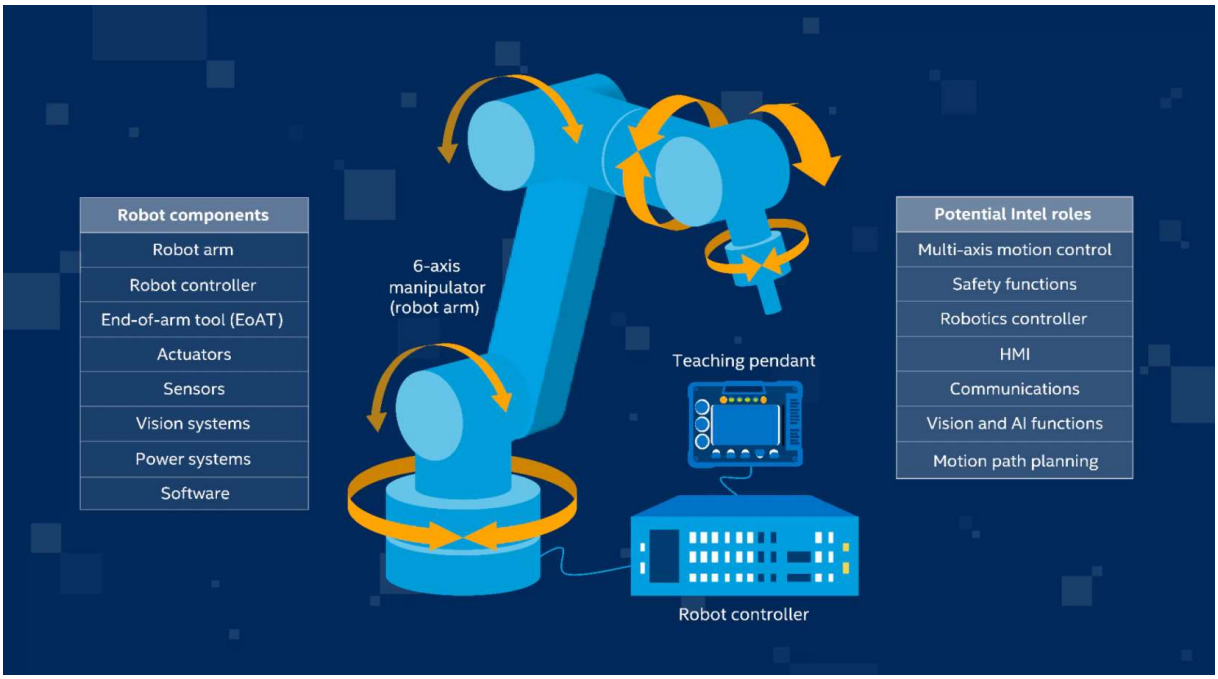
INDUSTRIAL ROBOTIC ARM

Industrial Robotic Arm



What Is an Industrial Robotic Arm?

From manufacturing to automotive to agriculture, industrial robotic arms are one of the most common types of robots in use today.

Robotic arms, also known as articulated robotic arms, are fast, reliable, and accurate and can be programmed to do an infinite number of tasks in a variety of environments. They are used in factories to automate execution of repetitive tasks, such as applying paint to equipment or parts; in warehouses to pick, select, or sort goods from distribution conveyors to fulfill consumer orders; or in a farm field to pick and place ripe fruits onto storage trays. And as robotic technologies develop and industrial environments become more connected, the capabilities of robotic arms expand to enable new use cases and business operation models.

In the past, a robotic arm required teaching to perform narrowly defined tasks, such as picking a single type of object from a precise location with a specific orientation. Robots were not able to identify a particular type of object among many, determine an object location with some tolerance (area rather than exact position), or adjust the grasp based on object orientation.

These smart, vision-augmented robots can detect objects in their surroundings, recognize them by types, and manipulate them accordingly. These capabilities allow robots to

operate more accurately and more consistently, and safer and faster than before. They also expand the range of tasks that robots can accomplish.

With these advancements in machine vision, AI and network technologies, robotic arms can now see, analyze, and respond to their environments while transmitting valuable data and insights back to facility and business management systems. One area that benefits from this transformation is equipment (robot included) maintenance. The robot can compute data at the edge or transmit it to a server or the cloud for remote monitoring. This process enables predictive maintenance, which in turn helps reduce maintenance costs while improving machine uptime.

Robotic Arm Applications

One of the key advantages of industrial robotic arms is their versatility for supporting multiple applications—from the simplest to the most complex jobs in the safest or harshest environments. Automating these types of tasks not only removes human workers from possibly hazardous situations, but it enables those workers to take on high-value tasks such as interfacing with customers.

Here are some of the most common ways manufacturers are using robotic arms today:

Palletizing

Robotic arms can be used to automate the process of placing goods or products onto pallets. By automating the process, palletizing becomes more accurate, cost-effective, and predictable. The use of robotic arms also frees human workers from performing tasks that present a risk of bodily injury.

Material Handling

Material-handling robotic arms can help create a safe and efficient warehouse by ensuring goods and materials are properly stored, easy to find, or transported correctly. Automating these processes can help accelerate the delivery of goods to customers, prevent workplace accidents, and improve the efficiency of a facility.

Welding

Welding is a task that can be performed by robots in advanced industrial settings such as automotive manufacturing. Given its critical impact on product quality, welding is an excellent candidate for advanced robotics with vision and AI augmentation for inline quality inspection.

