DE-40 (DC&SE)

NUST COLLEGE OF

ELECTRICAL AND MECHANICAL ENGINEERING

IOT - Smart Roller Blinds

A PROJECT REPORT

DE-40 (DC&SE)

Submitted by

NS AJMAN ULLAH KHAN WAZIR

PC EASAB KHAN

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BACHELORS

IN

COMPUTER ENGINEERING

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PROJECT SUPERVISOR

DR. AIMAL KHAN

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ACKNOWLEDGEMENTS

First, Alhamdulillah, that our FYP is finally made and all Thanks to Allah for giving us the strength and moral to keep pushing forward and helping us on each step of the way.

Secondly, we would like to offer heartily thanks our supervisors, Dr. Aimal Khan and Dr. Rizwan Masood, who helped us a lot, tremendously, on each and every single issue, who's help ad guidance became a source of strong determination for us. Thank You, sir`s you played a great role in our lives, one that we can never forget.

And lastly, we would like to thank our parents and friends, without whose unimaginable support and constant motivation, we might not have been able to complete our final year project. They played an unparalleled role throughout our journey, and we are eternally thankful to them. Their constant support motivated us to do more than we ever realized, and they inspired new hope in us, when we found none in ourselves.

ABSTRACT

According to the IOT, there is a worldwide use in all objects to be able to connect faster and easier. Mobile phones, tablets, laptops, and smart watches are among the many internet - connected devices used by the general public today. As a result, there is a huge market for wireless networking between individual devices such as phones and computers and common household items. This concept is generally applicable to homeowners, businesses, and buildings, where there is a huge market for smart home or smart-business appliances. Many companies, such as Nest, ADT, and Apple, sell automated home security and in-home media control products. The Wireless Window Blinds project aims to make window blinds smarter by integrating smart home technology. Users can control well before wireless blinds with the Wi-Fi Window Blinds. Users have full control over basic window blind features via a smart phone app, including opening, closing, helping to raise, and bringing down window blinds. Users also have complete control over any number of blinds in any number of bedrooms. The platform allows the user to control all of their connected blinds from afar. This project aims to develop an auto system allows users to control a network of window blinds wirelessly and automatically.

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Chapter 1: Introduction

1.1 Introduction

According to Pew Research Center, 64 percent of adults in the United States had their own cell phone in 2015. Remote gadgets have become essential for day-to-day existence as a result of the explosive growth of the cell phone and tablet industries. Remote devices provide an unavoidable platform for achieving the IoT goal of connecting and effectively opening all items. Today, a slew of products and services exist to meet this need, and they've laid the groundwork for IoT-related devices. Several family-specific IoT gadgets, such as Smart Lights with Wi-Fi control, have proven to be a valuable asset in the development of products and equipment for IoT gadgets and applications. As a result, a growing industry for cell phone-controlled gadgets and machines has emerged.

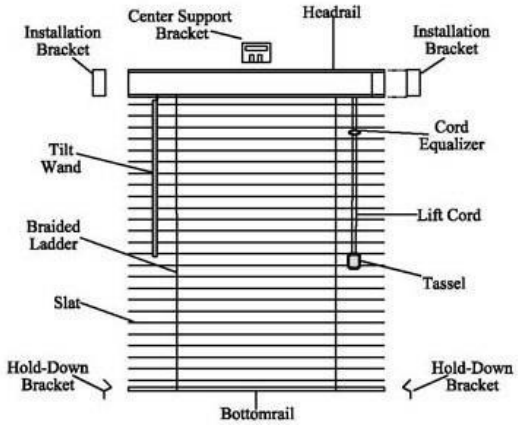
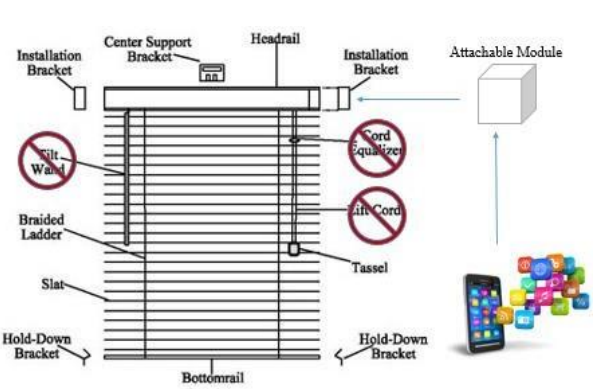
Current Mini Blinds	Wireless Window blinds
	

Table 1: Comparison of current blinds with old blinds

1.2 Motivation

Presently, conventional manual Blinds located in different parts of the house makes it difficult for the user to go near and Open and close Blinds. Even more it becomes more difficult for the elderly or physical handicapped people to do so. Smart Roller Blinds system provides most modern solutions with smart phones.

1.3 Scope

The smart blind system prototype uses a standard window and has several flaps.

The use of multiple flaps reduces the amount of motor torque required to control the blinds opening and closing. By deployment of simple solar panels, this project can be turned into a solar-operate smart blind system. Circuitry for charging the batteries during the day .A smart blind system could be created. By adding new Blinds and Schedule blinds within a week and during day time by setting time of opening and closing blinds at your own controls, the device becomes more advanced.as well as Feasible security systems. In this system, a Microcontroller and stepper motor are used to make the smart roller blind more convenient and effective than manual blinds. The smart roller blind is a suggestion for making blinds more practical in everyday life.

1.4 Structure

Following is the structure of the report ahead:

- Chapter 2, it mainly deals with the literature Review which means all the hardware components we have used in the projects, their specifications, features and pinout configurations.
- Chapter 3, it deals with the user's needs, configurations and Market analysis of Smart Roller Blinds
- Chapter 4, it deals with the Blynk app setup, how we controlled through google assistants using Google setup or IFFFT and Arduino codes for Blinds open and close ,and some specific time stop.
- Chapter 5, it deals with the Flutter app development for FYP project .it deals with requirements of Flutter app running through windows and what are the features of Flutter app for Blinds control.
- Chapter 6, it consists of concluding the report and exploring future possibilities and directions in which the project can be taken

Chapter 2: Literature Review

2.1 Microcontroller NodeMCU ESP8266

2.1.1 ESP8266 Functionality

Module	ES P8266
Inputs	User Data Encoded in Wi-Fi: Decodes User data from Wi-Fi User Data at 32KHz: Arduino can send data to the ESP8266 to be sent to the Smart Phone notifying user of action complete, or if anyerrors occurred.
Outputs	User Data at 32KHz: Passes the signal containing the desired window blind position from Wi-Fi to the Arduino to be processed.
Functionality	Deciphers Wi-Fi encoded data into an Arduino friendly data form.

Table 2: Functionality

2.1.2 Brief Info

The Node MCU can either assist an apps or simply transfer all WiFi organising functions from another app. Each ESP8266 module is pre-programmed with AT order set firmware, allowing you to connect it to your Arduino device and get roughly the same Connectivity as a Mobile internet Cover (and that's just out of the box)! The Microcontroller is a very cost-effective board with a massive, and rapidly growing, nearby region.

This microcontroller has a sufficient on-board processing and hording capabilities to allow it to be integrated with sensing devices and other app devices via its GPIOs with minimal front-end improvement and minimal stacking during runtime. Its increased levels of on-chip communication and cooperation accounts for little external device, including the front-end module, and is designed

to have a small PCB footprint. The microcontroler supports Bluetooth mutual cooperation interfaces, has an auto RF that enables it to work in any environment, and does not need outside RF components.

2.1.3 Images of Microcontroller Node MCU

Some of their images are given below:

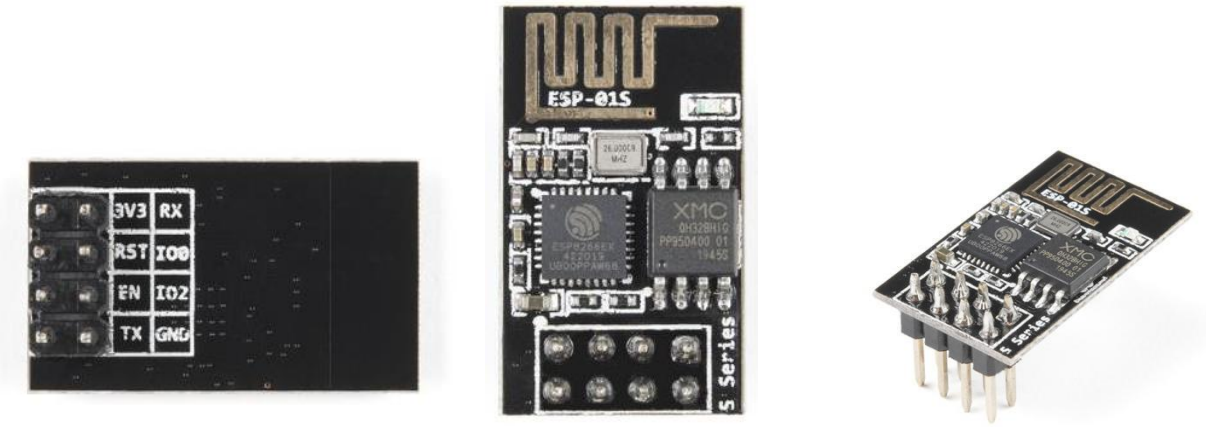


Figure 1: Node MCU

2.1.4 Modules ESP8266

17 GPIOs, SPI, and I2C are among the ESP8266 Microcontroller (implemented on software)

DMA UART 10-bit ADC with I2S integrations.

2.1.5 Pinout Node MCU

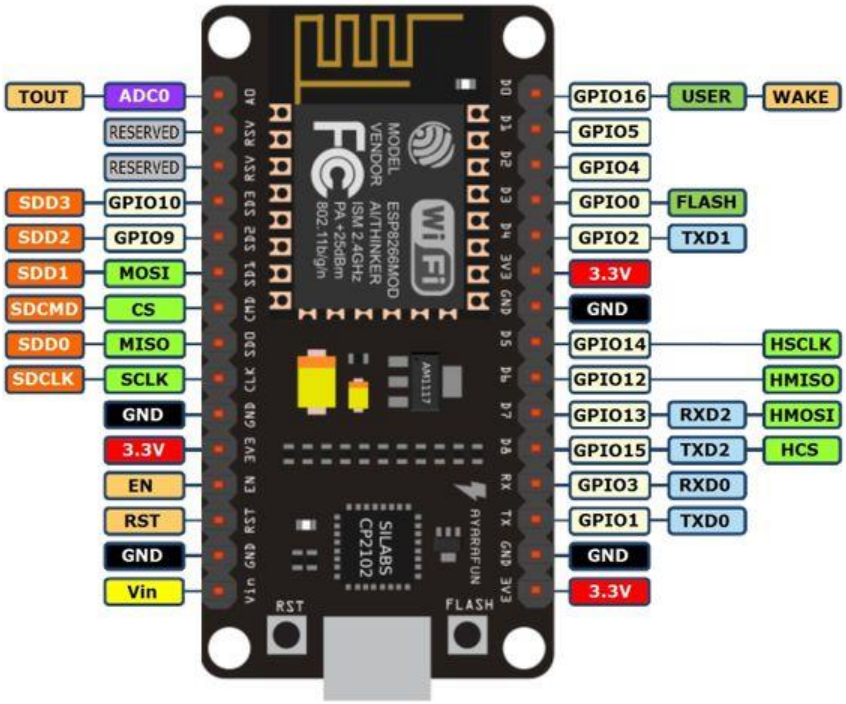


Figure 2:Pinout Node MCU

2.1.6 At high studs, ESp8266 Pins are used

If some pins are drawn LOW or HIGH, the ESP8266 will not be able to boot. The state of the mentioned pins on BOT is seen in the table below:

GPIO16: the pin is high.

If GPIO0 is drawn LOW, the setup process will fail.

GPIO2: pin is high on BOT, and if drawn LOW, this same bot will fail.

If GPIO15 is drawn HIGH, the boot process will fail.

GPIO3: At BOT, the pin is high.

GPIO1: pin is high at BOT, and if drawn LOW, the bot will fail.

GPIO10: At BOT, the pin is high.

GPIO9: At BOT, the pin is high.

2.1.7 Pins at the top of the bot

When the Microcontroller bots, a 3.3V signal is output on certain pins. If you have relays or other various integrated to those GPIOs, this could be a problem. On boot, the following GPIOs yield a HIGH signal.

2.2 Functionality of Voltage Regulator:

2.2.1 LM117 Functionality

Aspects	LM117
Inputs	5v
Outputs	12.5 to 37V and 1.5A
Functionality	The microcontroller require of the Roller Blinds operate on different levels .

Table 3: LM117 Functionality

2.2.2: Low voltage drop of LM117

The LM1117 is a low down voltage controller with a range of 1.2 V at 800 mA of load current. The LM1117 arrives in a customizable version that lets you adjust the voltage level from 1.25 to 13.8 V with just two external resistors. It also comes in five fixed voltage options: 1.8 V, 2.5 V, 3.3 V, and 5 V. The LM1117 has current restriction and warm closure as features.

2.2.3:Attributes of LM117:

1.8 V, 2.5 V, 3.3 V, 5 V, and Adjustable Versions are available.

LM1117: 0°C to 125°C; LM1117I: 40°C to 125°C

2.2.4: Images of LM117:

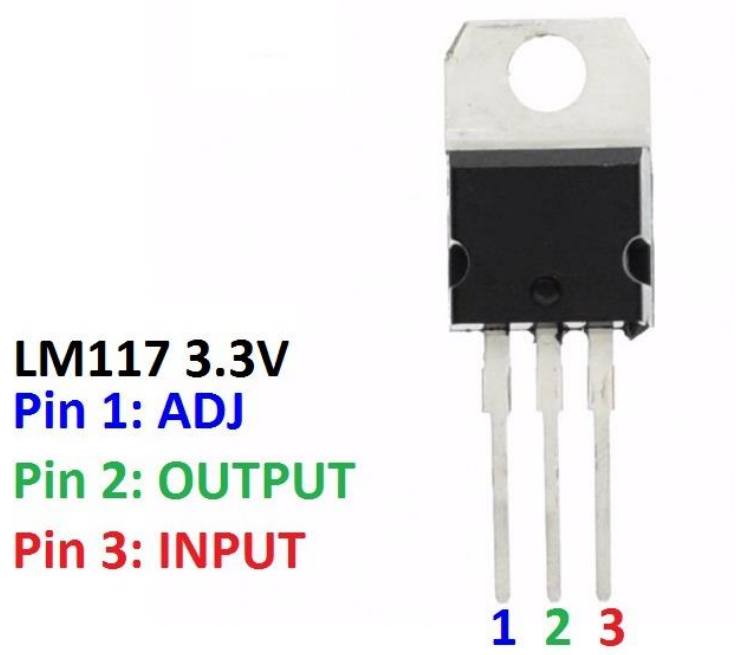


Figure 3: LM117

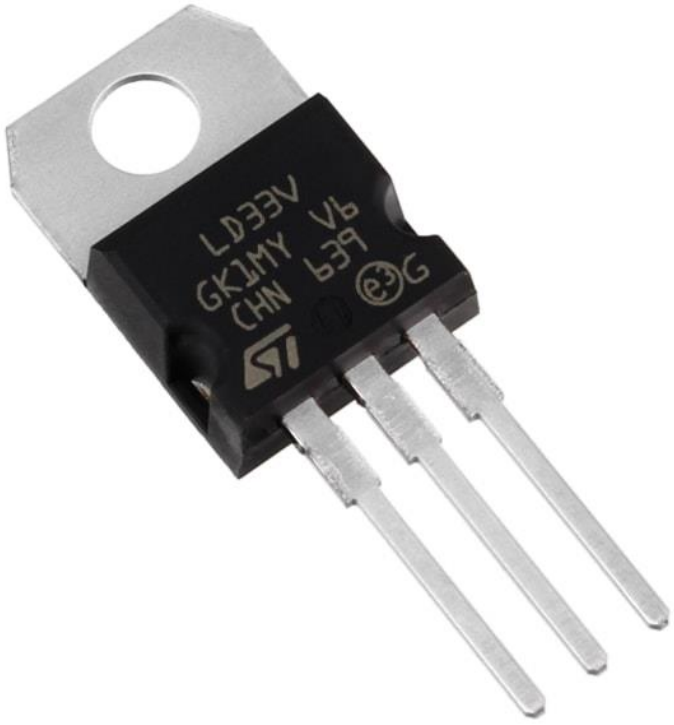


Figure 4: LM117

2.2.5: LM117 Pin Configuration:

