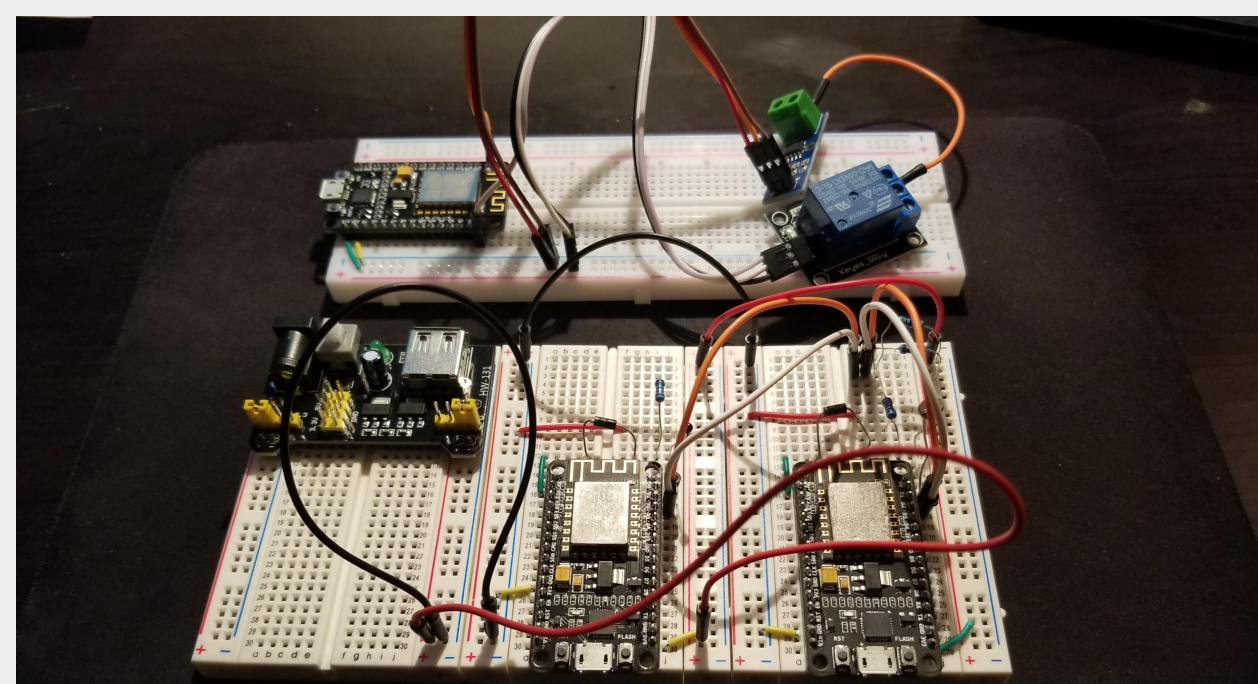
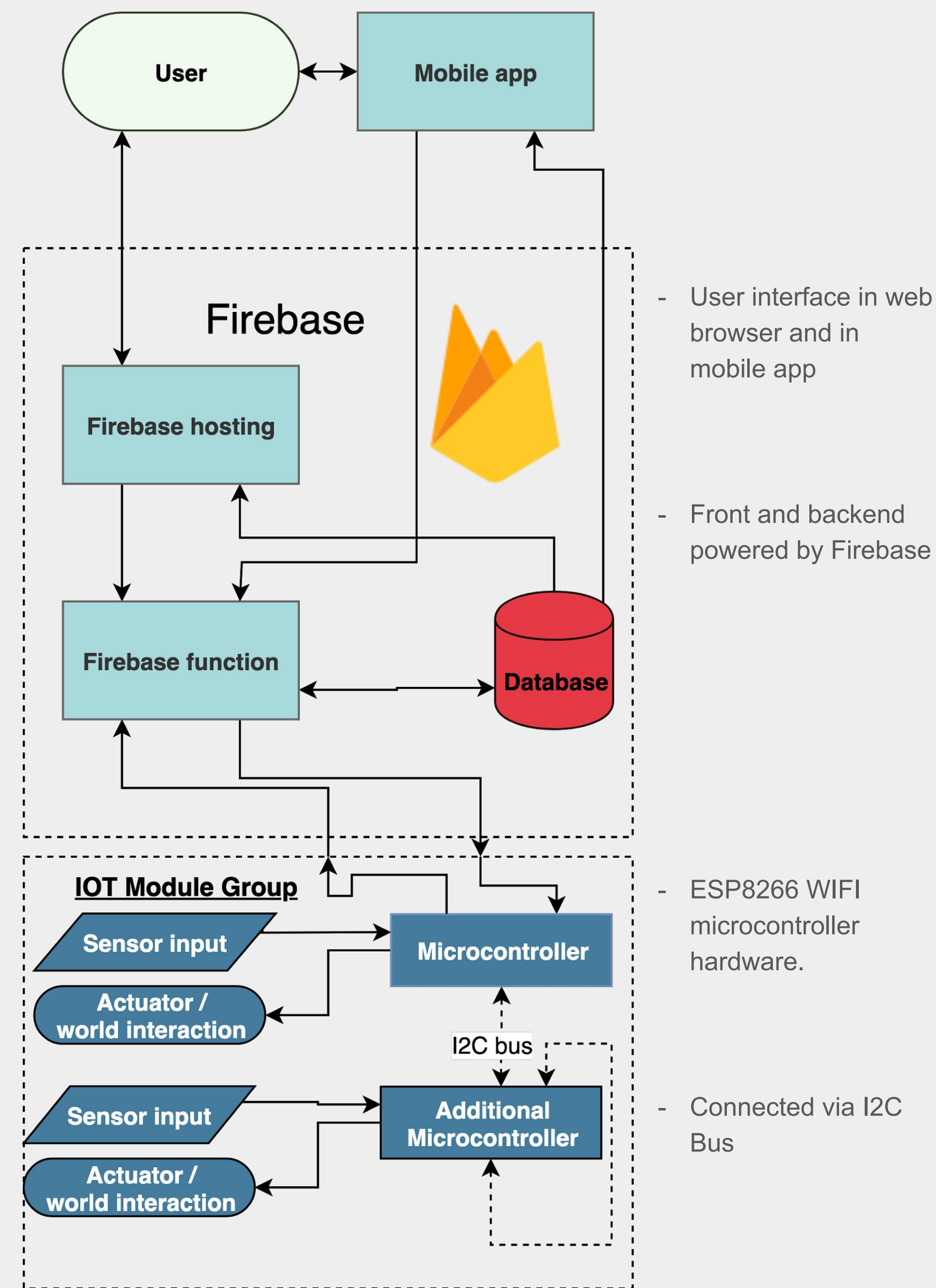


Fig.1) Prototype design

### Process



### Milestones/Progress

- **Initial research** into IOT devices, web hosting, and hardware components (weeks 1-2).
- **Acquire all required hardware** and setup software environments (weeks 2-3).
- **Hardware connects to wifi** and can transmit sensor readings along with hardware id in JSON package (week 4)
- **Firestore function hosts API** to receive, process, and store data in Firestore database (week 4).
- **Firestore website operational** with user authentication fully implemented (week 5)
- **Sensor modules can communicate with each other** over hot-pluggable I2C communication bus (week 5).
- **Static implementation for prototype smart plug complete** (shown in figure 1)

### Future Goals

- **Dynamic User Interface** that allows users to make rules depending on attached modules.
- **3D printed enclosure** for hardware with rechargeable battery and magnetic latch for each module.

### References

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- [3] R. Brama, P. Tundo, A. D. Ducata and A. Malvasi, "An inter-device communication protocol for modular smart-objects," *2014 IEEE World Forum on Internet of Things (WF-IoT)*, Seoul, 2014, pp. 422-427.