Inspection

Performing quality inspection is typically completed at the end of a production line, which delays the detection of production quality issues. By enhancing robots with vision and AI systems, businesses can benefit from real-time inspection, helping to reduce waste and downtime.

Pick and Place

Pick-and-place robots are typically used in modern manufacturing and logistics. They are equipped with advanced machine vision systems to identify an object, grasp it, and move it from one location to another —quickly and efficiently— to increase speed of production and distribution of goods.

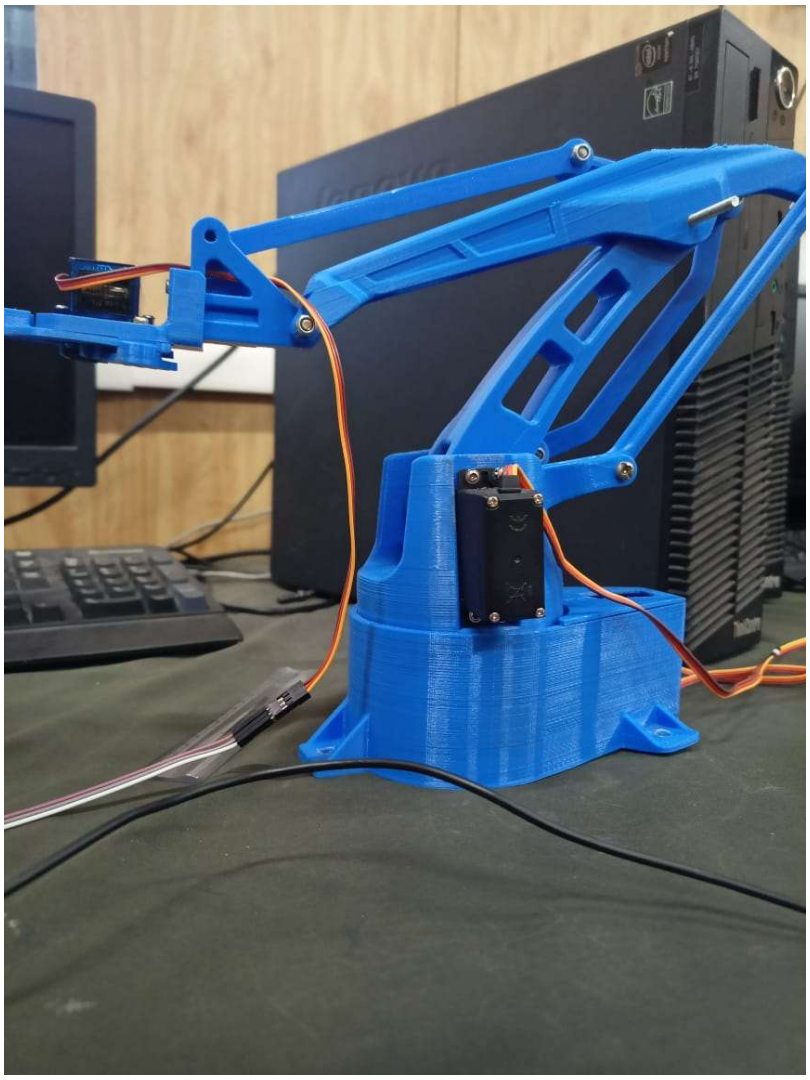
COMPONENTS REQUIRED FOR ROBOTIC ARM

- 3D PRINTED ROB ARM MODEL
- 4 SERVO MOTOR
- WIFI-MODULE (NODEMCU-ESP8266)
- 20-25 jumper wires
- BREAD BOARD
- ARDUINO CODE
- CIRCUIT DIAGRAM

IoT base robotic arm using nodemcu (esp8266).

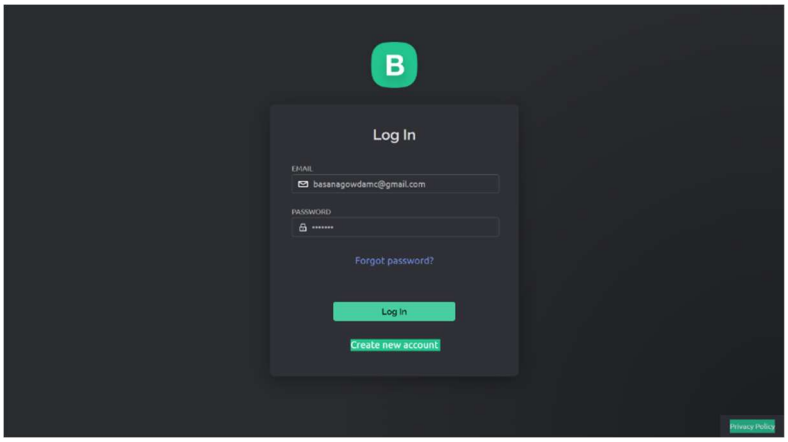
3D printing your Robotic ARM

As mentioned earlier the robotic arm used in this project is 3D printed, if you do not have a printer, you can use any Robotic Arm or build a crude one using cardboards. The 3D printed Robotic Arm design is taken from this link on Thing verse. This link also has complete detailed video showing the procedure of making and assembling this 3D printed Robotic Arm.