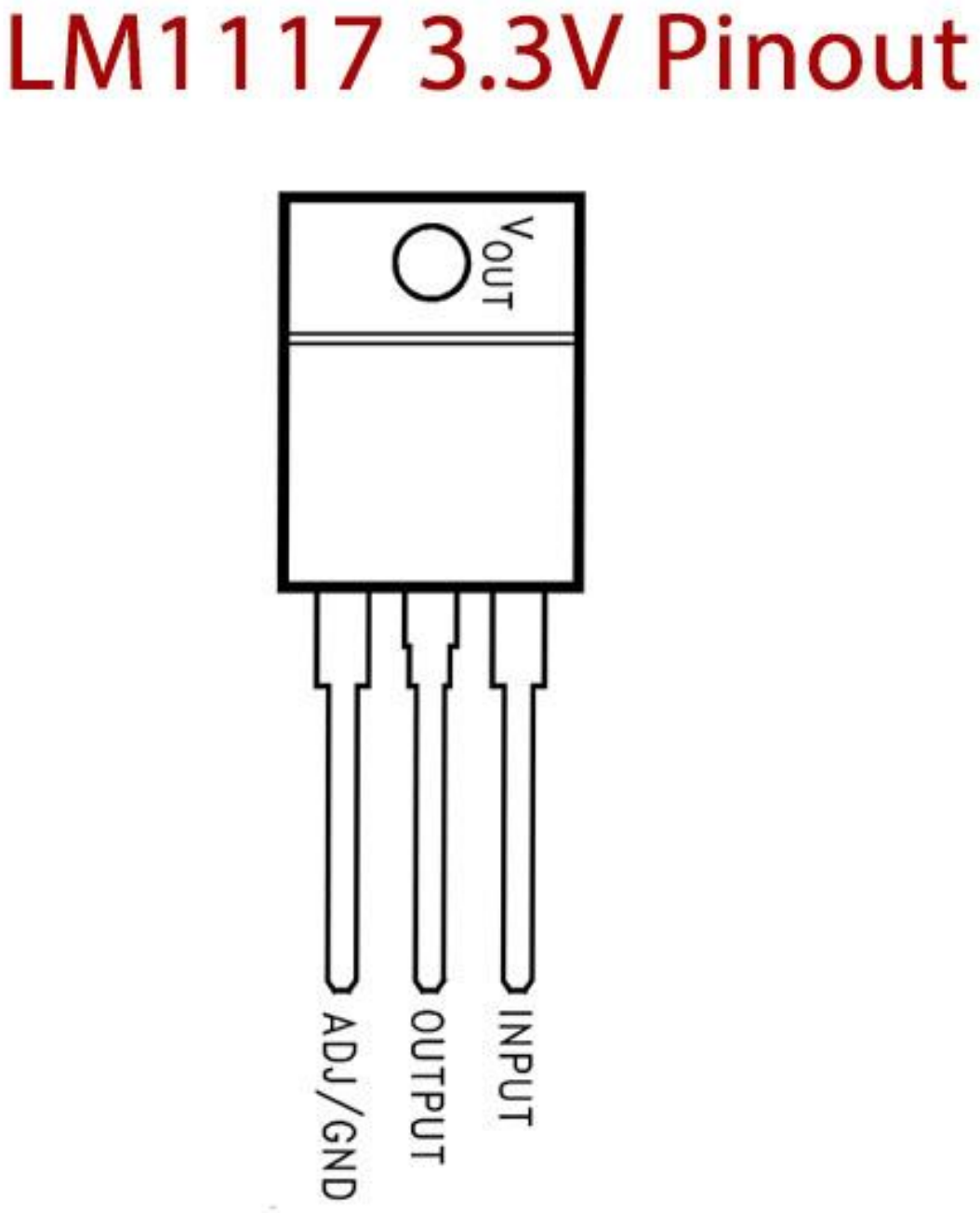


Figure 5: LM117 Pinout Configuration

Number	Name
1	Input
2	Output
3	GND

Table 4: Pinout Configuration

2.3 Stepper Motor

2.3.1 NEMA 17 functionality

Aspects	Motor
Input	Pulse Width Modulation (PWM): Adjusts the motor's rotation primarily based at the responsibility cycle of function. 9 Volts: This motor is pushed by means of 9 volts and may supply up to 150 mA
output	Roller Blinds Actually Moved as customers Recommended: Based upon that PWM input, mechanically proceeds the blinds a certain amount.
Functionality	Mechanically adjusts the window blinds to the customer's preferred position.

Table 5: NEMA 17 Functionality

2.3.2 What is NEMA

An affiliation establishes requirements for groups that manufacture electrical and hardware in numerous fields. This standardisation removes a few not unusual misunderstandings between customers and electric item manufacturers and improves the state of electrical meeting.

2.3.3 NEMA 17

The NEMA 17 is a 1.8-diploma degree point crossing stepper engine. As a result, one upset takes the shaft two hundred steps to complete. A mixture of a protracted-lasting magnet and a variable hesitance stepper engine is made reference to as a half of breed. The NEMA 17 stepper engine is wider than the NEMA 14 stepper engine, assessing 1.7 x 1.7 inches (42 x 42 mm). it's far designed to offer extra force than the smaller NEMA 14 stepper engine.

Like another engine, the NEMA 17 stepper engine is made up of a stator and rotor. The rotor of the NEMA 17 engine is a particularly long lasting magnet with 50 enamel round its circumference. A forty eight-teeth electromagnet is all that the stator is. those are divided into four classes, every with its very own device of regulations.

2.3.4 Characteristics of Motor

Para	Value
Voltage	4V
Rated present day/segment	0.95A
Step attitude	1.8°
Number of stages	4
Segment Resistance	3.3ohm
Inductance	4mH

duration	33mm
Rotor Inertia	35g-cm2
Shaft Diameter	Φ5mm
Shaft duration	22mm
Frame size	42 x 42mm
Unipolar Torque	2.59kg-cm(36oz-in)
R Accuracy	10%
L Accuracy	20%
Step Accuracy	±5% (full step, no load)
Temperature uptrust	80°C Max. (rated current,2 phase on)
Ambient Temperature	-10°C ~ +50°C
Insulation Resistance	100MΩ Min. 500 VDC
Dielectric current	500 VAC•5mA for one minute
Shaft Radial Play	0.06 Max. (450 g-load)
Shaft Axial Play	0.08 Max. (450 g-load)

Table 6: Characteristics of Motor

2.3.5: Nema 17 - Features:

- 12V DC Rated V
- 1.2 A at 4 V
- 1.8 degree. Stepper angle

The number of phases is four.

- 1.54-inch motor length
- 8-inch 4-wire lead
- 1.8 degrees, 200 steps per revolution
- Temperature range: -10 - 40 centigrade

2.3.6 Images of NEMA17

Figure 6: NEMA17

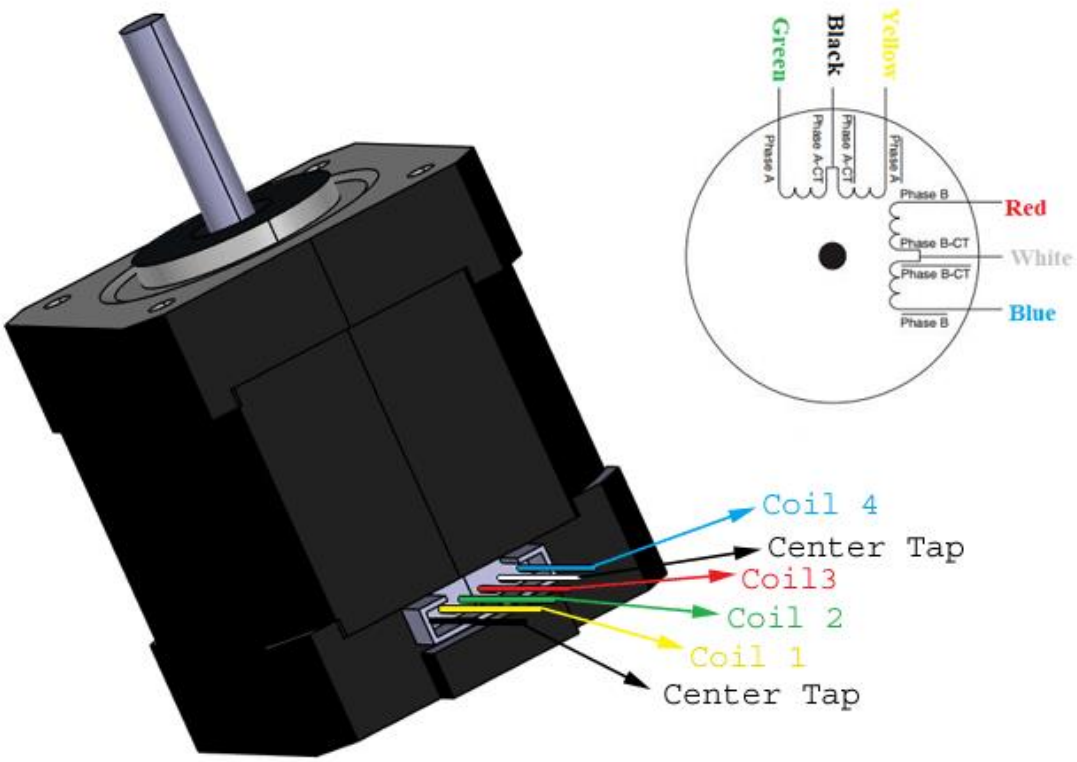


Figure 7: NEMA 17

2.4 A4988 Stepper

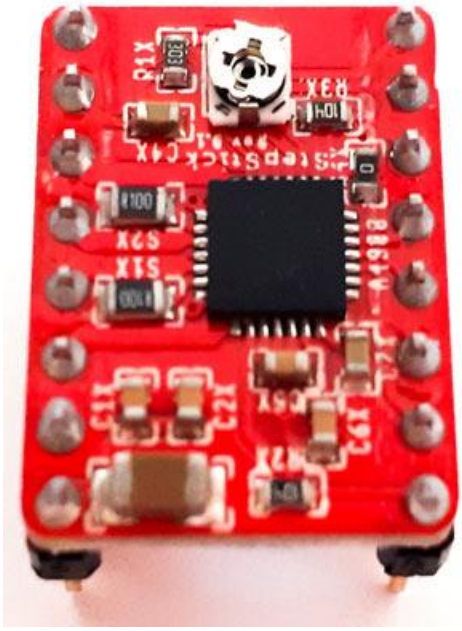


Figure 8: A4988 Stepper

The function of a stepper is managed by a stepper motive force module. The ebb and waft are dispatched to the stepper engine via numerous stages by using drivers.

The NEMA 17 stepper driving force, version A4988, is a micro stepping motive force module for bipolar stepper engines. This driver module has an implicit interpreter, this means that we are able to control the stepper engine with only some pins from our regulator. the usage of this NEMA 17 engine driving force module, we are able to manage the stepper engine with simply two pins, STEP and route. The STEP pin is used to manipulate the method, even as the route pin is used to manipulate the engine's direction. Complete-venture, haft-step, area-step, 8-step, and 16th-step are the five develop dreams offered by means of the A4988 motive force module.

2.4.1 Driver table

MS1	MS2	MS3	Decision
Low	Low	Low	complete Step
Excessive	Low	Low	½ Step (1/2 Step)
Low	High	Low	¼ Step (1/4 Step)
High	High	Low	1/8 Step (1/8Step)
High	High	High	1/16 Step (1/16Step)

Figure 9: Driver Table

2.4.2 Specs of driver

- Working Voltage most: 35V
- 8V is the minimum working voltage.
- 2A most cutting-edge consistent with section
- Complete step, 12 step, 14 step, 1/eight and 1/sixteen step microstep resolution
- No protection against reverse voltage.

- Size: 15.5 x 20.five mm (zero.6″ x 0.8″)

2.5 Design and Builds the Blinds Gear

The maximum tough part was developing the Blind gear that might pull the beaded rope. I won't go into detail about how to create the gear, but we would be able to use this basic concept to get started. A image of the thread with the beads can be seen here.

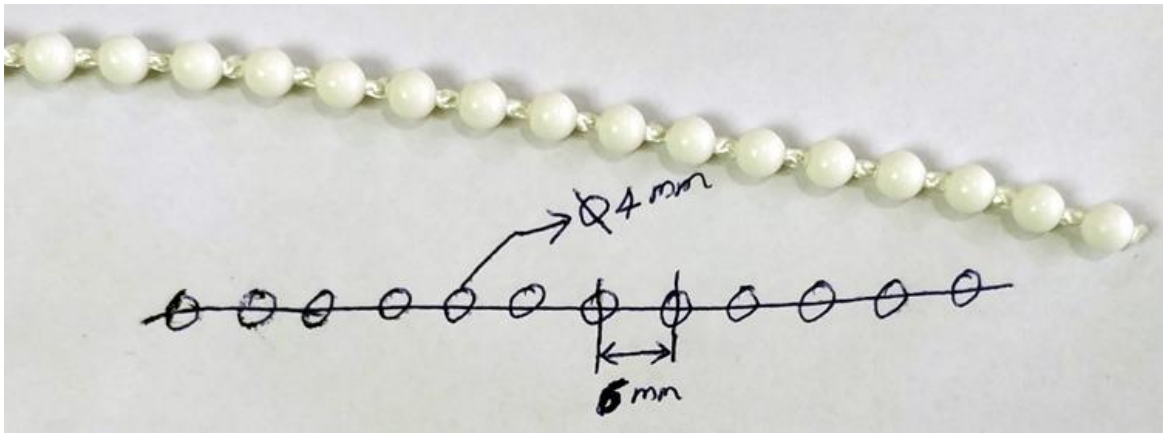


Figure 10: Designing of Blinds Gear

Again, there are many one of a kind kinds of ropes, however the most normally used ropes have a middle-to-middle distance of 6mm and a diameter of 4mm. We can begin designing our gear using this information. Our rope has the same beading structured as we given in the picture above , so we had to design the blind gear and print it.

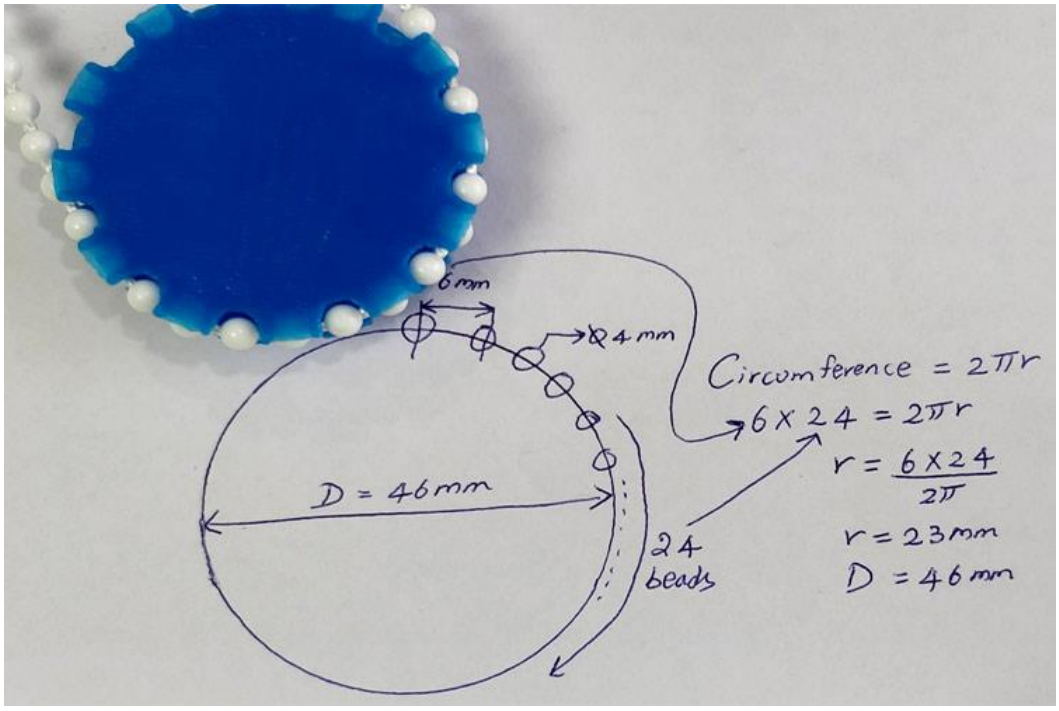


Figure 11: Designing of Blinds Gear

To reap the quality equipment wheel length, we determined to use 24 beads on our gear. So now we realize that the spacing among each bead is 6mm and that we are going to want 24 beads for our gear. The circumference of the gear wheel can be calculated via multiplying each. we are able to calculate the radius of the equipment wheel the usage of this data. The diameter of our equipment wheel become calculated to be around forty six mm, as proven in the image above. but remember the fact that this isn't the real diameter of the gear due to the fact we have not factored in the 4mm diameter of the beading. As a result, the gearwheel's actual diameter could be forty-two mm; we've published and examined a variety of tools wheels before.

