

Department of ELECTRONICS AND COMMUNICATION ENGINEERING

Smart Home Automation Using ESP32 and Firebase

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ABSTRACT



In our day to day life we are connected to the internet on an average of 6 hours and 30 minutes. The main essence of this mini project was to harness some of time into making our life more efficient and informative.

We have devised a prototype for a smart home that uses ESP32, Firebase and a mobile app letting u control your home's electronics that run on a resistive load i.e Toasters, Lamps, Kettle, electric heaters, etc.

The Current is measured through an ACS712 and fed to the ESP32 for processing and uploading the data to firebase.

The app acts as a switch allowing the system to run on its own or on input from the user. The uploaded data is accesses firebase and is subjected to a program that visualises the data and displays it as a real time graph.

INTRODUCTION



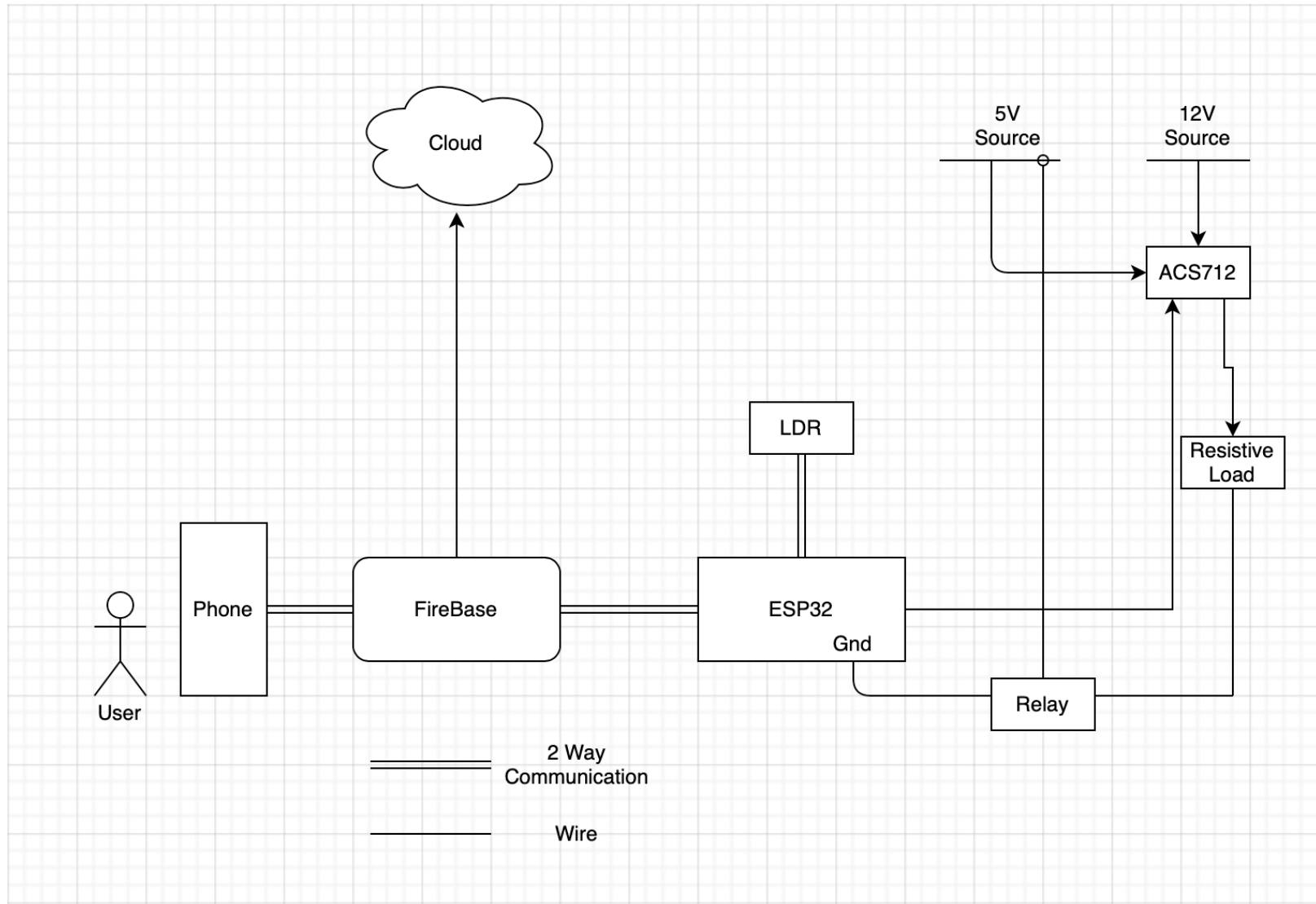
- The main essence of this mini project was to provide an interactive way to control electrical / electronic devices in your home.
- This can help people be more informative about the power they are consuming from the grid and lead a more efficient life.
- The Project work on the principle of real time communication over the cloud between devices.
- The App communicates with Firebase which in turn is connected to the ESP32 which allows the user a sleek yet efficient UI to control his devices.