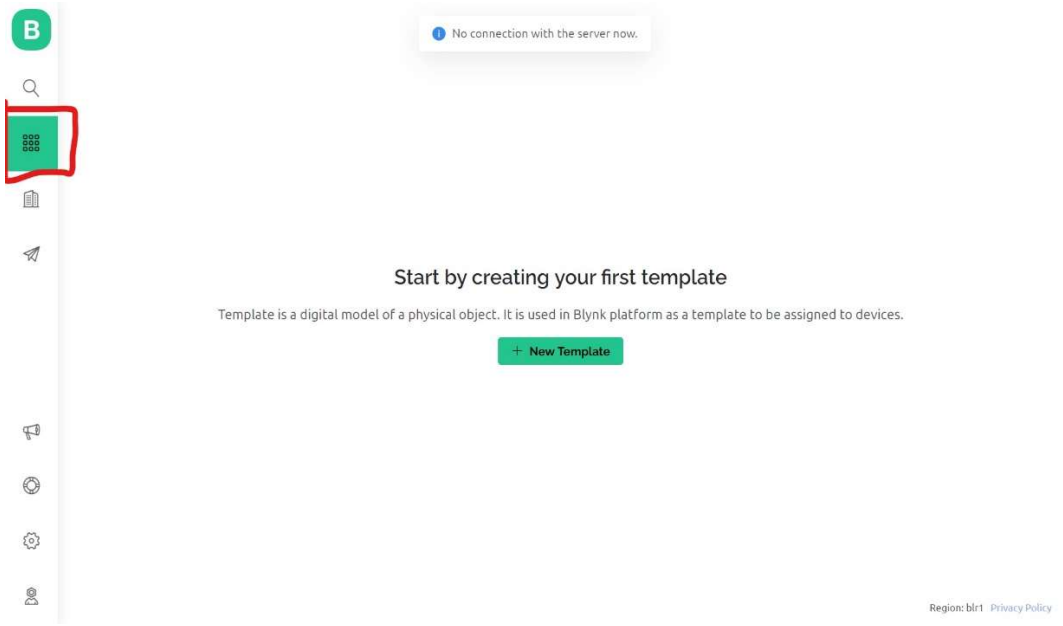


Setting up Blynk web dashboard Blynk Application for Robotic Arm.