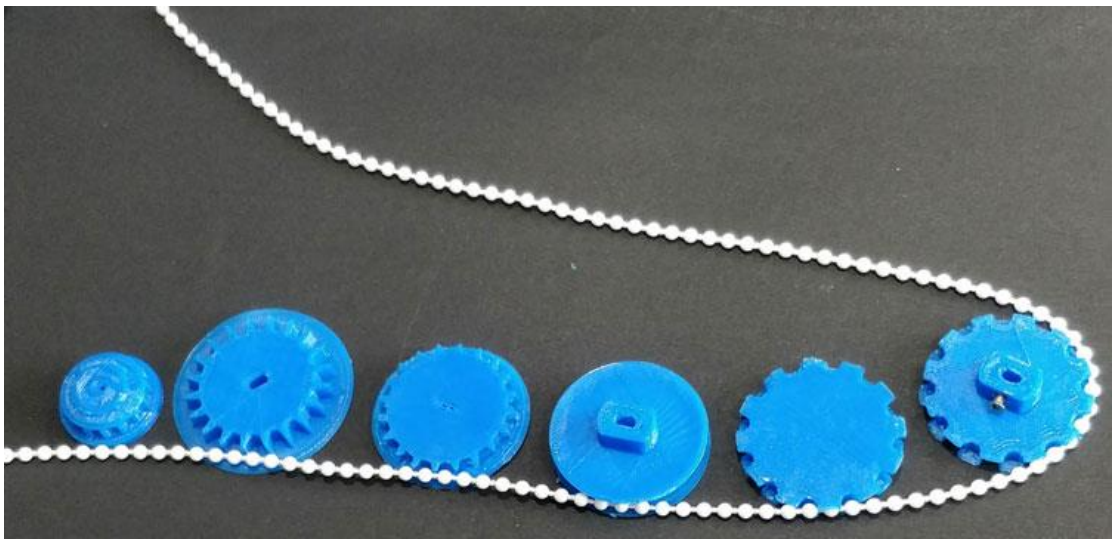


Figure 12: Designing of Blinds Gear

2.6 3D Printing the Motor Holder and Blind Gear

We're going to also want a small casing to drill into the wall and preserve the stepper motor in location; each the casing and the gear used on this challenge are display beneath.

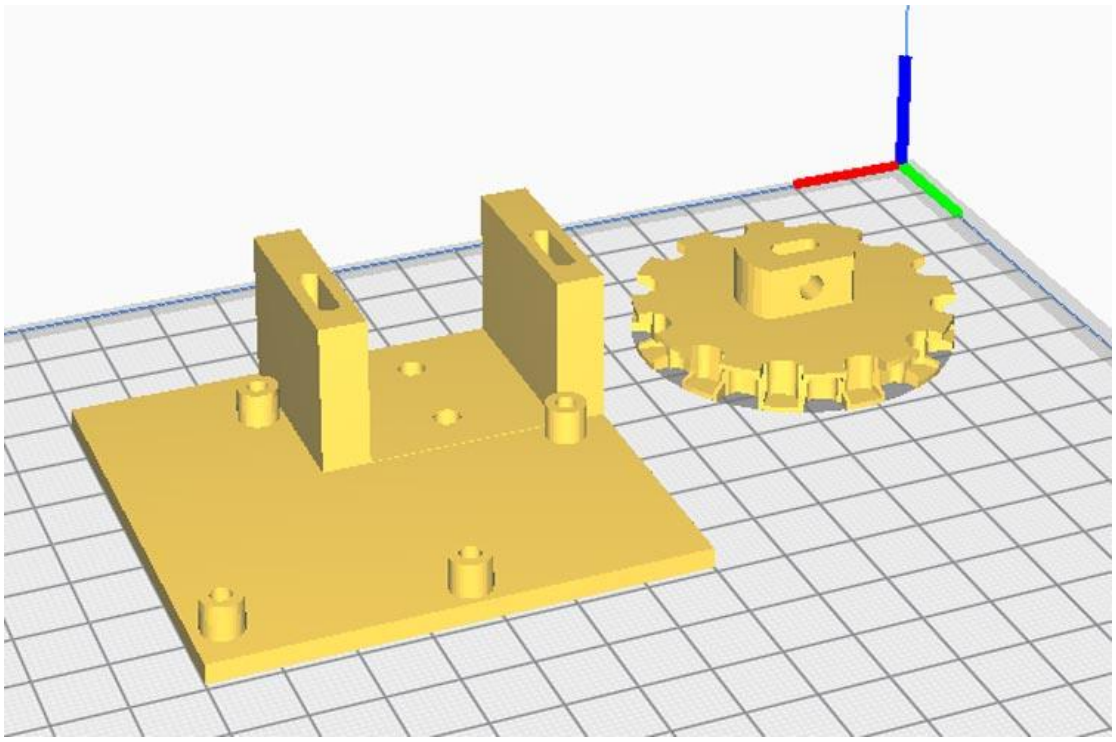


Figure 13: 3D Printing of Motor Holder and Blind Gear

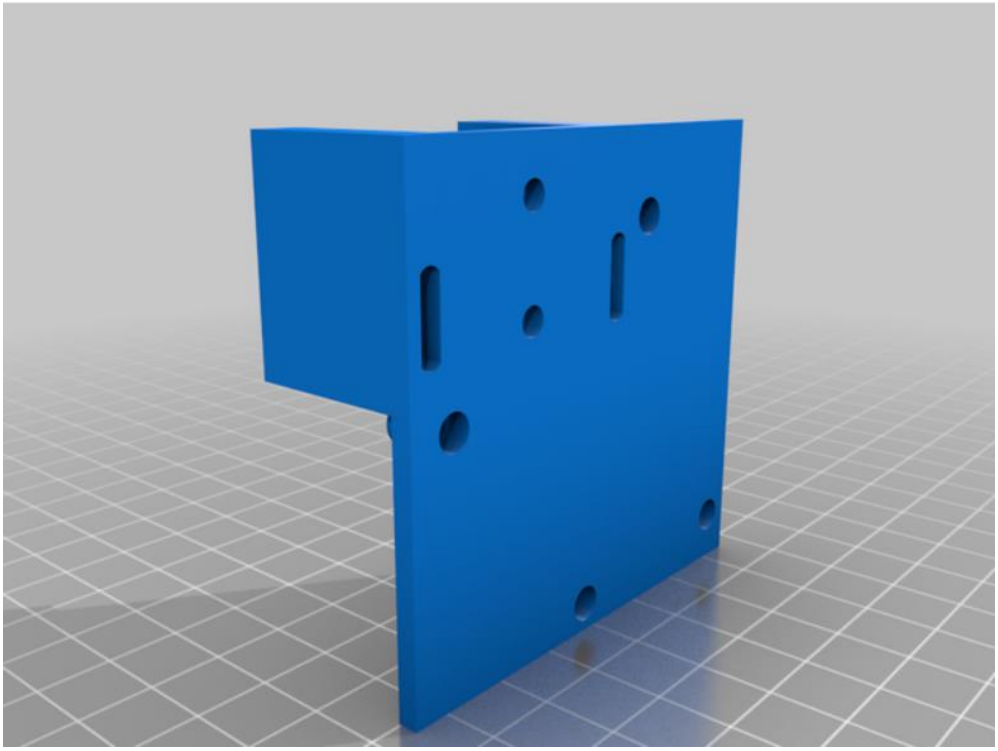


Figure 14: 3D Printing of Motor Holder and Blind Gear

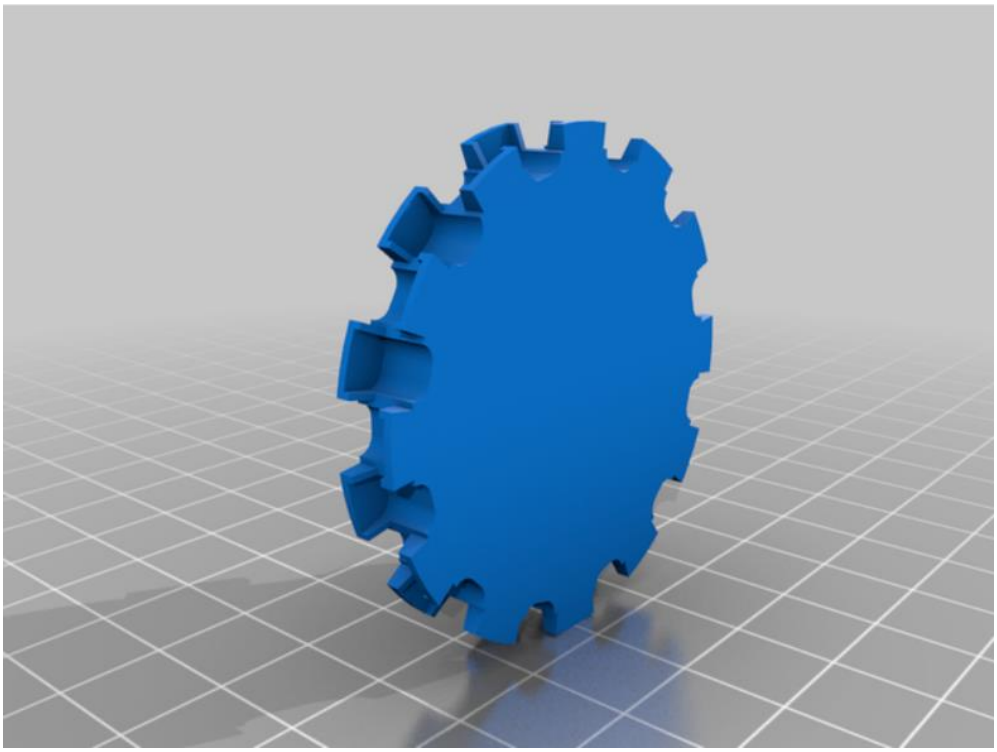


Figure 15: 3D Printing of Motor Holder and Blind Gear

Chapter 3: User Needs, Configurations, and Wants

3.1 Analysis of Client Needs

We learned about customer needs by conducting market research on existing Smart Roller blind systems and interviewing homeowners what they required from Smart Roller blind . Because household with andriod app and internet connection make up the majority of the Smart Roller blinds Focused market, we favoured their responses over those of business owners. According to Smarthomeowner, they need a system that is automatically favourable, easy to install, and has a long battery capacity. The andriod app should have an intuitive platform for percentage level opening and closing blinds.

Furthermore, the whole framework must valuable to accommodate any % level of blinds that the users may want.

3.2 Configuration and Criteria

Market Req	Features	Justification
1	In less than a second, one system responds to app input controls.	The customer requires a set of window shades that can be controlled quickly.
2	At least three months of battery capacity for a typical user who enhances and brings down blinds twice a day.	Batteries not only have an environmental effects, but they also gives an unnecessary functions to the roller blind platform upkeep
3	Uses 9 volts and pulls less than 100 milliamps.	The end user requires familiar, inexpensive batteries that can be observed in any store. 9 Volt

		batteries account for the vast majority of user batteries on the market.
4	For one hour, the the whole window blinds system runs consistently.	Users expect a long-lasting, energy-efficient system that needs little to no maintenance.
5	deployment duration for the users not increase 30 minutes.	Installation and maintenance market blinds takes only a few minutes. To compete effectively, platform must conduct at a high level.

Table 7: Configuration and Criteria

The Marketing Requirements shown in Table I were dictated by customer needs. A sleek, easy-to-install, and low-cost system are among the marketing requirements. Our product is more offering to users and challenged in the current market if it meets these requirements. Users should also expect low maintenance and upkeep costs, which necessitates only replacing the system's batteries on a regular basis. Table I summarises the marketing needs.

The IEEE NESC safety standard should be abided by the good or service.	Systems that are made available to the general public must be installed, operated, and kept in a secure way.
The total cost of production should not increase $75.	The cost of motorised blinds ranges from $250 to $300. To stay competitive, this platform must conduct at a top standard.
Dimensions less than 2’’ Long up, 4’’ expand, and 2’’ height	User requirements necessitate the use of a secret framework that is not an outcast.

The framework has passed measurement tests and can now be used on a variety of horizontal small blinds systems.	Roller Blinds come in a wide range of styles. To take full responsibility for this, our systems should be able to fit and operate effectively on a broad range of blinds.
Take a peek Wi-Fi information exchange is being used to communicate with the mobile application remotely.	Users with in-home Area network need a simple, interactive interface to regulate their curtains.
Needs: React quickly to online commands to open up and close down . Powered by a battery Easy and risk-free installation 4.Affordable Attaches to multiple window blind sets 5.Looks sleek/hidden Durable Allows the user to control the window blinds from a distance.	

Table 8: Needs and Requirements

Chapter 4: Blynk App, Google Assistant Setup and Project Structure Diagram

4.1 Blynk application for blinds control

Before we start the Controlling Blinds code, now suppose open your blynk app and create icons to automate smart Roller Blinds. In the future, we'll need this to regulate Voice Assistant.

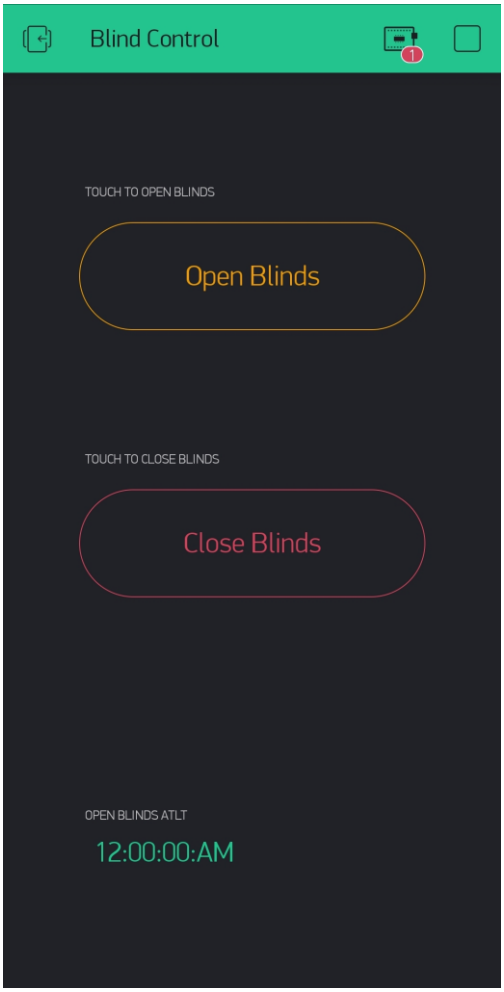


Figure 16: Blynk Application

We added new two buttons for opening and closing the blinds, and also an one which opens the blinds at 12:00 a.m. every day. Various time slots can be set to open and close the blinds at different times during the day. When the blinds must be closed, digital pin V1 is provoked, and when the blinds must be opened, virtual pin V2 is provoked...

4.2 Control through Google Assistant

IFFFT (Adaufruit)…..Creating Trigger

To control the blinds via Voice Control, we'll use the blynk Web services. Basically, we need to say a pre-defined phrase to Google Home .

The authentication oath is replaced with the one given by our blynk app. We can also check in your Internet explorer to see if it works properly. Now that the link has now become ready, all we must do is head over to IFTTT and forms two applets which will close and open the blinds using virtual pins V1 a d V2 respectively.

