- **Water level Depth Detection Sensor**

Figure 5.9: Water level Depth Detection Sensor

This is simple and small portable water level/water droplet identification, detection sensor water that has high cost performance. Complete water yield and analog conversion, the output value apply to your custom function. It is low power consumption and high sensitivity. Water Sensor water level sensor is an easy-to-use, cost-effective high level/drop recognition sensor, which is obtained by having a series of parallel wires exposed traces measured droplets/water volume in order to determine the water level. Its specifications include:

- Operating voltage: DC3-5V
- Operating current: less than 20mA
- Sensor Type: Analog
- Detection Area: 40mmx16mm
- Humidity: 10% -90% non-condensing
- Dimensions: 62mmx20mmx8mm
- Working Temperature: 10 °C to 30 °C
- Work Humidity: 10% to 90% without condensation

- **Servo Motor**

Figure 5.10: Servo Motor

Servo motor works on PWM (Pulse width modulation) principle means its angle of rotation is controlled by the duration of applied pulse to its Control PIN. Basically, servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse, and a repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement.

- **RFID Tags and Reader**

Figure 5.11: RFID Kit

Radio-Frequency Identification (RFID) is the use of radio waves to read and capture information stored on a tag attached to an object. A tag can be read from up to several feet away and does not need to be within direct line-of-sight of the reader to be tracked. This is the advantage over Bar-code. A RFID reader is a device used to gather information from an RFID tag, which is used to track individual objects. Radio waves are used to transfer data from the tag to a reader. A passive tag is an RFID tag that does not contain a battery, the power is supplied by the reader. When radio waves from the reader are encountered by a passive RFID tag, the coiled antenna within the tag forms a magnetic field. The tag draws power from it, energizing the circuits in the tag. Specifications include an Input voltage of 3.3V and frequency of 13.56MHz.

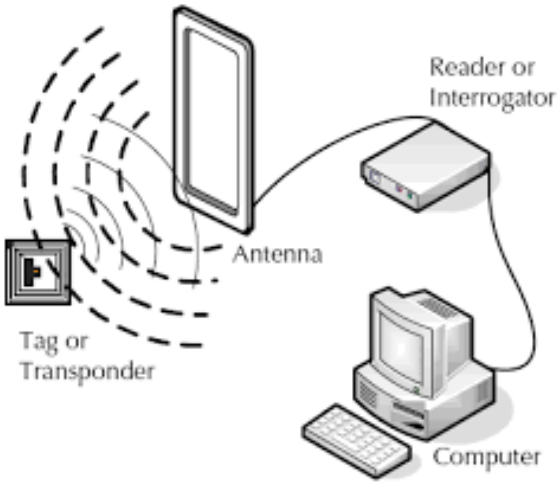

Figure 5.12: Working of RFID

5.2 Softwares Used

- **Arduino IDE**

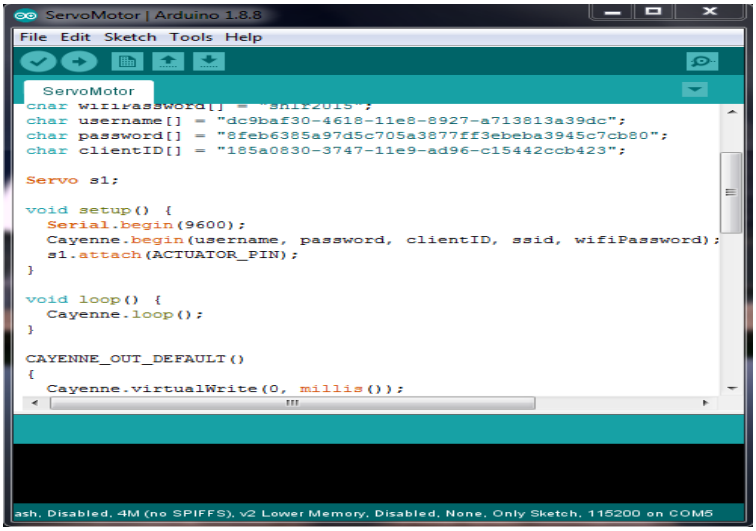

Figure 5.13 : Snapshot of Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiringproject,

which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. The language that is used in this project is Embedded C.

- **Cayenne API**

Cayenne is an online IoT dashboard that takes most of the complication out of creating hardware-oriented programming. Originally it worked with just the Raspberry Pi. Now it is available for the NodeMCU as well. Cayenne is a drag-and-drop programming system for the IoT that really does make it much easier. It not only makes it possible to build programs using drag-and-drop, it standardizes the connection of devices such as sensors and motors and makes sure that drivers are in place. All we have to do is install the Cayenne agent using the web site. The NodeMCU needs to have an Internet connection. Once the Cayenne agent is installed, we can interact with it via the mobile app or the website.