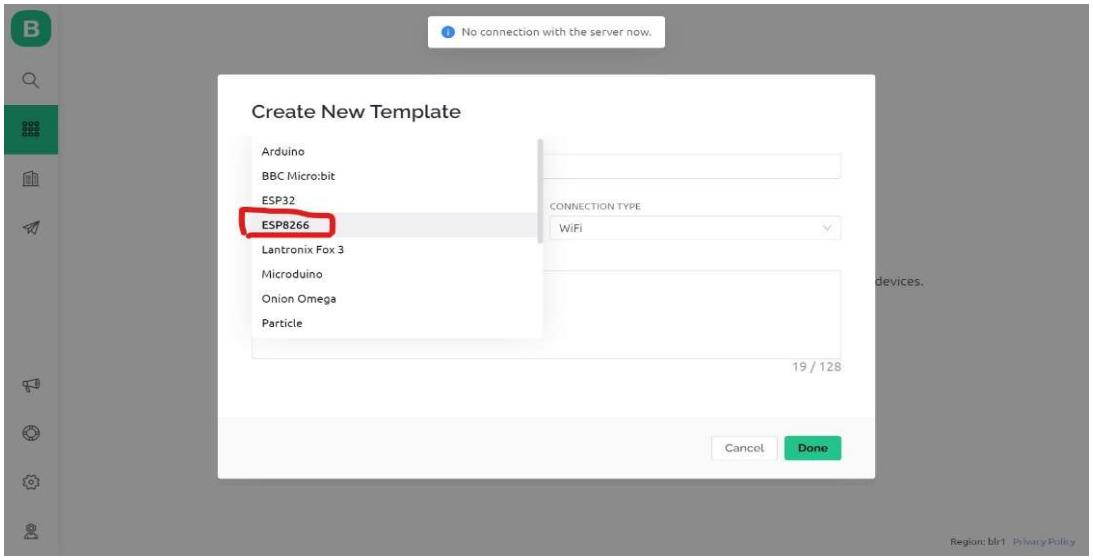
- **First login to a blynk console.**



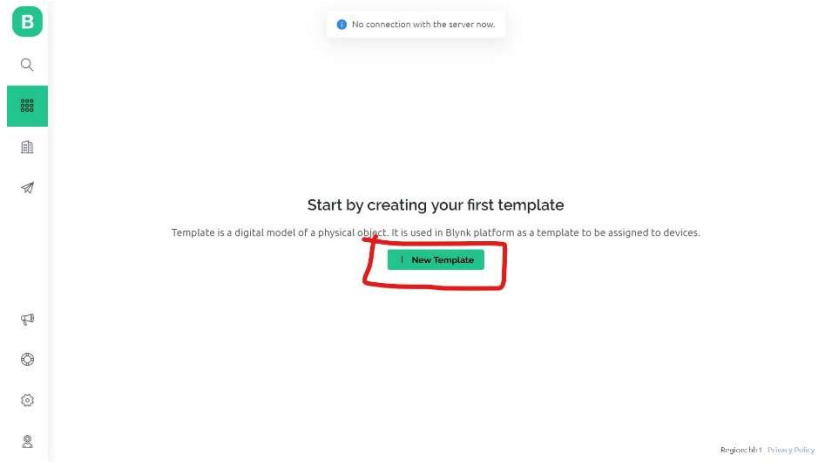
- **And go to web dashboard**



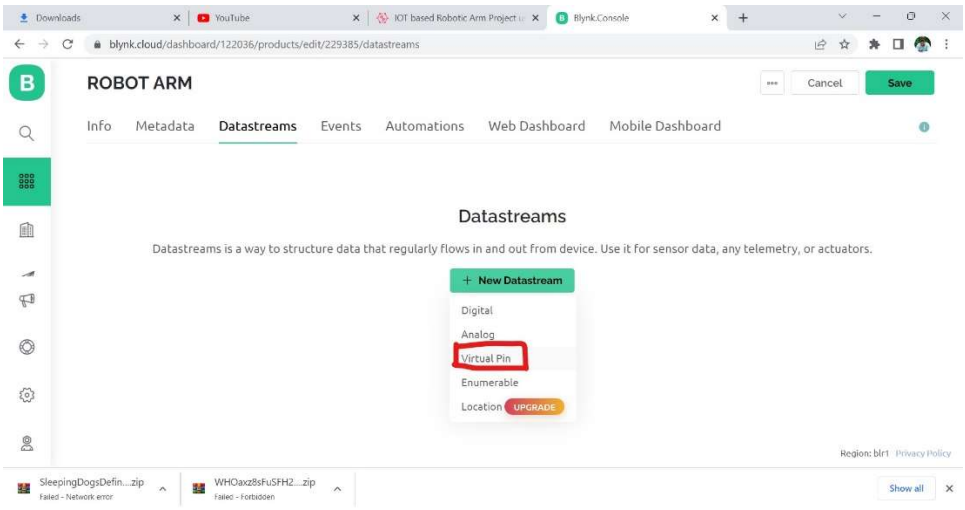
- **Then create new template and select name and board esp8266.**