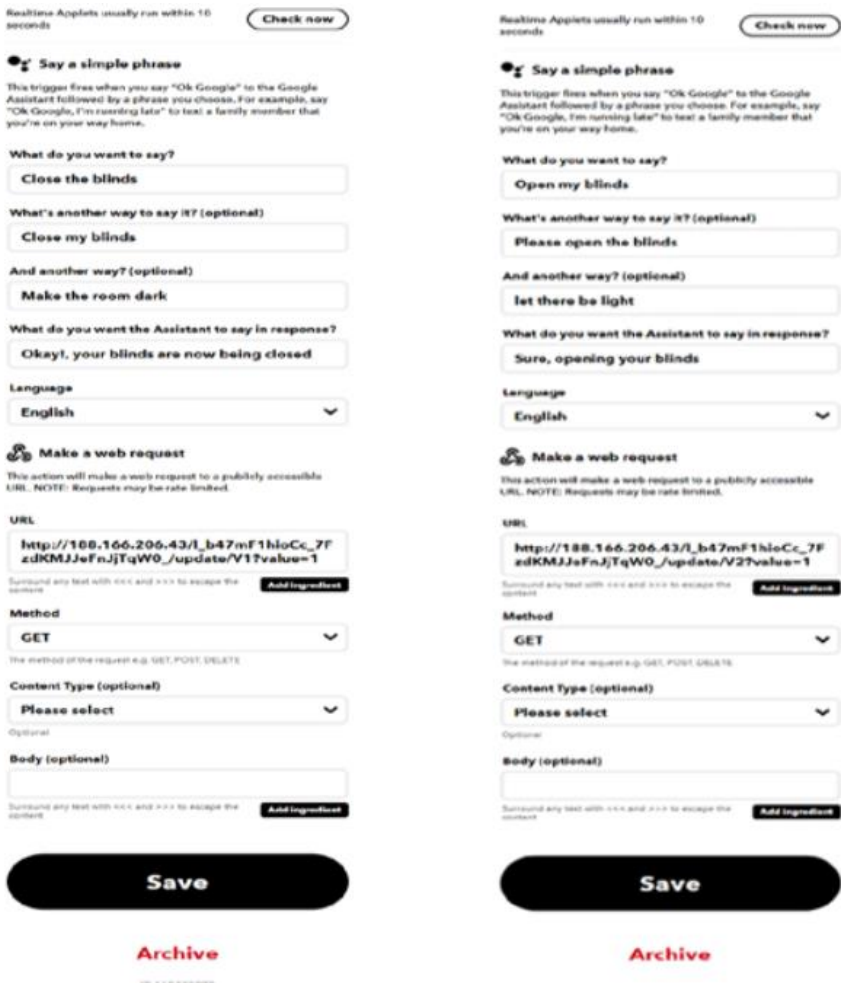


Figure 17: Control through Google Assistant

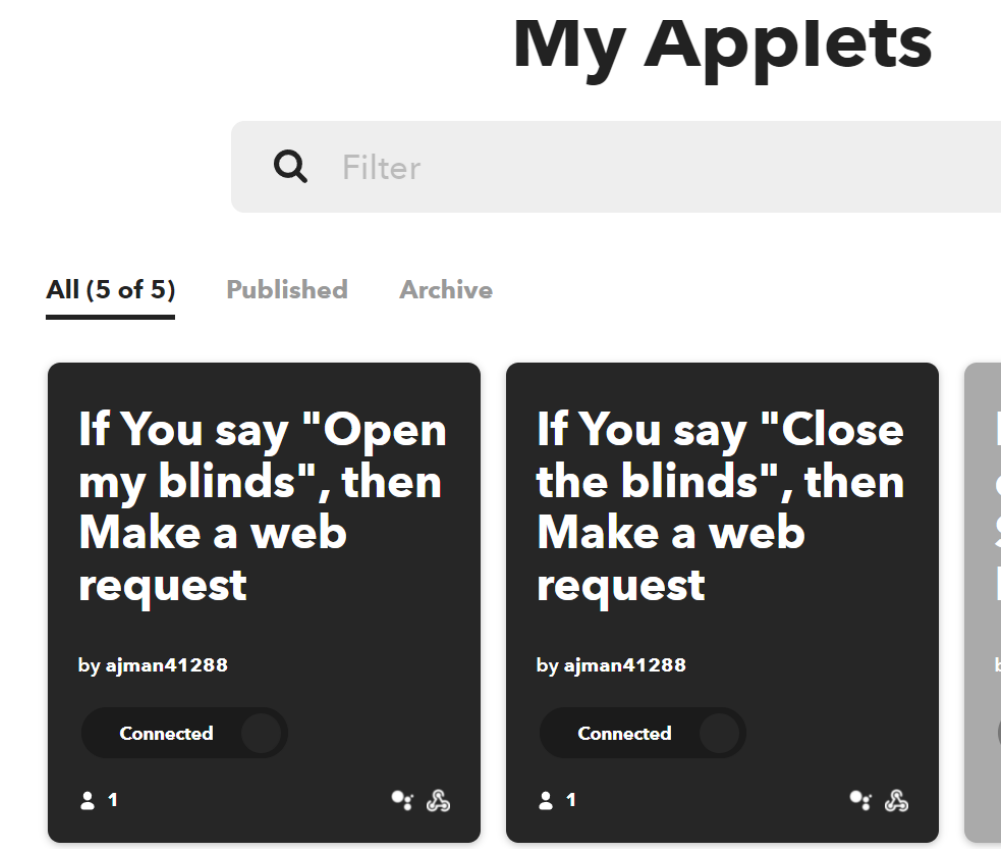


Figure 18: Control through Google Assistant

4.3 Project Structure Diagram:

Project hardware diagram is given below.

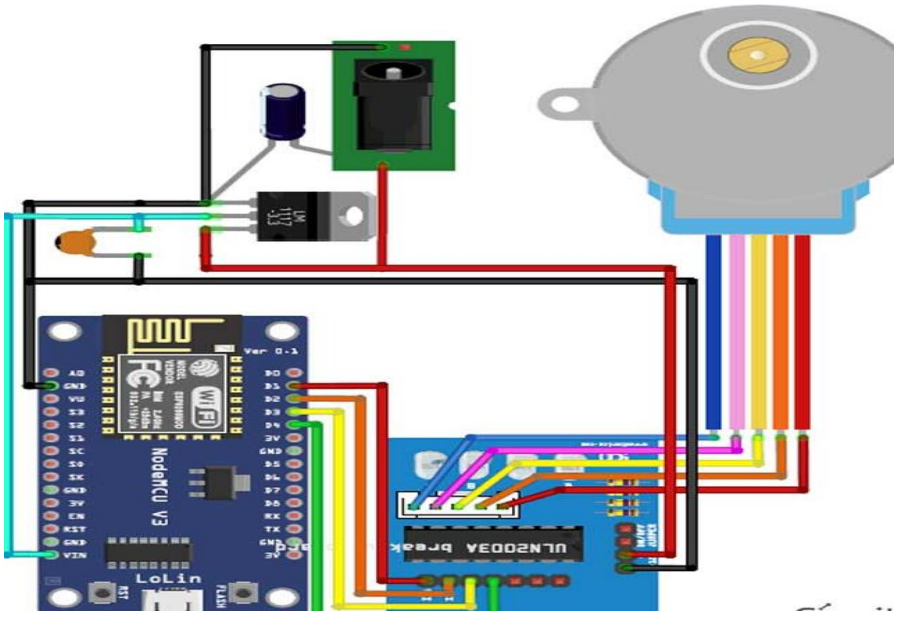


Figure 19: Project Structure Diagram

Now we utilized a 12V adapter to give voltage and current the entire system; the voltage regulator -3.3V regulator transfer the 12V to 3.3V which can be utilized to charged the microcontroller board. The A4988driver charged from the 12V adapter. we want run NEMA17 on 5V, but not give appropriate torque to draw the curtain , NEMA 17 is used for heavy load.

4.4 Project Images: Work done(Hardware part)

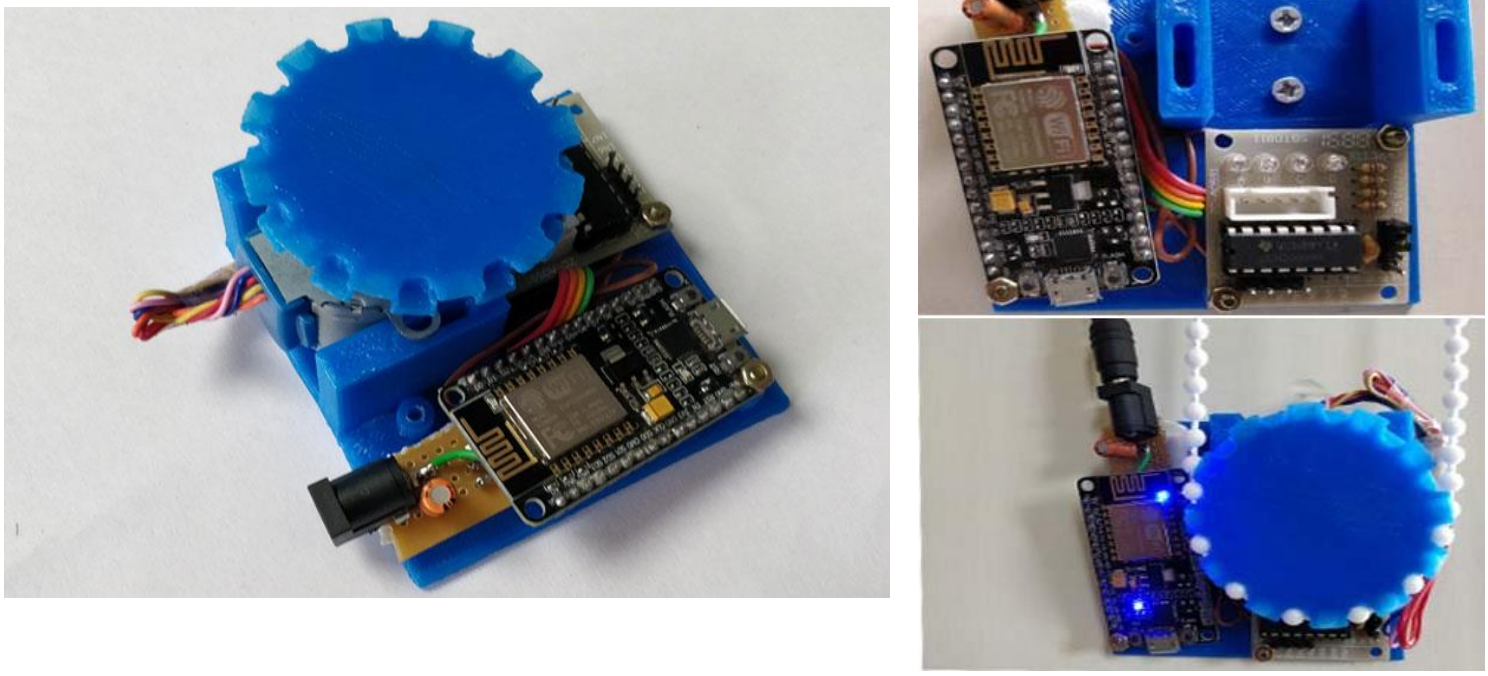


Figure 20: Fabrication

Figure 21: Fabrication

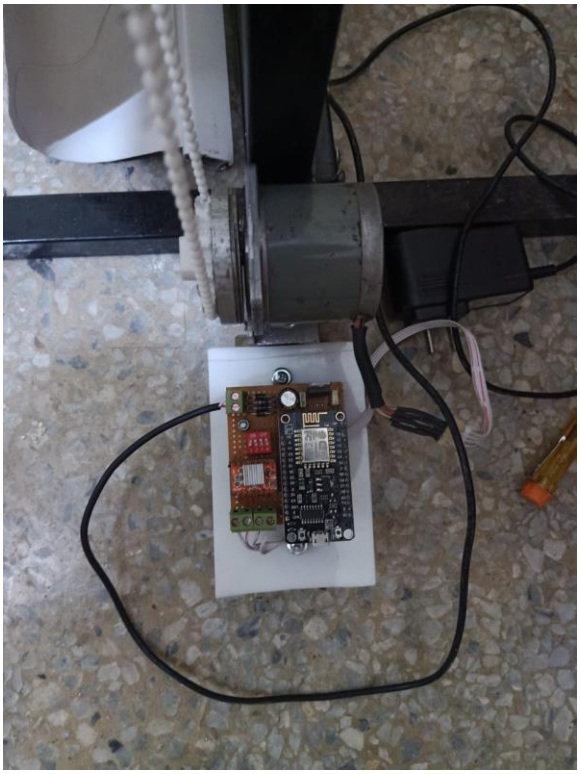


Figure 22: Fabrication

Figure 23: Fabrication

4.5 Arduino Codes for Blinds control:

code | Arduino 1.8.16

File Edit Sketch Tools Help

code

```
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#define BLYNK_PRINT Serial
// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "pBuOncjUa0_Qz_oKUrHehJwYE8AXov44";
// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "IOT_kit";
char pass[] = "IOT78612345";
//Run the program only after opening the blinds
boolean closed = false;
boolean opened = true;

void setup(){
  pinMode(D0, OUTPUT); //on-board LED as output

  pinMode(D1, OUTPUT); //on-board LED as output
  pinMode(D2, OUTPUT); //on-board LED as output
  pinMode(D3, OUTPUT); //on-board LED as output

  digitalWrite(D0,HIGH); //turn this light on
  Serial.begin(9600);

  Blynk.begin(auth, ssid, pass);
  //http://188.166.206.43/pBuOncjUa0_Qz_oKUrHehJwYE8AXov44/update/V2?value=1/
  digitalWrite(D0,LOW); //turn it off after connecting to blynk
}
BLYNK_WRITE(V1) //CLOSE the BLINDS
{
    Serial.println("Closing Blinds");
    if (opened == true){
    digitalWrite(D1, HIGH);
    digitalWrite(D2, LOW);
    delay(100);
```

Figure 24: Arduino Coding

code | Arduino 1.8.16

File Edit Sketch Tools Help

code

```
digitalWrite(D3, HIGH);
delayMicroseconds(100);
digitalWrite(D3, LOW);
delay(1);
    }
  digitalWrite(D2, HIGH);
    closed = true;
    opened = false;
 // always desable stepper motors after use to reduce power consumption and heating
    }
  }

  BLYNK_WRITE(V2) // OPEN the BLINDS
  {
    Serial.println("Opening Blinds");
    if (closed == true){
    digitalWrite(D1, LOW);
    digitalWrite(D2, LOW);
      delay(100);
    for (long cc_val = 0; cc_val <= 22000; cc_val++) //rotate in Clockwise for opening
    {
digitalWrite(D3, HIGH);
delayMicroseconds(100);
digitalWrite(D3, LOW);
delay(1);
    }
    digitalWrite(D2, HIGH);
    opened = true;
    closed = false;
    }
 // always desable stepper motors after use to reduce power consumption and heating
  }
void loop(){
  Blynk.run();
}
```

Figure 25: Arduino Coding

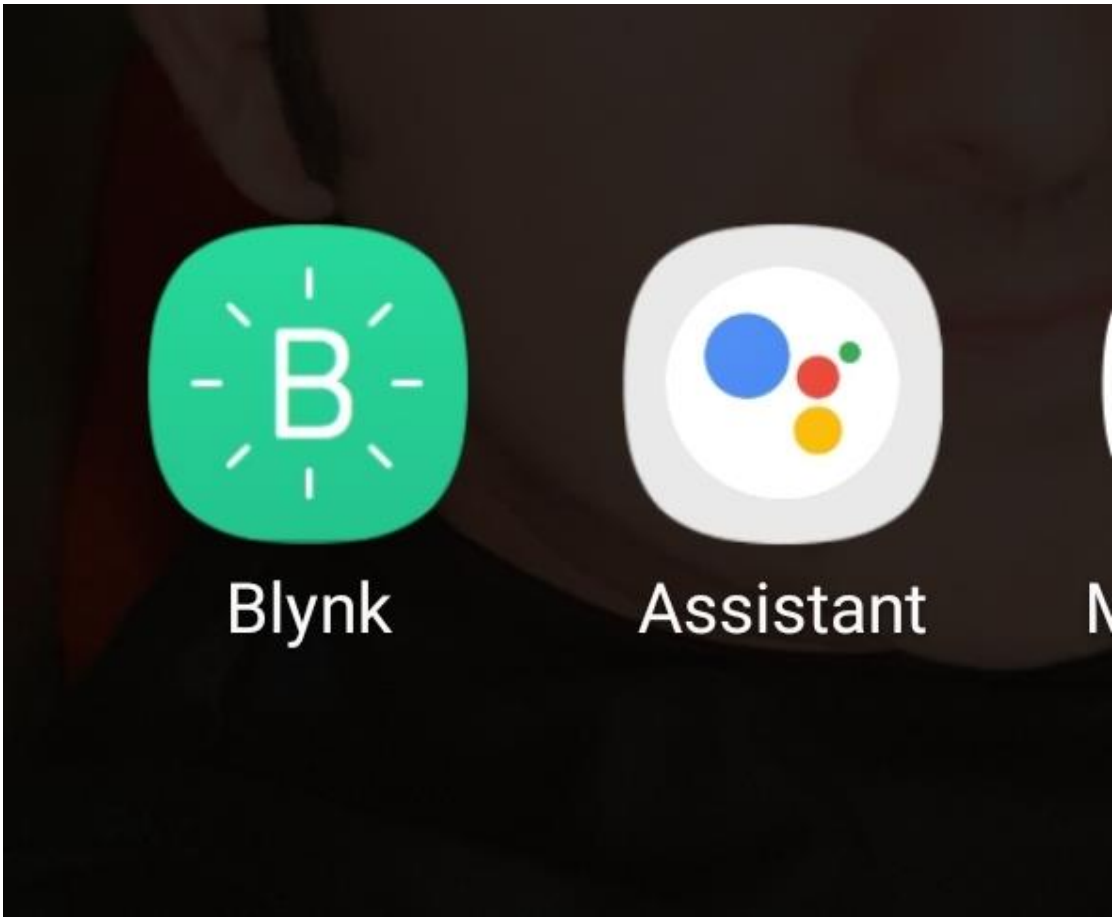


Figure 26: Blynk App Logo

Chapter 5: Flutter app development

5.1: Requirement for Flutter app

- Install Fluterr SDK
- Install android studio
- Install git
- Install Visual studio Code
- Create Virtual Desk for android studio
- Change Environment path
- Install Dart and Flutter extensions in VSC
- Check Commands Flutter Doctor through Command Prompt
- The main coding part will be lib/main.dart