LITERATURE SURVEY



- <https://ieeexplore.ieee.org/abstract/document/8276748/> : This paper helped us understand how firebase and its database works.
- <https://books.google.com/books?hl=en&lr=&id=v86PDwAAQBAJ&oi=fnd&pg=PP1&dq=ESP32&ots=RyUYdhW3X5&sig=U5AftSDskT2ZMkbzqUhahnLdvmw> : Some parts of this book helped us understand how to use the ESP32 for IoT.
- <https://ieeexplore.ieee.org/abstract/document/5622149/> : This paper showed. The detailed working of an ACS712 in a humanoid robot which in turn helped us understand how to use the sensor.
- Other Udemy Courses and online links that taught us the way around coding for this Project
 - 1) <https://www.udemy.com/course/ios-13-app-development-bootcamp/>
 - 2) <https://www.udemy.com/course/advanced-ios-firebase-build-an-uber-clone-app/>
 - 3) <https://www.udemy.com/course/esp32-for-arduino-makers/>

BLOCK DIAGRAMS



METHODOLOGY

RESULT



- Obtained current and voltage readings from ACS712.
- Calculated power on the ESP.
- Created and Calibrated a real time database on firebase with Google Authentication.
- Uploaded the power reading to the Power child in my database on firebase.
- That specific child is taken real time into the app and a real time graph is displayed.
- Created an IOS app using Xcode and Swift which allows real time control of light from anywhere and displays its power reading with a real time graph.

FUTURE SCOPE



- Can be expanded to Industrial size automation that can work in line with SCADA systems.
- Can be integrated with existing smart home devices i.e Alexa, HomePod, Google home to enable it to work with Voice commands.
- The app can be used as a backbone to construct more complex applications after upgrading the existing Database.

Individual Contributions

Anantha Krishna

1. FireBase Database Configuration
2. Firebase Authentication with E-Mail
3. Rewrote part of the Firebase.set part of the Firebase Library of ESP32 to suit our needs. (Line 82 - 85) of IOXhop_FirebaseESP32.cpp
4. Wrote the Firebase push and get code for the ESP32.
5. Made an App using Swift and Xcode to map the realtime value of the power and to act as a switch for the light with Firebase Authentication built into the App.

Isha Prabhakar

1. Developed the hardware aspect of the project by designing the interface for measuring of current using ACS712 and ESP32.
2. Interfaced all the Hardware Components.
3. Interfaced a LDR , in order to facilitate the automated powering off of the LED Strip.
4. Interfaced a bidirectional logic shifter to convert 5v to 3.3 V and vice-versa.
5. Wrote the code to control all Hardware.
6. Tested and verified the measurements of the components using a multimeter.

CONCLUSION



In Conclusion, the mini project we have presented today is the prototype of the final product we plan on developing and couldn't do so due to the lockdown restrictions.

On the bright side, we made the best out of this situation to make a functioning prototype that uses all the fundamentals of IoT Using ESP32, Firebase and an IOS App

References



1. <https://firebase.google.com/docs/ios/setup>
2. <https://www.engineersgarage.com/arduino/acs712-current-sensor-with-arduino/>
3. <https://www.electronicshub.org/interfacing-ac712-current-sensor-with-arduino/>
4. <https://techtutorialsx.com/2018/02/17/esp32-arduino-controlling-a-relay/>
5. <https://www.elprocus.com/acs712-current-sensor-working-and-applications/>
6. <https://randomnerdtutorials.com/esp32-pinout-reference-gpios/>
7. <http://www.circuitstoday.com/ltr-light-dependent-resistors>
8. <https://randomnerdtutorials.com/esp32-adc-analog-read-arduino-ide/>
9. A few miscellaneous research papers on using Firebase to retrieve data in Unique ways.

THANK YOU