- **Go To DataStream**



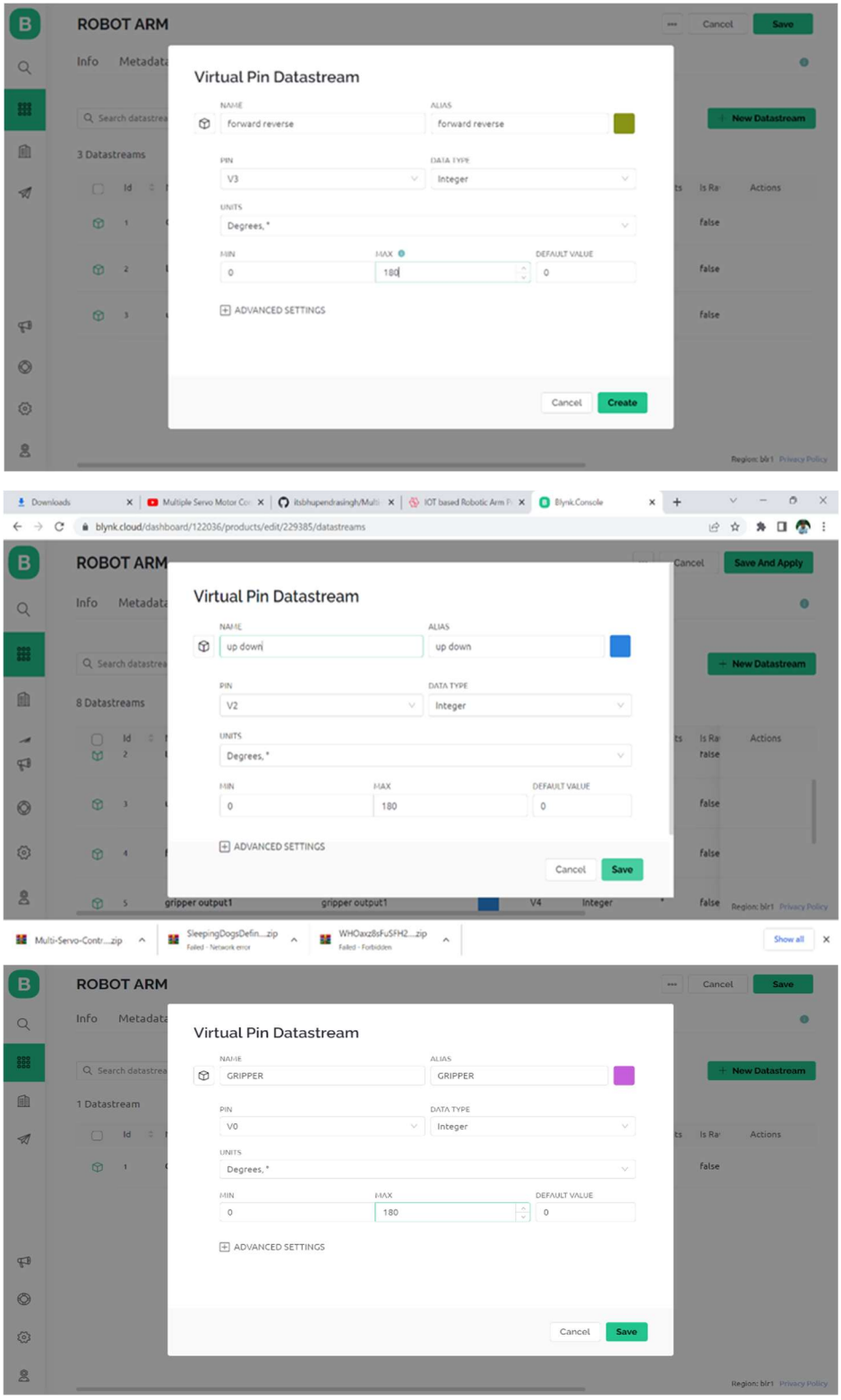
- **And create virtual pins.**

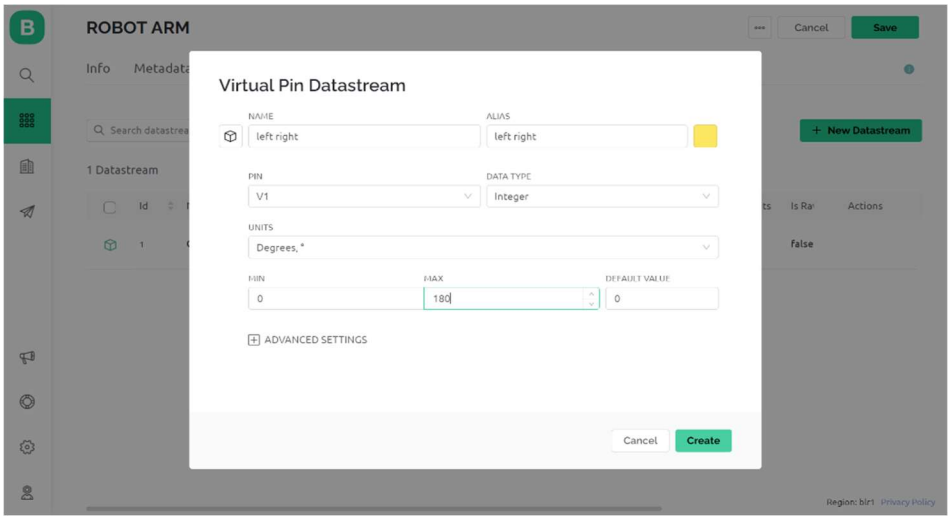


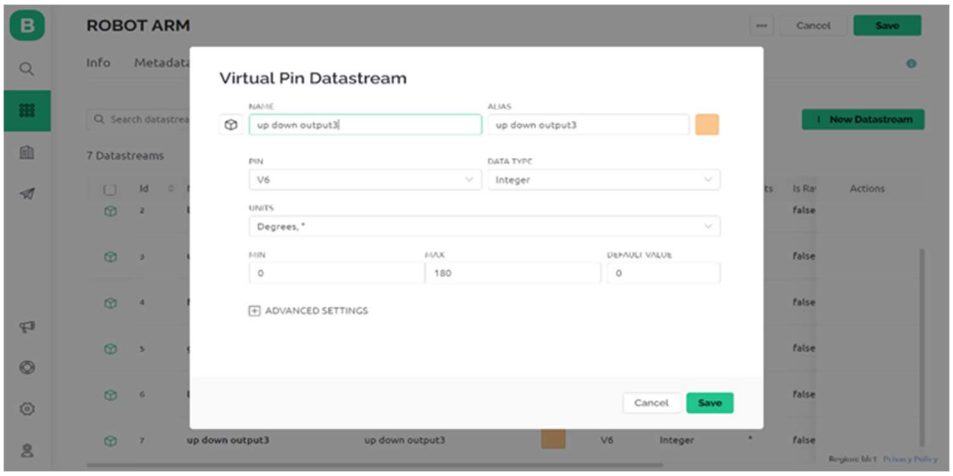
- Here I have set virtual pins as:
- Slider 1 as GRIPPER with settings as V0 from 0 to 180.
- Slider 2 as LEFT/RIGHT with settings as V1 from 0 to 180.
- Slider 3 as UP/DOWN with settings as V2 from 0 to 90.
- Slider 4 as FORWARD/REVERSE with settings as V3 from 0 to 60.
- Slider 1 as GRIPPER with settings as OUTPUT V4 from 0 to 180.
- Slider 2 as LEFT/RIGHT with settings as OUTPUT V5 from 0 to 180.
- Slider 3 as UP/DOWN with settings as OUTPUT V6 from 0 to 90.

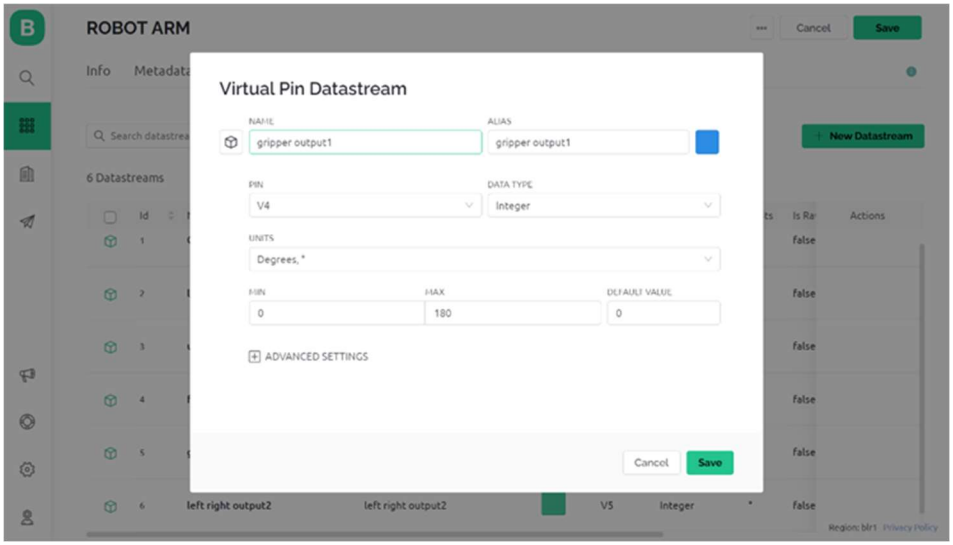
- Slider 4 as FORWARD/REVERSE with settings as OUTPUT V7 from 0 to 60.