We will show above requirements in the laptop:

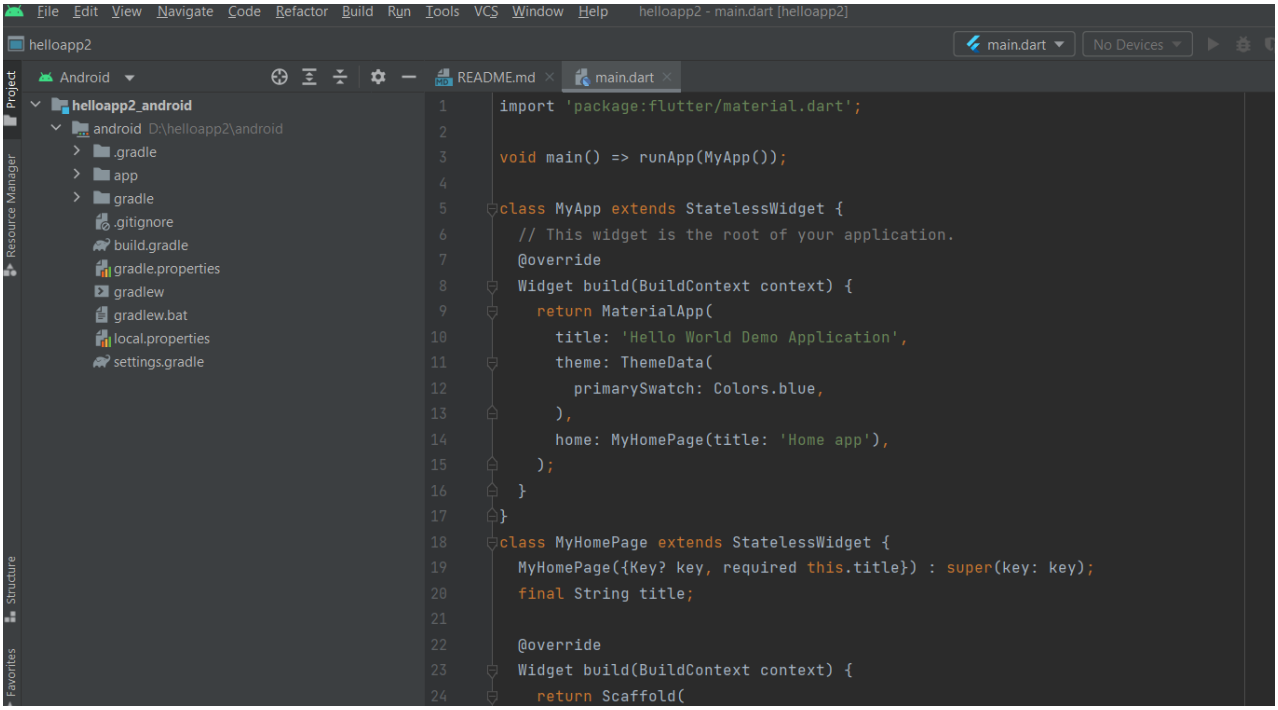


Figure 27: Fulfilling of the Requirements

VSC:

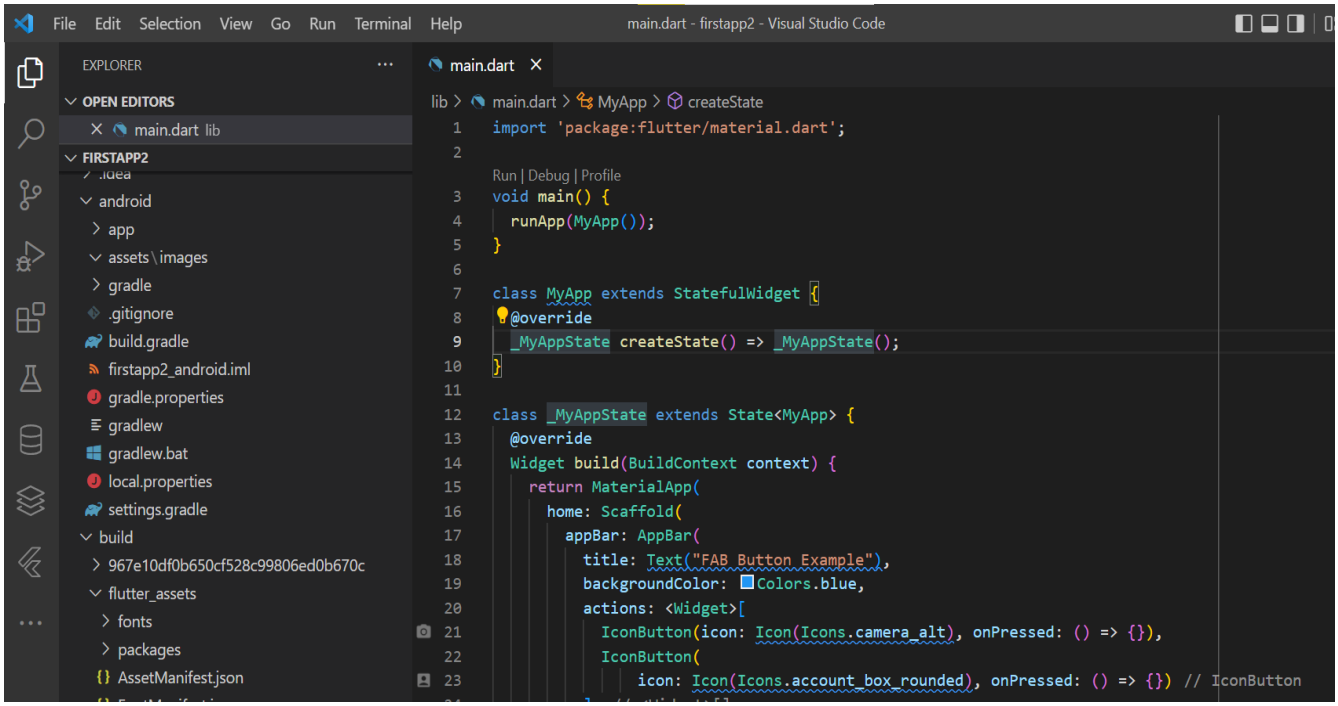


Figure 28: VSC

Dart:

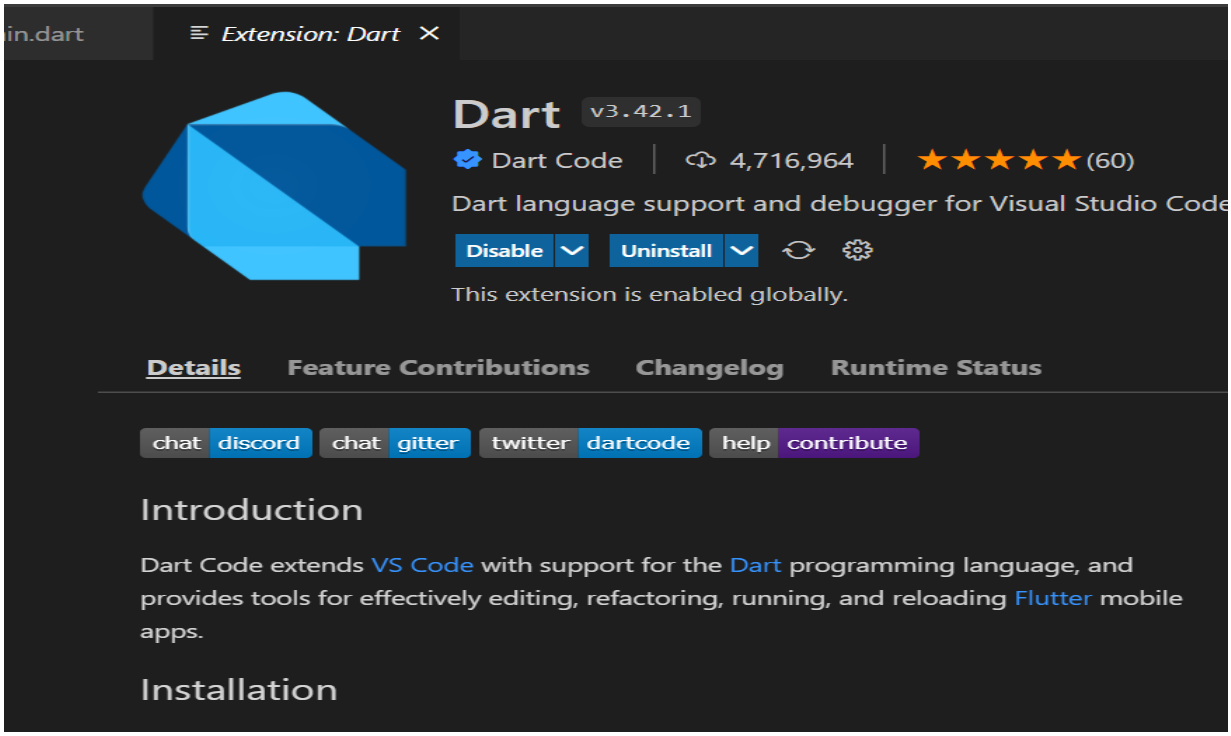


Figure 29: Dart

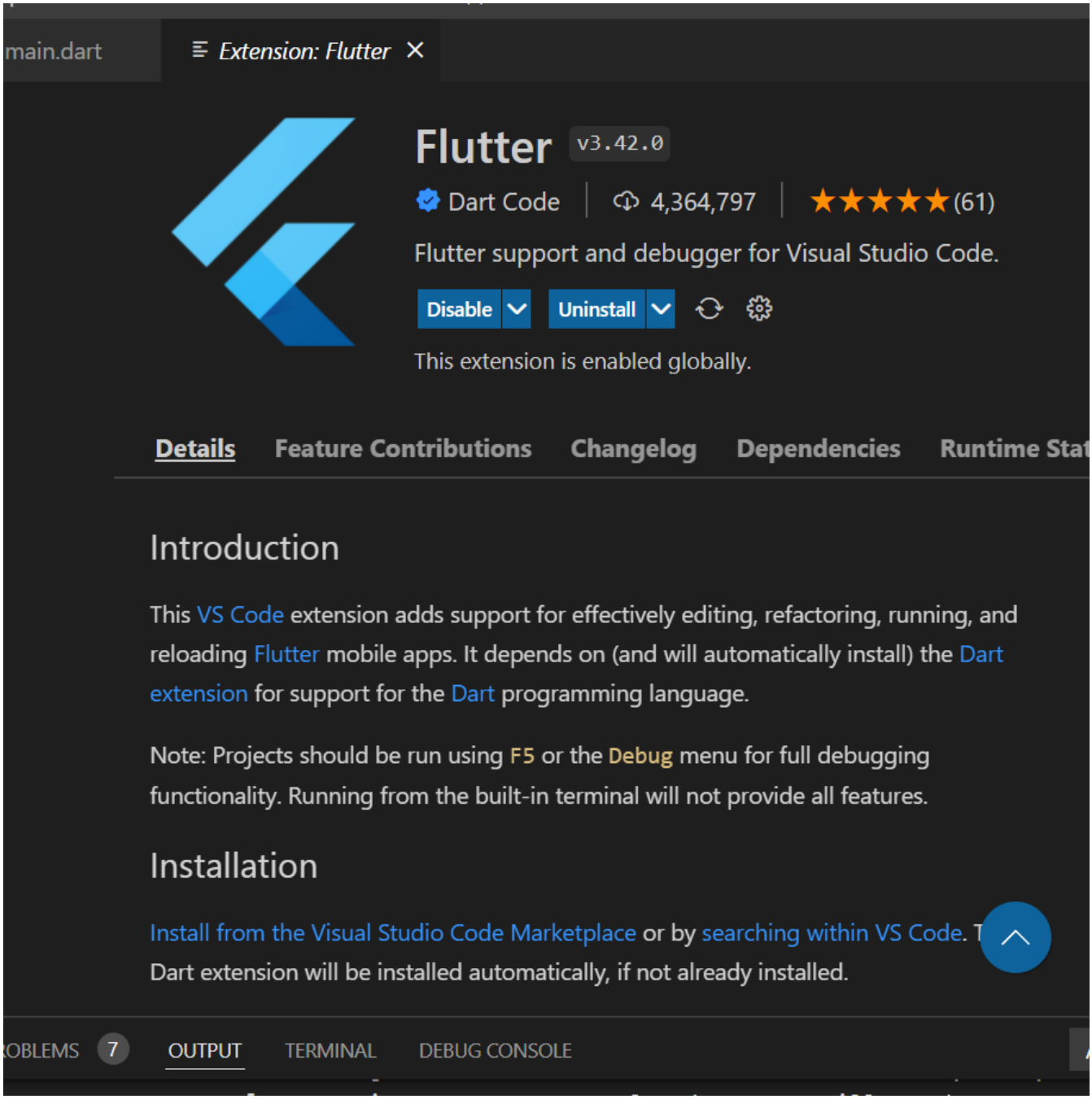


Figure 30: Flutter App on Play Store

```
Try the new cross-platform PowerShell https://aka.ms/pscore6

PS D:\Flutterapp\firstapp2> flutter doctor
Doctor summary (to see all details, run flutter doctor -v):
[√] Flutter (Channel stable, 2.10.5, on Microsoft Windows [Version 10.0.19041.685], locale en-US)
[!] Android toolchain - develop for Android devices (Android SDK version 31.0.0)
    X cmdline-tools component is missing
      Run `path/to/sdkmanager --install "cmdline-tools;latest"`
      See https://developer.android.com/studio/command-line for more details.
    X Android license status unknown.
      Run `flutter doctor --android-licenses` to accept the SDK licenses.
      See https://flutter.dev/docs/get-started/install/windows#android-setup for more details.
[√] Chrome - develop for the web
[!] Visual Studio - develop for Windows (Visual Studio Community 2019 16.10.0)
    X Visual Studio is missing necessary components. Please re-run the Visual Studio installer for
      "Desktop development with C++" workload, and include these components:
        MSVC v142 - VS 2019 C++ x64/x86 build tools
          - If there are multiple build tool versions available, install the latest
        C++ CMake tools for Windows
        Windows 10 SDK
[√] Android Studio (version 2021.2)
[√] IntelliJ IDEA Community Edition (version 2021.1)
[√] Connected device (3 available)
```

Figure 31: Flutter

5.2 How to Run Flutter app

There are Following steps to do this:

