UCI Samueli School of Engineering | Department of Electrical Engineering and Computer Science

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 w/ 0.9 inch OLED Screen**
- **Sensor Suite** (thermistor, photoresistor, ACS712-5A Current Sensor, 5A relay, PIR motion sensor)
- **Housing** (3d printed material)

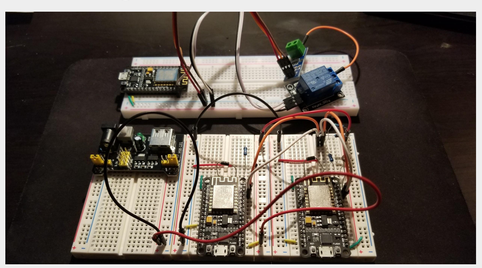
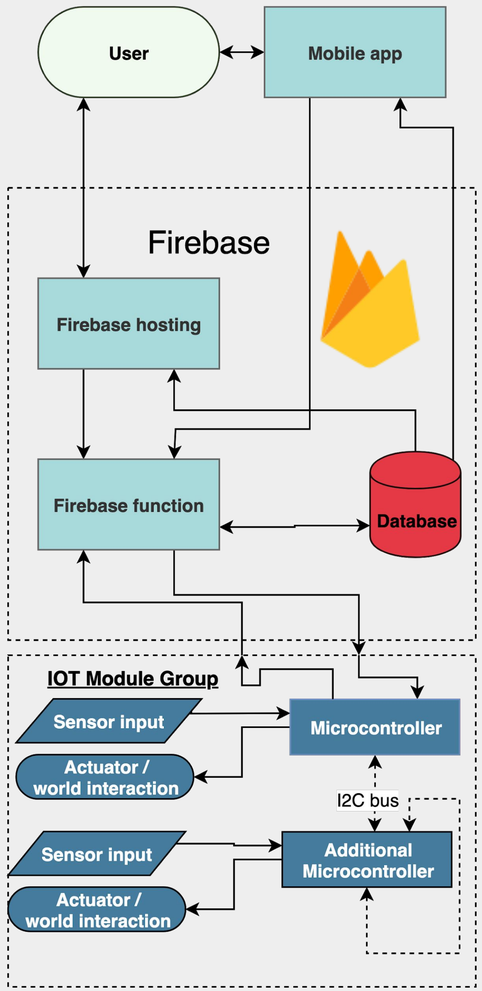


Fig.1) Prototype design

Process

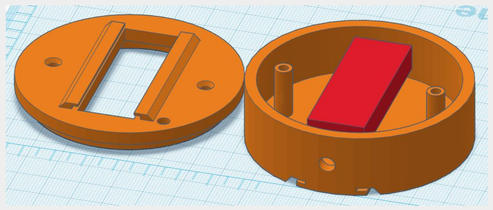


- User interface in web browser and in mobile app
- Front and backend powered by Firebase
- ESP8266 WIFI microcontroller hardware.
- Connected via I2C Bus

Milestones/Progress

- Finish chip to chip hardware interface.
- Update website user interface to allow adding devices and viewing data.
- Design and print individual enclosure housings.
- Create mobile compatible version of the website.
- Finalize firmware
- Implement module dependent options for use in automation.

Fig.1) Prototype Enclosure



Future Goals

- **Dynamic User Interface** that allows users to make rules depending on attached modules.
- Alternative Communication Protocol and microcontroller for more compact

References

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[2] M. A. A. da Cruz, J. J. P. C. Rodrigues, J. Al-Muhtadi, V. V. Korotaev and V. H. C. de Albuquerque, "A Reference Model for Internet of Things Middleware," in *IEEE Internet of Things Journal*, vol. 5, no. 2, pp. 871-883, April 2018.

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