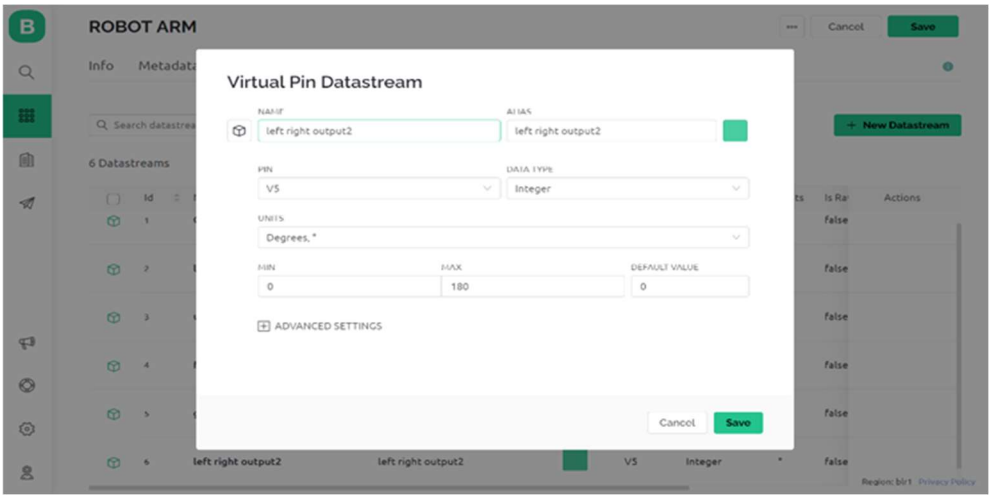
  Note: set virtual pins of servo motor as per your requirement.

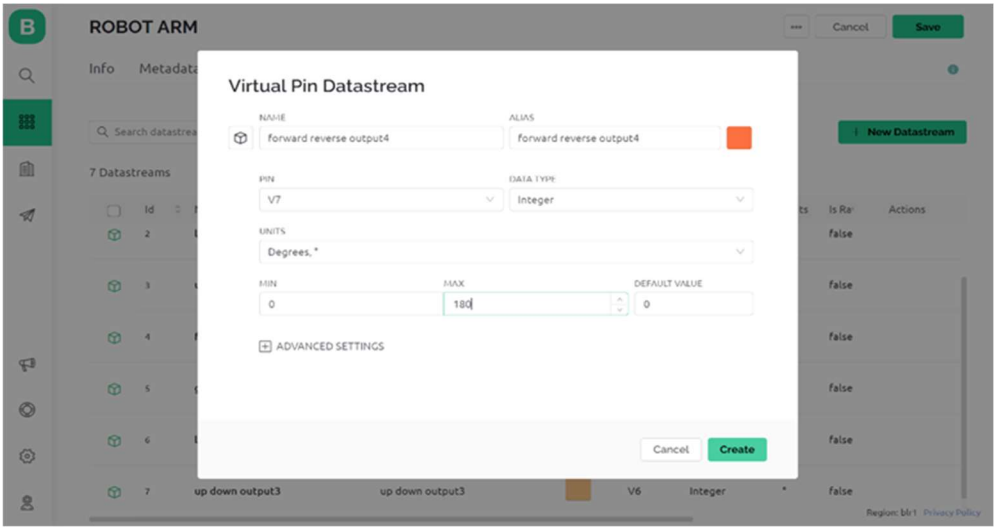



ROBOT ARM
Cancel
Save
Info
Metadata
Virtual Pin Datastream
NAME
left right
ALIAS
left right
PIN
V1
DATA TYPE
Integer
UNITS
Degrees, °
MIN
0
MAX
180
DEFAULT VALUE
0
ADVANCED SETTINGS
Cancel
Create
New Datastream
1 Datastream
Id
Actions
false
Region: blr1
Privacy Policy