1. Open visual studio code
2. Go to View option and select Command pallete:

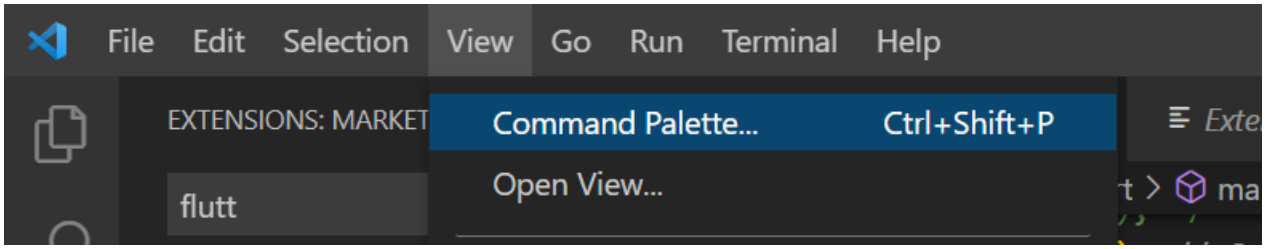


Figure 32: View Option

1. Enter Flutter new Project and select it:

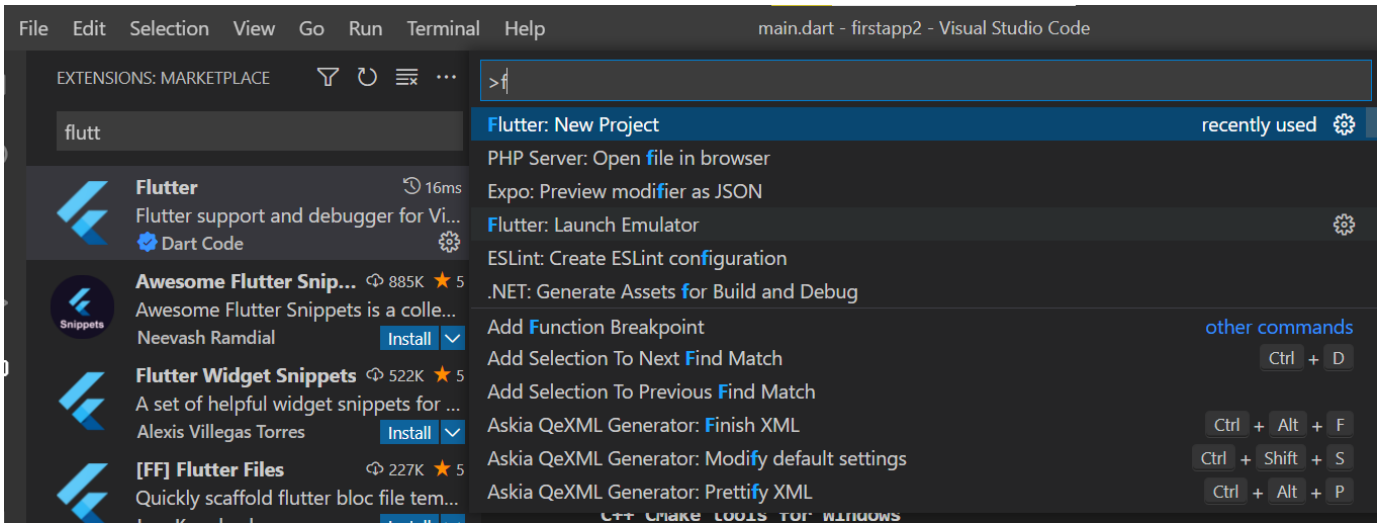


Figure 33:New Project

2. Select application:

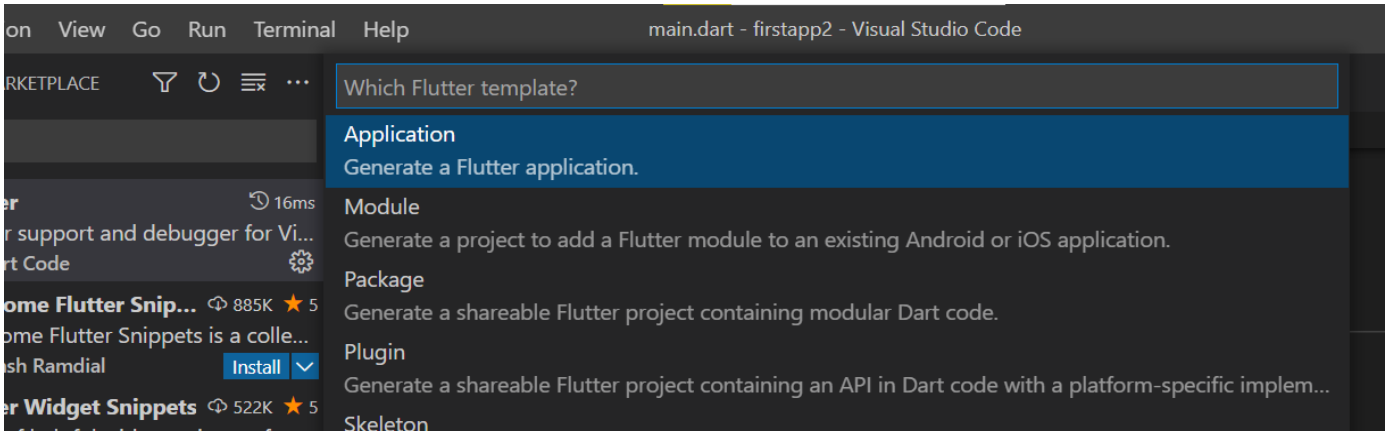


Figure 34: Select Application

3. Create Folder for project:

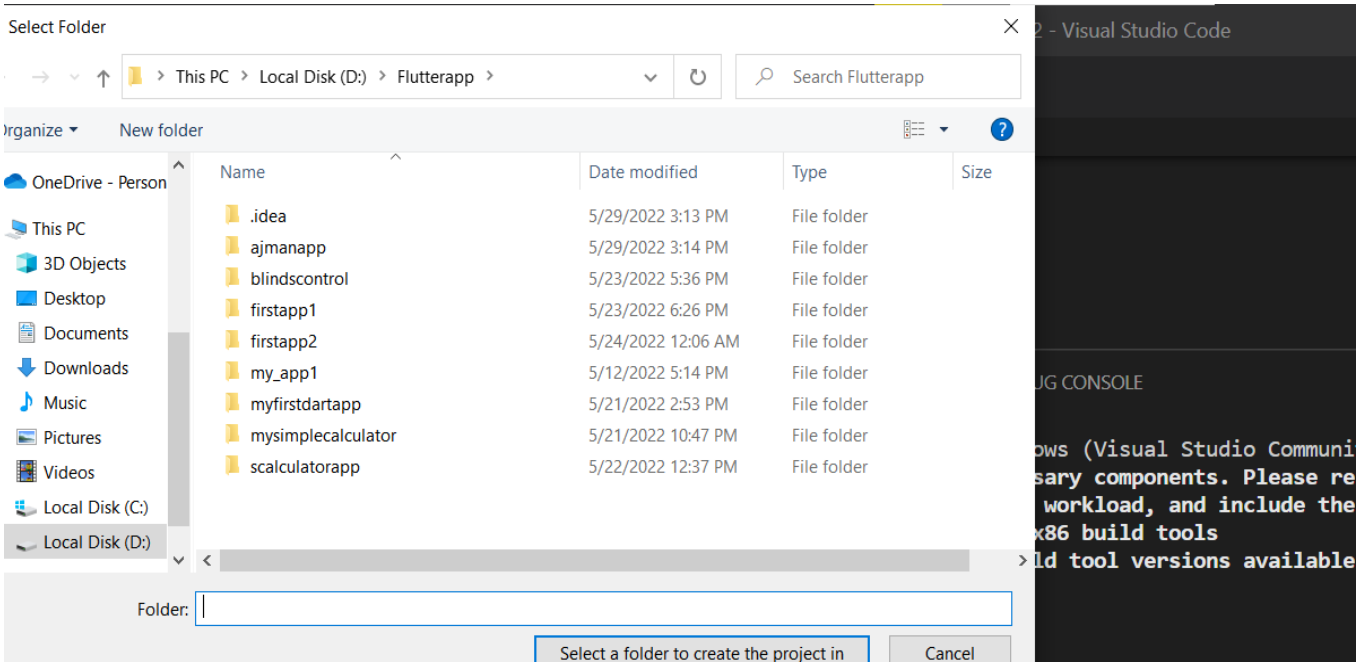


Figure 35: Creating Folder

4. Give name to Project

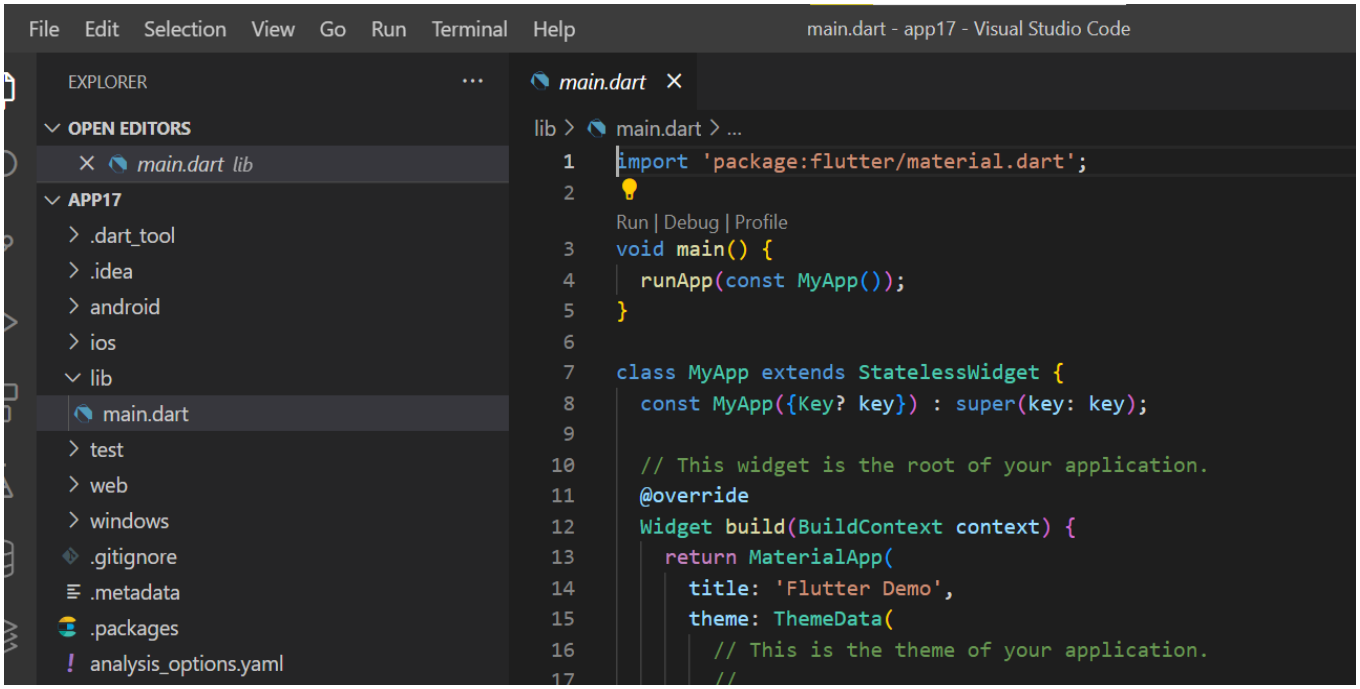


Figure 36: Naming the Project

5. Run project app17 through terminal “flutter run” and select 3 Edge:

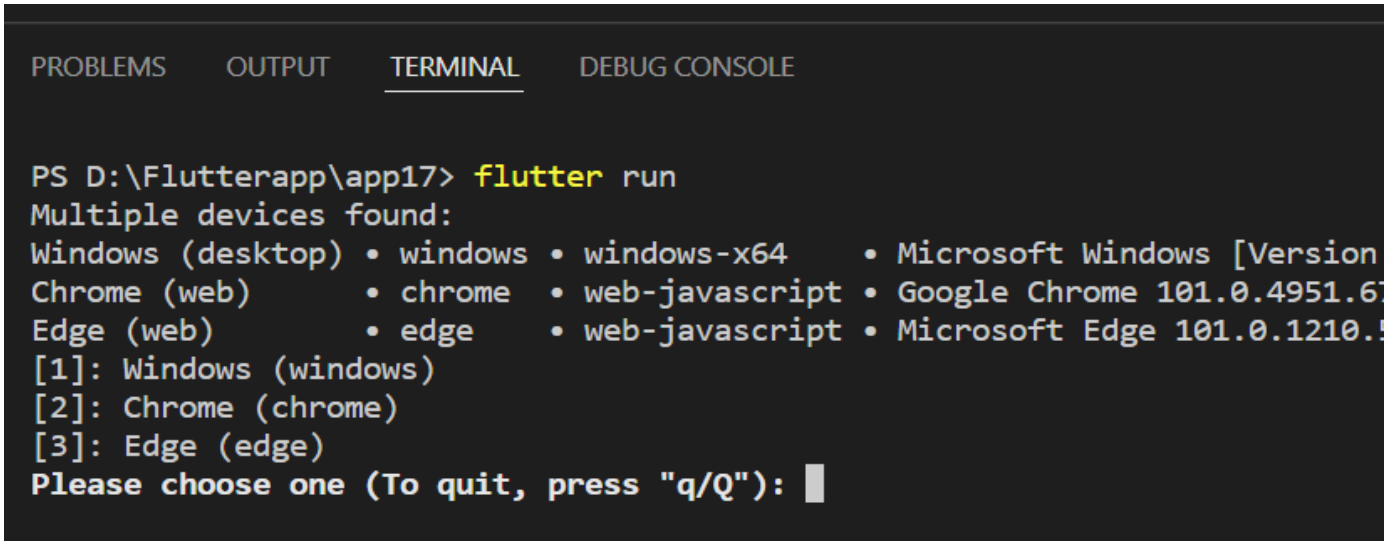


Figure 37: Running Project App17

6. After complete Flutter app code for blinds connect mobile via USB cable and Transfer and install app in mobile:

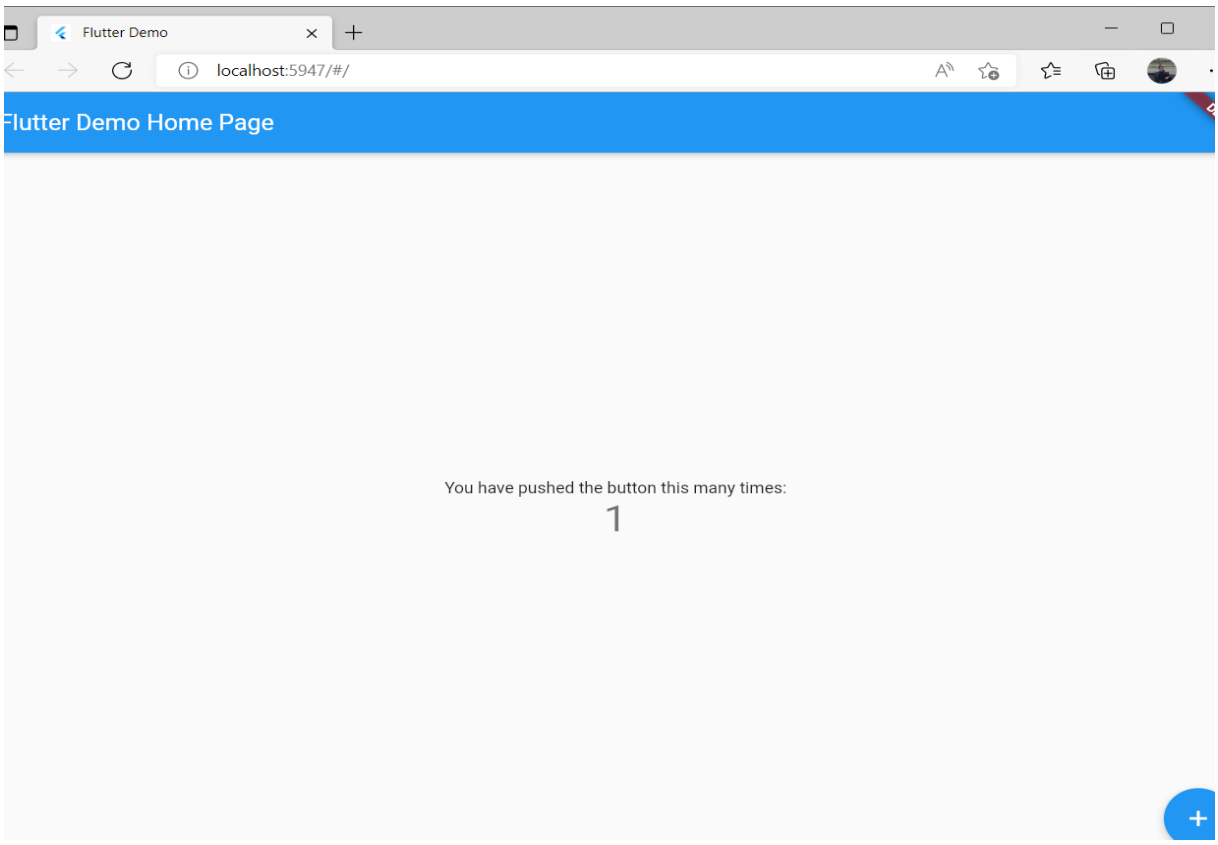


Figure 38: Running Project App17

5.3 Key Termonologies used in flutter when developed andriod app for Blinds controle

5.3.1: runApp() function:

