# Smart Home Automation using ESP Modules and Firebase (Week 1)

Working Principle:

This whole system works over the internet. Here, Firebase will be the backbone of the communication with all the components integrated into the system. Firebase stores its data on the real time database in a .json which is faster to access compared to other formats and this makes the communication delay very less, making the system very reliable. This working in parallel with the program logic on the microcontroller makes this a very efficient system for creating an autonomous ecosystem.

Block Diagram and Explanation:
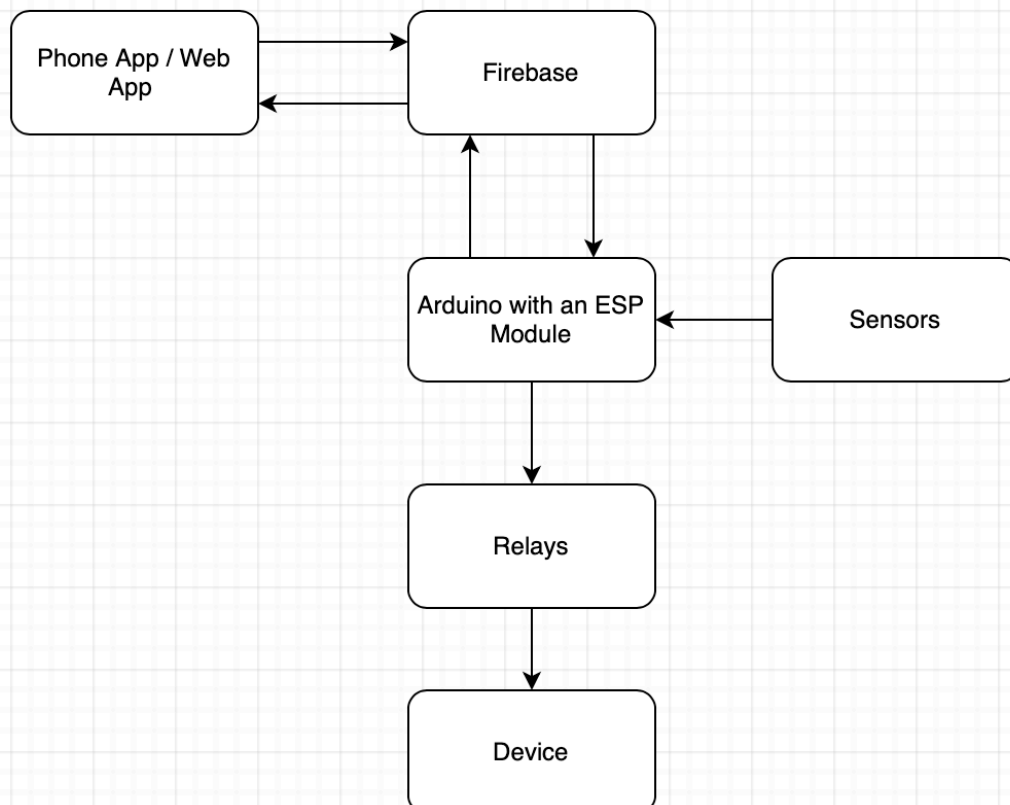
Arduino with ESP Module:

An Arduino with an ESP Module or a NodeMCU will be the main brain of the system. This module(ESP8266) can be controlled via a Wi-fi network or the phone's internet, thus having a wider range of operation than a Bluetooth module.The ESP Module will help us interface all the hardware to the internet enabling us to remotely operate and control devices using firebase as a buffer to store information.

Sensors:

These are hardware components that record certain data values and feed them to the Arduino. We are using Sensors in this system so as to make it autonomous to some extent.

Firebase:

Firebase is a cloud service offered by google on which we can access realtime data from the sensors once they are connected to the internet to a specific address. We are using firebase in this project to make it easier for the Mobile/Web app to communicate with the hardware.

Mobile/Web App:

This acts as the main interface between the user and the system. From this app the user can control and monitor the system. The App will be designed in a simple yet efficient way so as to minimise the learning curve.

Relays:

Relay module is a 3 terminal device that serves as a switch. It's 3 terminals are NO,NC and COM. Initially the relay and the device are in open circuit. When it receives a high signal from the Arduino, the contacts inside the relay come together and form a closed circuit, thus powering on the device. A low voltage would result in an open circuit, thus powering off the device.

The relay is activated and deactivated on the basis of stimulus received from the Arduino based on the sensor readings or a prompt from the App.

Device:

The object whose operation has to be controlled by the mobile app. This device is connected to the relay which is connected to the mains to supply the necessary power. The device powers on depending on the state of the relay, if it is in closed condition it powers on, else it remains in OFF condition.