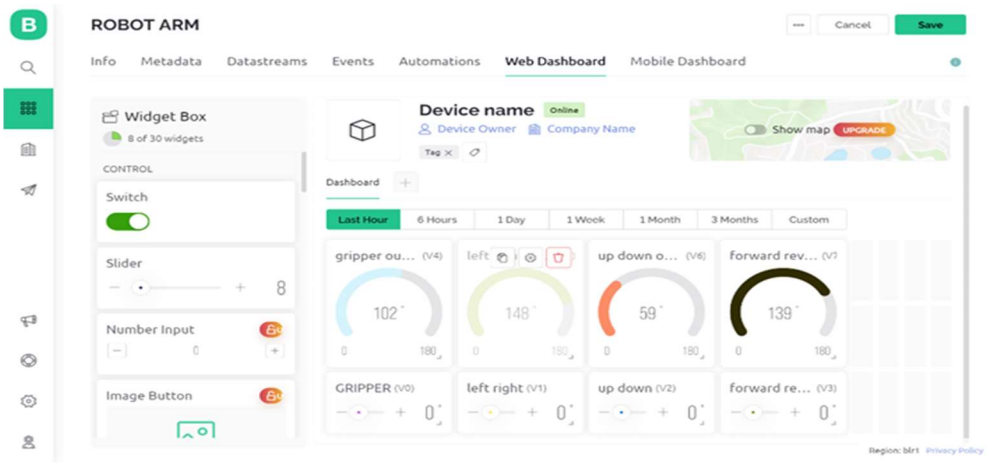

ROBOT ARM
Cancel
Save
Info
Metadata
Virtual Pin Datastream
NAME
up down output3
ALIAS
up down output3
PIN
V6
DATA TYPE
Integer
UNITS
Degrees, °
MIN
0
MAX
180
DEFAULT VALUE
0
ADVANCED SETTINGS
Cancel
Save
New Datastream
7 Datastreams
Id
Actions
false
up down output3
up down output3
V6
Integer
Region: blr1
Privacy Policy


ROBOT ARM
Cancel
Save
Info
Metadata
Virtual Pin Datastream
NAME
gripper output1
ALIAS
gripper output1
PIN
V4
DATA TYPE
Integer
UNITS
Degrees, °
MIN
0
MAX
180
DEFAULT VALUE
0
ADVANCED SETTINGS
Cancel
Save
New Datastream
6 Datastreams
Id
Actions
false
left right output2
left right output2
V5
Integer
Region: blr1
Privacy Policy

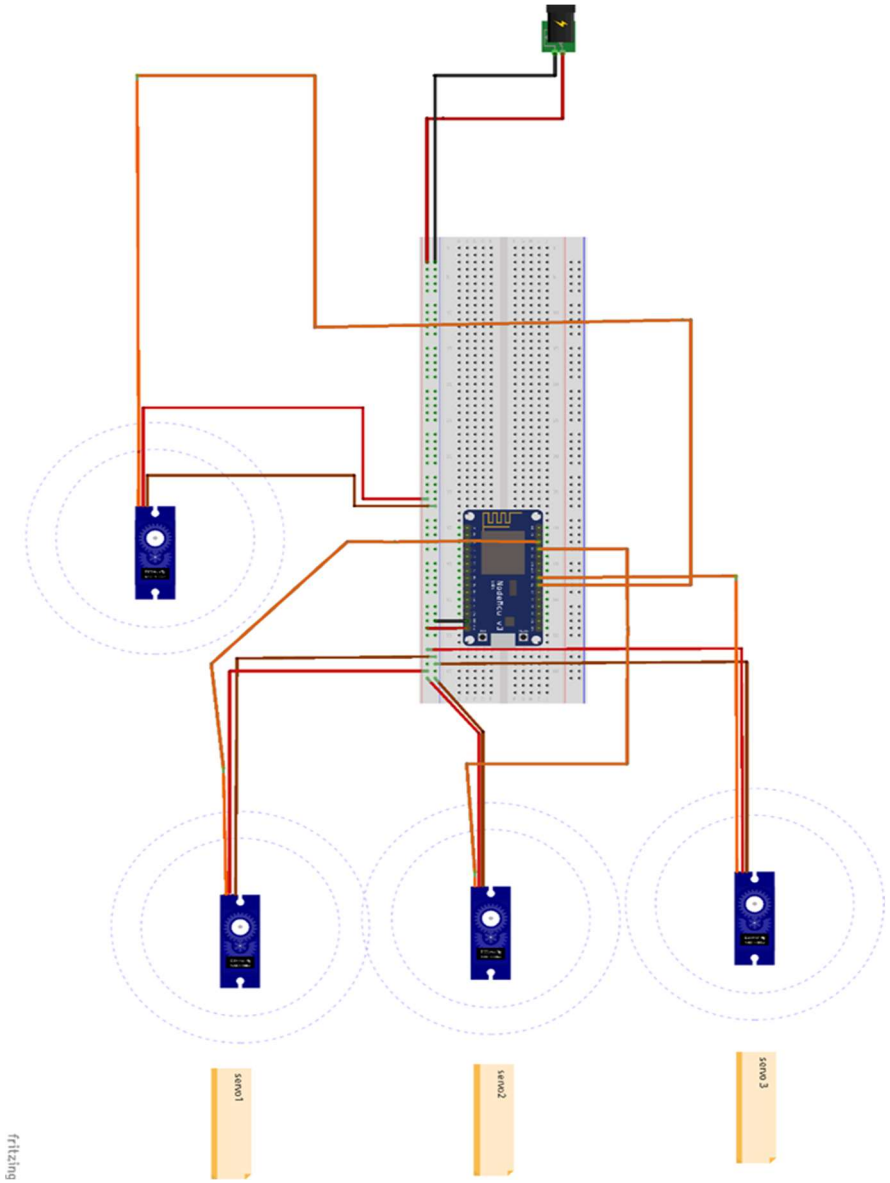




- **Go to web dashboard and add 4 Guage and 4 slider.**
- **Give virtual pin out from v4 to v7 as Guage DataStream.**
- **Give virtual v0 to v3 as slider DataStream.**



CIRCUIT DIAGRAM



Arduino code:-

```
#define BLYNK_TEMPLATE_ID "TMPL7XQtjlSm"
#define BLYNK_DEVICE_NAME "ROBOT ARM"
#define BLYNK_AUTH_TOKEN "eAhHQLbG632fQa-m7SIQiTfKDyYE22jq"

#define BLYNK_PRINT Serial
```