5.3.2: StatelessWidget or Stateful Widget:

5.3.3: Build() and renderobject:

5.3.4: Basic Widget:

Text,Row, Column

Stack

Container

5.3.5 Widget state:

5.3.6 App17(first app for try):

Cd App17

Flutter run

5.3.7 FYP Project Smart Roller Blinds Flutterr app for controlling Blinds

We have Developed Flutter app for controlling Blinds in which UI have following functionalties:

In home page we have

1. Schedule Blinds

In the Schedule Blinds we have following features:

- Select a blinds
- Target level(I.e how many percentage blinds open and close)
- Select Time

- Repeat (I.e. how many days of week repeat this schedule)

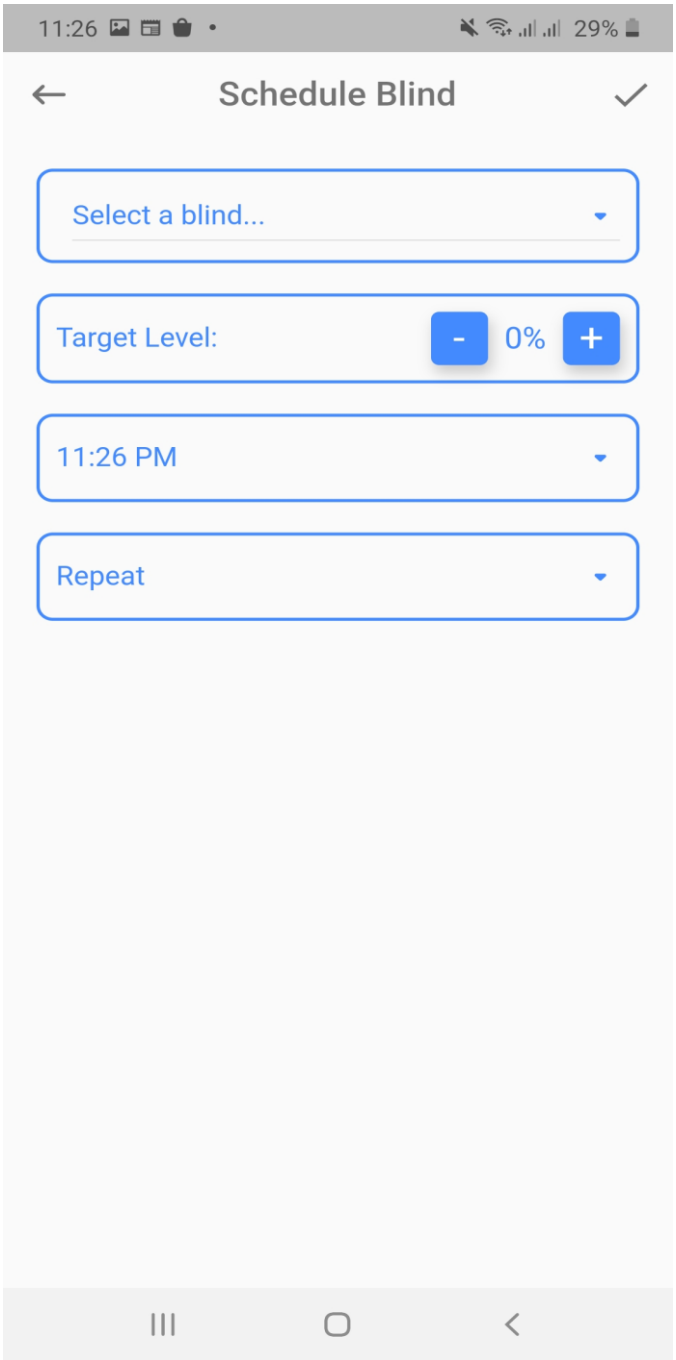


Figure 39: Scheduling the Blind Timing

1. Add New Blinds

Add new Blinds have following Functionalities .