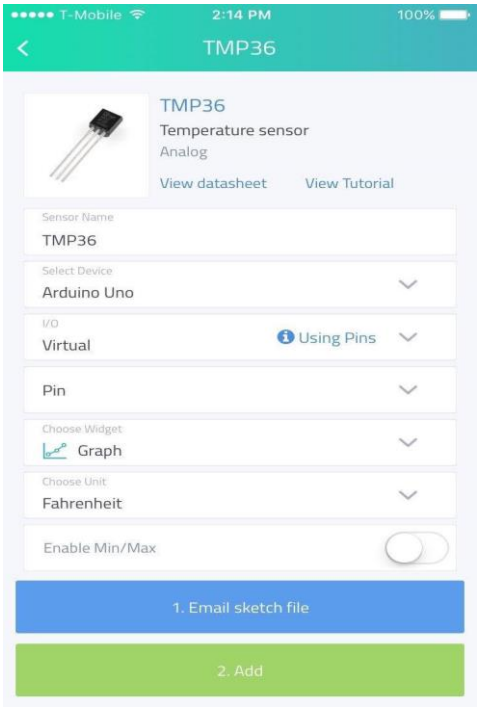

Figure 5.14: Cayenne Web API

To make the interaction with the dashboard work you have to run a suitable sketch, i.e. a program that handles the communication between the sensor and the dashboard. With a sensor installed the dashboard will show you the current reading - temperature if it's a temperature sensor. To make things automatic you can define triggers, which are if-then rules that can take the state of sensor. You can do things like turn something off when the temperature reaches a threshold and you can send notifications to the outside world using SMS or Email.

As well as triggers we can also set up repeating events at a given day and time. So we could ensure that the lights were all off at midnight each day. While Cayenne is a cloud-based IoT solution, unlike the other cloud services it doesn't just offer the back end but also handles the difficult part of actual micro-controller hardware and software.

5.3 Laptop/Smartphone

The power of the Internet of Things (IoT) can be best harnessed through the computer be it smart phone or laptop. The Internet of Things (IoT) is shorthand for describing the trend where an increasing number of devices – from light bulbs and vacuum cleaners to refrigerators, lawnmowers, washing machines and cars – are able to connect and communicate over the internet. An IoT device is able to send and receive data to specially configured servers on the internet.

This trend towards smarter devices has occurred for a couple of reasons. The key one is that electronics are becoming so cheap that even simple devices can be managed by electronic components that have substantial processing capacity. Once electronics became integral to how most devices work, it wasn’t too far a leap to have those electronics be able to connect to the internet.

Figure 5.15: Smartphone and Laptop

CHAPTER 6

PROPOSED SYSTEM

Overview of the Proposed System

The idea comprises of two parts:

1. The front end, which involves designing an application to communicate with microcontroller over the Internet.

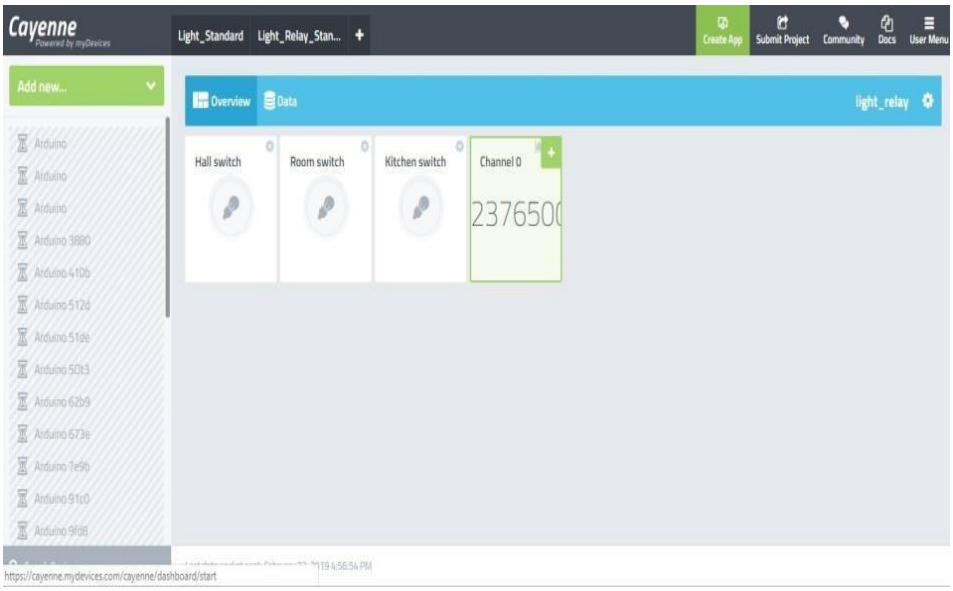

Figure 6.1: Snapshot from Laptop

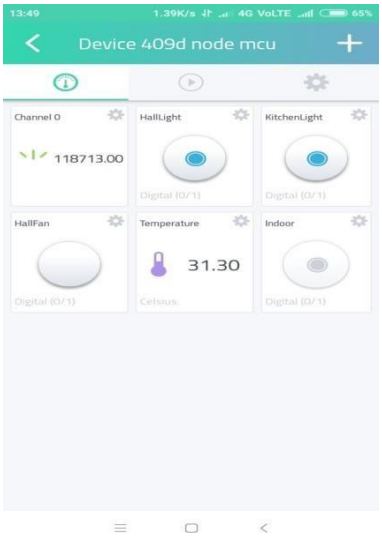

Figure 6.2: Snapshot from Smartphone