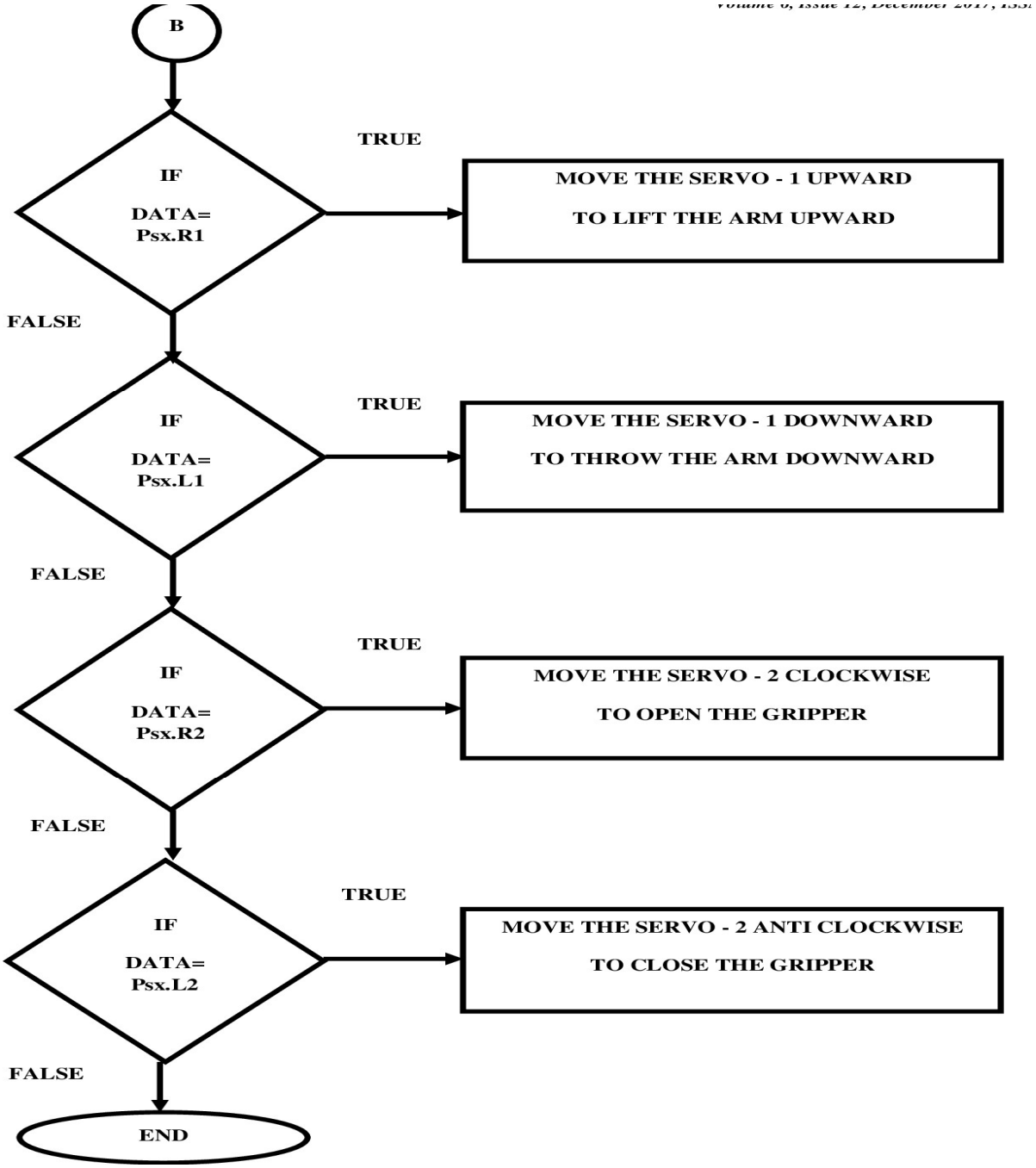
```
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

#include<Servo.h>
Servo servo1, servo2, servo3, servo4;

char auth[] = BLYNK_AUTH_TOKEN;
char ssid[] = "vivo 1907"; // Change your Wifi/ Hotspot Name
char pass[] = "abhi1401"; // Change your Wifi/ Hotspot Password

BLYNK_WRITE(V0)
{
int s0 = param.asInt();
servo1.write(s0);
Blynk.virtualWrite(V4, s0);
}
BLYNK_WRITE(V1)
{
int s1 = param.asInt();
servo2.write(s1);
Blynk.virtualWrite(V5, s1);
}
BLYNK_WRITE(V2)
{
int s2 = param.asInt();
servo3.write(s2);
Blynk.virtualWrite(V6, s2);
}
BLYNK_WRITE(V3)
{
```

```
int s3 = param.asInt();
servo4.write(s3);
Blynk.virtualWrite(V7, s3);
}

void setup()
{
Serial.begin(9600);
servo1.attach(D2);
servo2.attach(D3);
servo3.attach(D5);
servo4.attach(D6);
Blynk.begin(auth, ssid, pass);//Splash screen delay
delay(1000);
}

void loop()
{
Blynk.run();
}
```

CONCLUSION

Robotic Arms can be used to automate the process of placing goods or products onto pallets. By automation the process palletizing becomes more accurate cost-effective and predictable .The use of robotics arms also frees human workers from performing tasks that present a risk of bodily injury.

FLOW CHART



Result:

The Robotic Arm Model designed using ESP8266 works on the basis of Servo Motors.