I. Enter Blinds name

II. Activate Blinds

III. Current Level (I.e Percentage level of blinds)

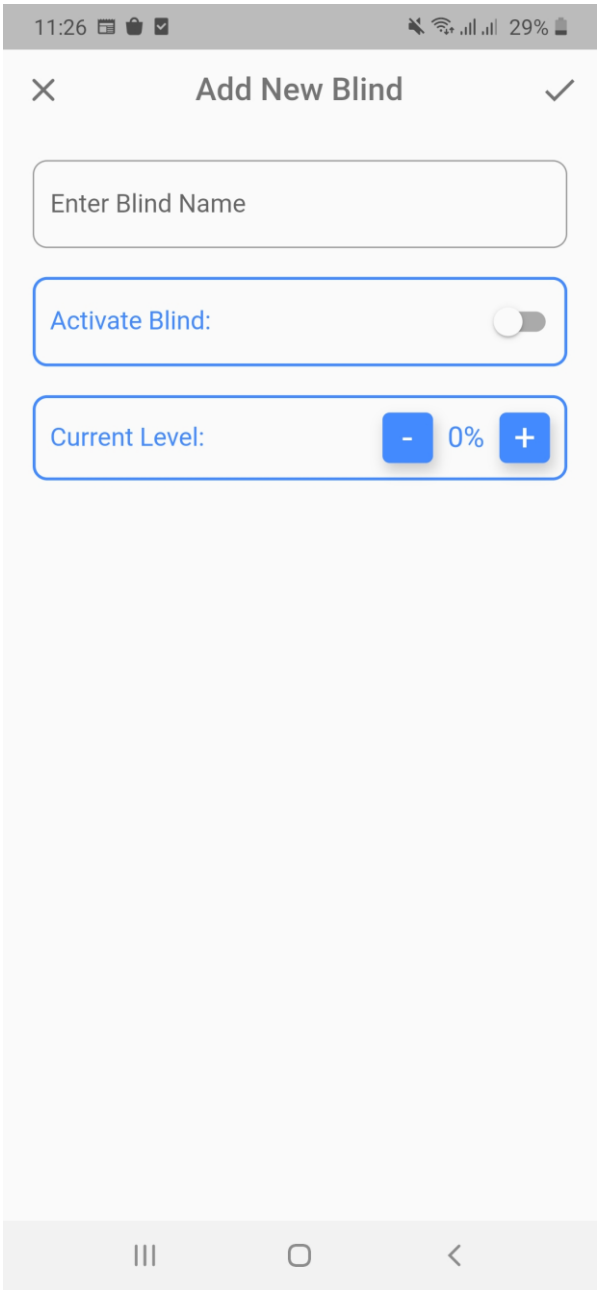


Figure 40: Adding New Blind

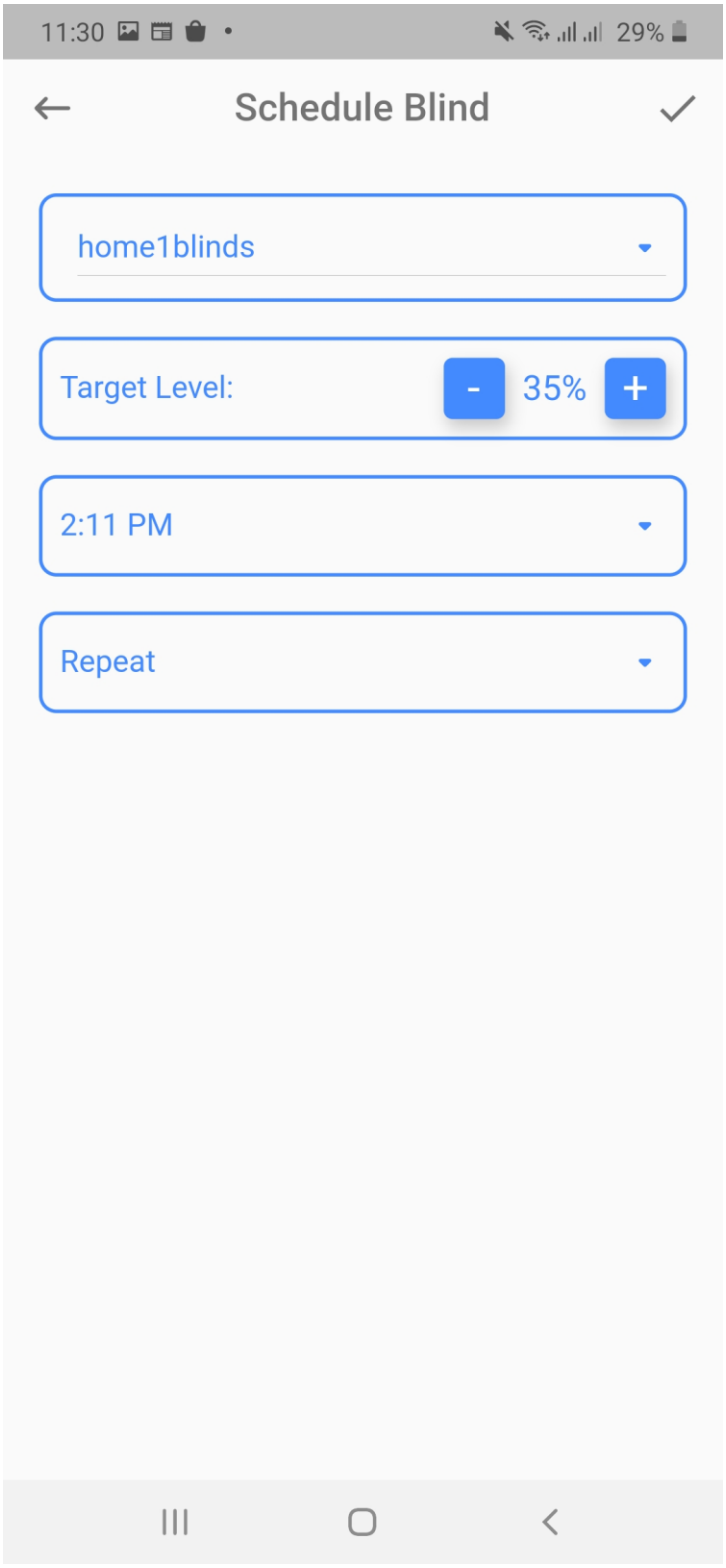


Figure 41: Scheduling Blind

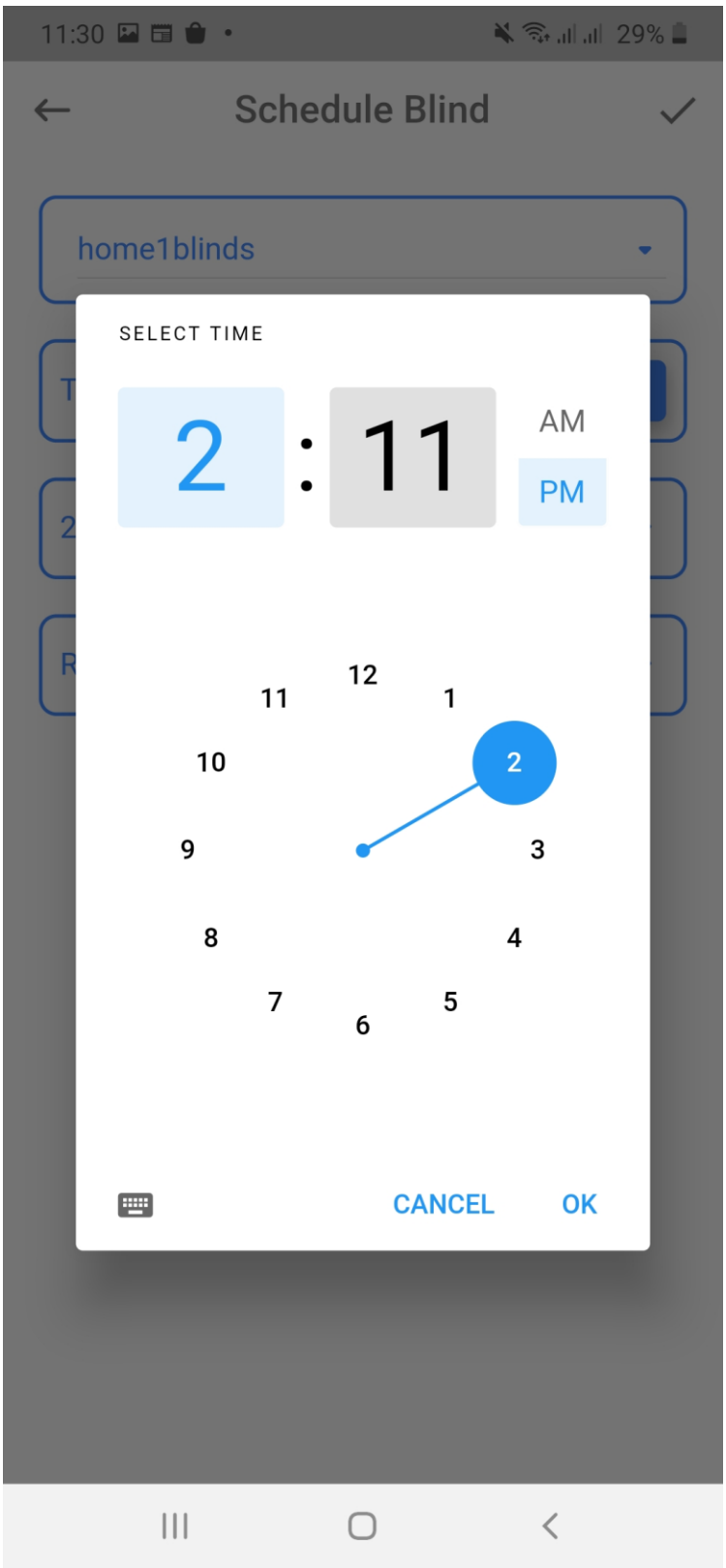


Figure 42: Scheduling Blind

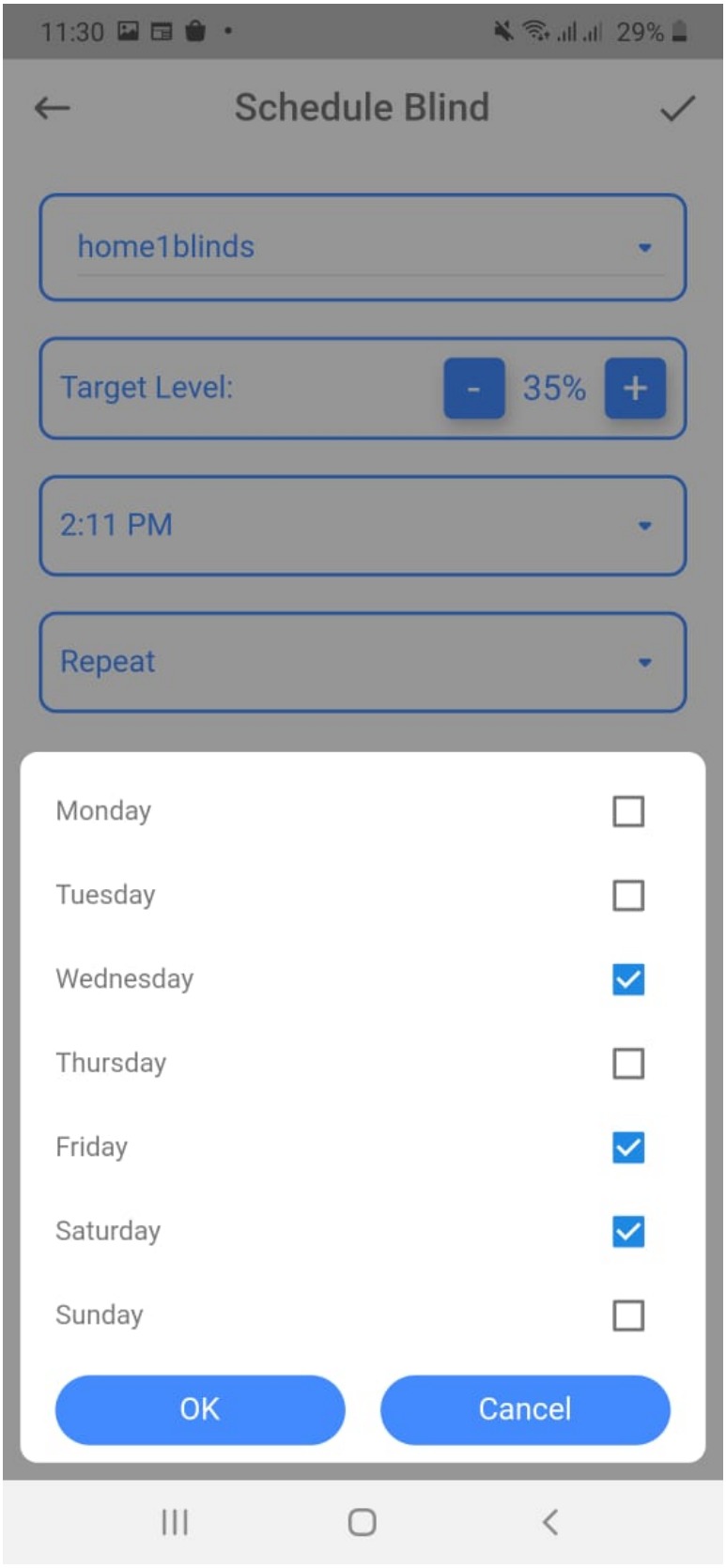


Figure 43: Scheduling Blind

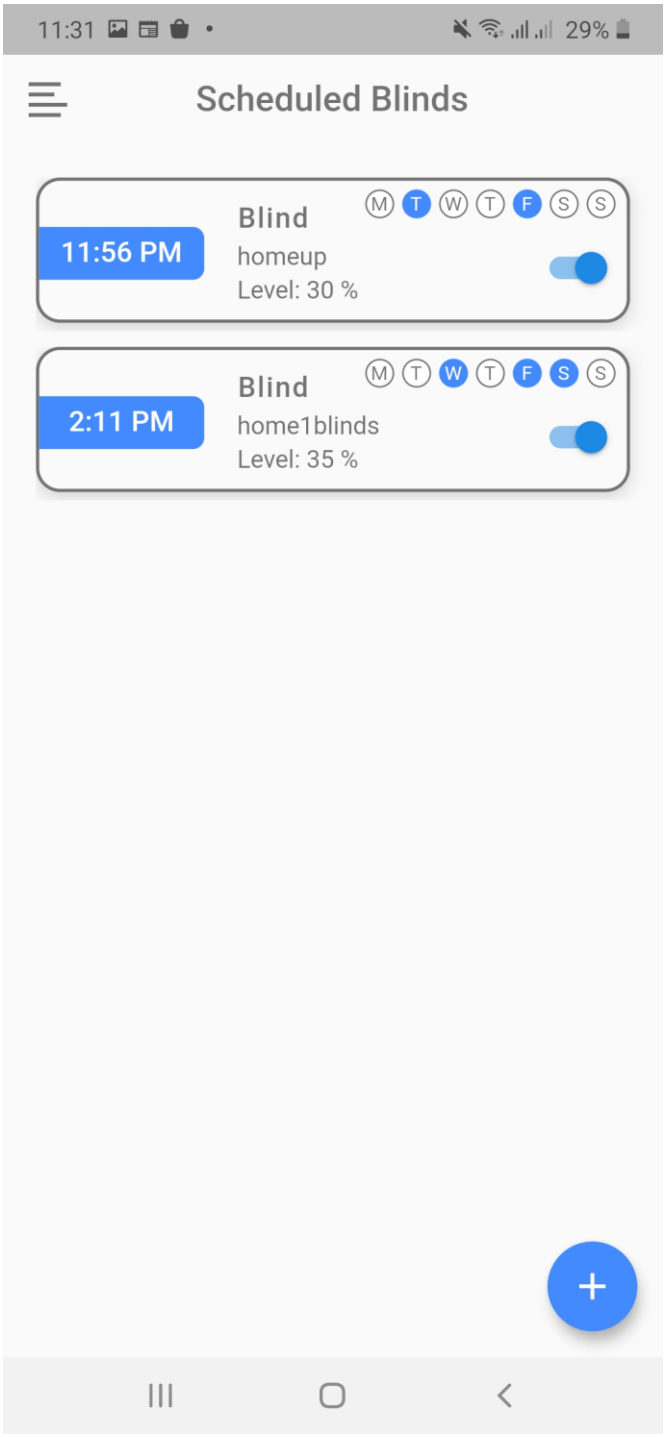


Figure 44: Blinds List being Scheduled

5.3.8 Codes of Flutter app Blinds control

We have following dart files

1. home_page.dart
2. main.dart
3. schedule_blind.dart
4. splash_screen.dart
5. add_new_blind.dart
6. Constant.dart
7. custom_menu_icon_button.dart

In the res folder, we have following two images:

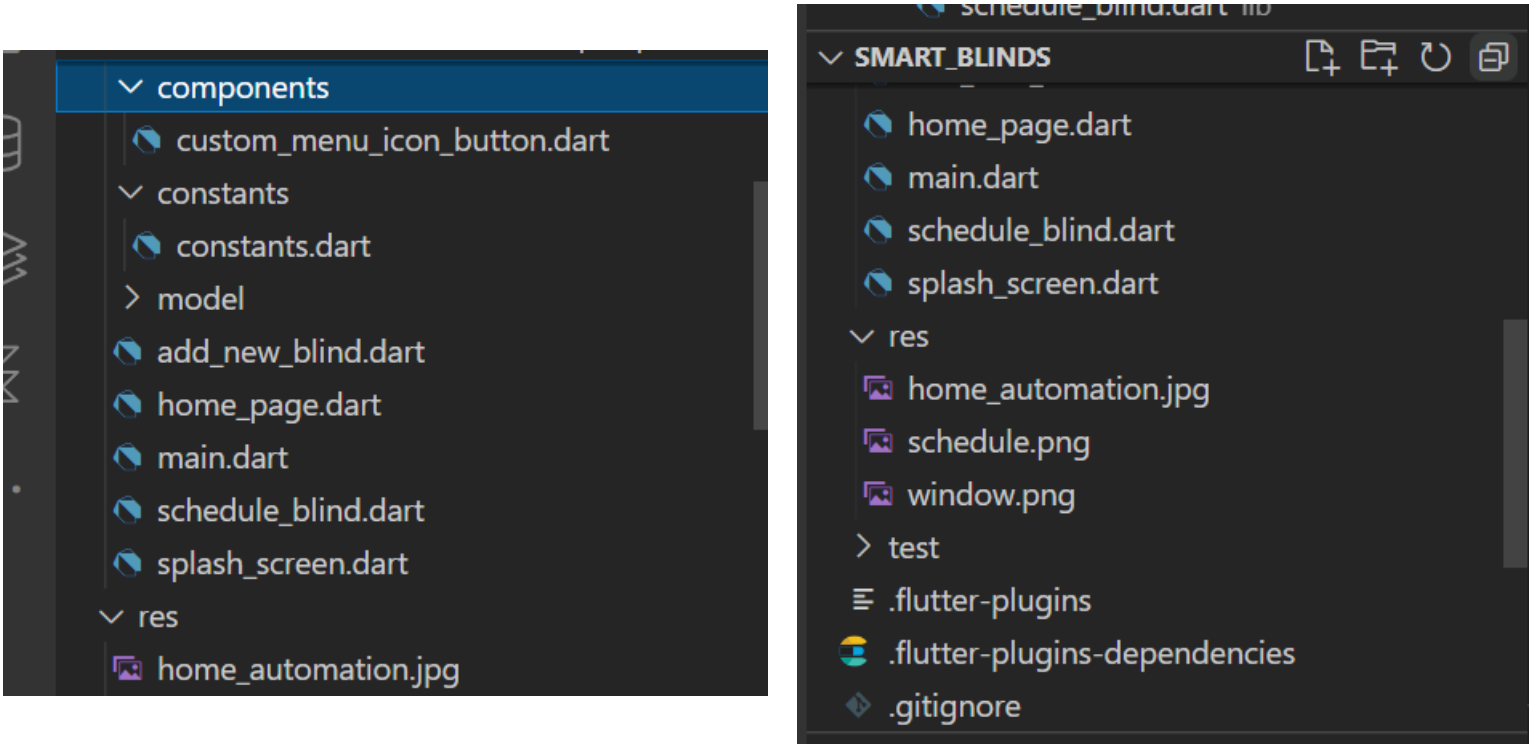


Figure 45: Res Folder

Chapter 6: Project Flow chart Hardware, Software Flow, Conclusion and Future Prospects

6.1: Project Hardware Flow chart

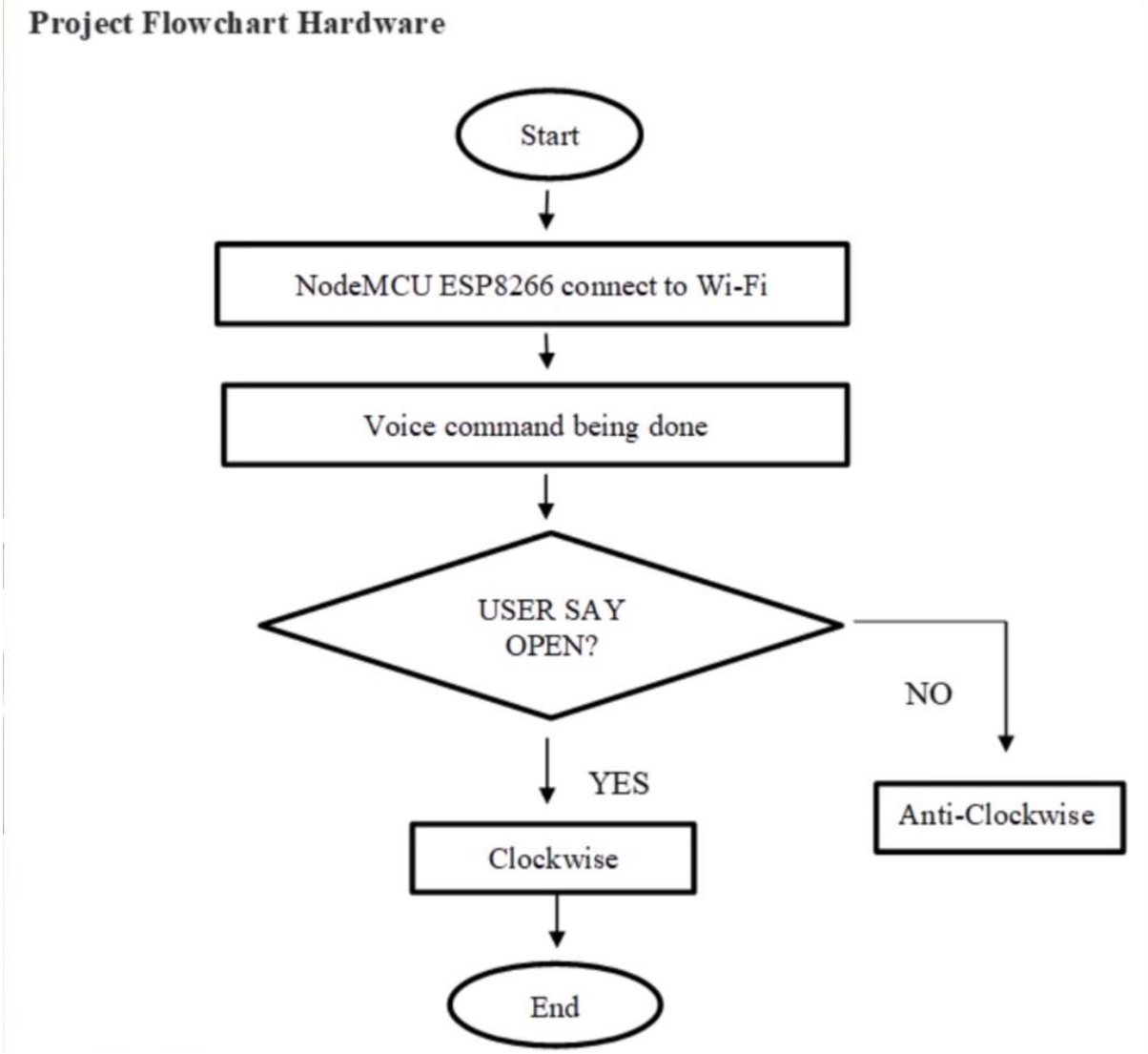


Figure 46: Project Hardware Flow Chart

6.2 Project Software Flow Chart

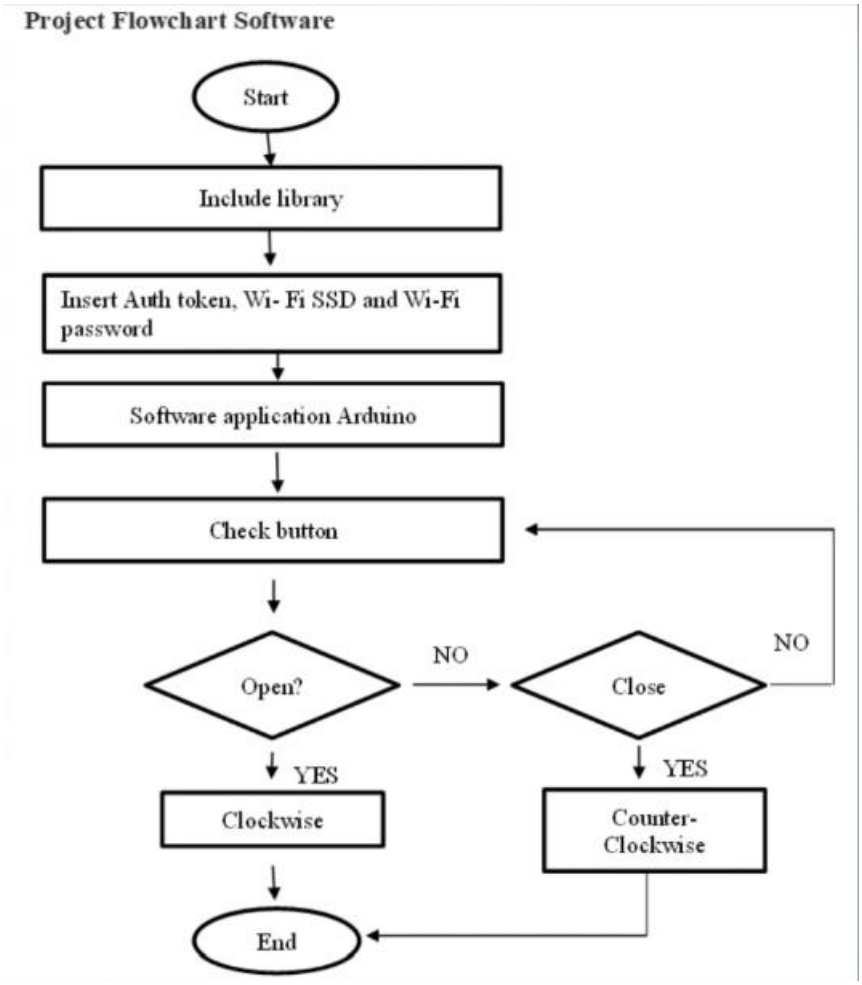


Figure 47: Project Software Flow Chart

CONCLUSION

In comparison to other home automation systems, the system'Smart Roller Blinds' makes the system more adaptable and offers an easy user interface. In this system, mobile components are integrated into home automation systems . The system is composed of two main elements: a NodeMCU ESP8266 microcontroller, as well as a Stepper Motor and A4988 Driver. The channel of communication between the android phone and the microcontroller is WIFI. The complexity of the principles involved in the home automation system is hidden by grouping them together into a simple but comprehensive comprehensive framework. This simplification is essential in order to fit as much functionality as feasible into to the available space on a mobile phone.

FUTURE PROSPECT

Our project has a bright future ahead of it. There are numerous new ways to improve the product as a whole and provide more development work. Due to time constraints, many of the planned improvements could not be implemented. As a result, performance and efficiency data can be collected, analysed, and tweaked to improve Wifi service and range and Smart Roller Blinds functionality (e.g., Open blinds , close Blinds ,blinds stop at specifi interval and how manay percentage open). We also improve andriod app functionality, such as Flutter UI interfaces and stepper motor noise minimization.

Appendix A

Bill of Materials

Count	Description	Manufacturer	Per UnitCost RS
1.	NEMA 17 4wire Stepper motor	Hallroad Electronics	2x700=1400
2.	STEPPER Diver A4988	Hallroad Electronics	2x150=300
3.	ESP8266 CH340 Lolin NodeMCU v3	Hallroad Electronics	2x1000=2000
4.	ULN2003 Stepper Motor Driver board	Hallroad Electronics	80
5.	Stripped Board Veroboard	Hallroad Electronics	40
6.	10UF 25V Electrolytic Capacitor	Hallroad Electronics	20x5=100
7.	Voltage Regulator LM117	Electrobes isb	30
8.	Jumper wires	Electrobes isb	100
9.	Adapter	Electrobes isb	350
10.	Arduino UNO	Electrobes isb	800
11.	3-D Printer Gear and Holder	Electrobes isb	1500
Total			**6700**

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