

Google Assistant controlled Arm

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Overview

In this tutorial we will create a Google Assistant controlled Robotic Arm.

Specifications

1. Robotic Arm with at least 3 servo motors.
2. Node MCU ESP8266 WiFi Module
3. Arduino UNO.
4. Jumper wires.
5. LED.
6. 5V 2A Constant DC Supply.
7. Laptop with arduino IDE Installed.

Steps

I. Setup Adafruit.io account

- Visit <https://io.adafruit.com>
- Create a New account using the google account which is used on your phone.
- Click on actions button and create a new dashboard.
- Name the dashboard as test
- Select the dashboard and create a new block by selecting the + sign. Name it as servo.
- Click on AIO Key and copy it to notepad or gedit for future use.

We have created completed the above steps in a dummy account.

Username: tinkeringlabiitrpr

Password: tinkeringlab

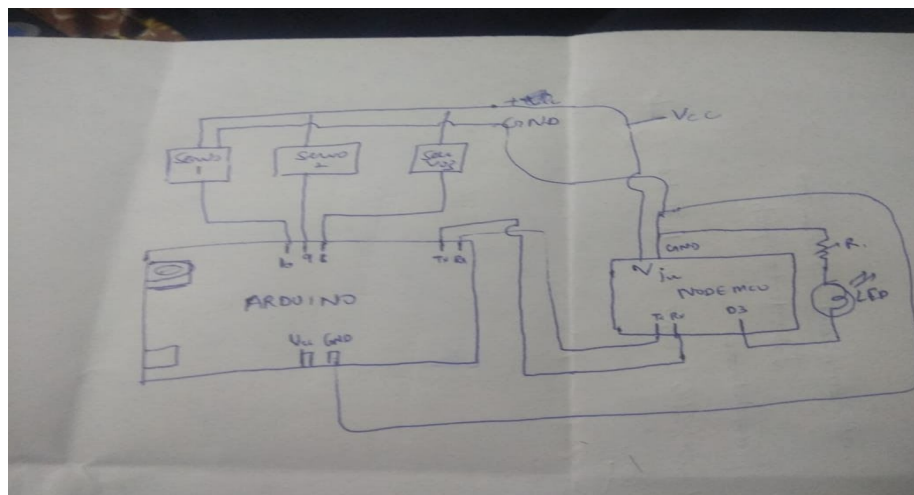
AIO Key: 5921f8ff7fe141a3b25615bd7fecb796

II. Setup IFTTT Account

- Visit <https://ifttt.com/join>
- Continue with google and create the account using the same google ID used in Step I above.

- Click on the Profile Icon next to Explore button and select Create.
- Click on +This button and search Google Assistant.
- Click and connect and give account permissions.
- Select Phrase with a number option.
- Define the feed using commands in the given columns.
- Next click on +That and search for Adafruit.
- Select the feed as servo and Put S{{NumberField}}.
- Create the trigger and save it.
- Similarly Create triggers for rotate,roll and address printing with D and M for rotate and roll and Address for address.
- We have created an account with following Credentials.
 - Sign-IN with google account of tinkeringlabitrpr@gmail.com with password tinkeringlab
 - All the feeds are already created and defined for you.

III. Making the circuit



- Create the circuit with the above specifications.
- Put the following code to arduino UNO

```
#include<Servo.h>
Servo gripper;
Servo wrist;
Servo claw;
Servo barrel;
String s;
void setup(){

  s="Z";
  gripper.attach(8);
```

```

    claw.attach(9);
    wrist.attach(10);
    barrel.attach(11);
    gripper.write(140);
    claw.write(40);
    wrist.write(110);
    barrel.write(90);
    Serial.begin(115200);
}
void setNorm(){
    gripper.write(140);
    claw.write(40);
    wrist.write(110);
    barrel.write(90);
}
void loop(){
    String s;
    int data;
    if(Serial.available()>0){
        String tests=Serial.readString();
        Serial.println(tests);

        if(tests[0]=='S' || tests[0]=='Z' || tests[0]=='D' || tests[0]=='M' || tests[0]=='R')s=tests;
        else s="123";
    }
    char ch=s[0];
    switch(ch){
        case 'Z':
            setNorm();
            delay(100);
            break;
        case 'S':
            data=(s.substring(1,s.length())).toInt();
            gripper.write(data);
            delay(100);
            break;
        case 'D':
            data=(s.substring(1,s.length())).toInt();
            claw.write(data);
            delay(100);
            break;
        case 'M':
            data=(s.substring(1,s.length())).toInt();
            wrist.write(data);
            delay(100);
            break;
        case 'R':

```

```

        data=(s.substring(1,s.length())).toInt();
        barrel.write(120);
        delay(data*1000);
        barrel.write(90);
        break;
    }
}

```

-
- Go to preferences in File Menu and add the following link in additional boards Box
 - http://arduino.esp8266.com/stable/package_esp8266com_index.json
 - Now open tools->Boards->Board Manager and install esp8266 from esp8266 community.
 - Now open Boards in Tools Menu and select ESP8266.
 - Open the tools menu and manage libraries in it. Install the following:
 - AdafruitMQTT
 - AutoConnect
 - Now Put the following code to esp8266
 -

```

#include <ESP8266WebServer.h>
#include <AutoConnect.h>
#include <ESP8266WiFi.h>

```

```

#include "Adafruit_MQTT.h"
#include "Adafruit_MQTT_Client.h"

```

```

#define Relay1      D1
ESP8266WebServer Server;
AutoConnect portal(Server);
//#define WLAN_SSID      "CHENAB"          // Your SSID
//#define WLAN_PASS      "9810762494"      // Your password
void rootPage() {
    char content[] = "Hello, world";
    Server.send(200, "text/plain", content);
}

```

```

#define AIO_SERVER      "io.adafruit.com"
#define AIO_SERVERPORT  1883                // use 8883 for SSL
#define AIO_USERNAME    "tinkeringlabiitrpr" // Replace it with your
username

```

```
#define AIO_KEY      "5921f8ff7fe141a3b25615bd7fecb796" // Replace with
your Project Auth Key
```

```
// Create an ESP8266 WiFiClient class to connect to the MQTT server.
WiFiClient client;
// or... use WiFiClientSecure for SSL
//WiFiClientSecure client;
```

```
// Setup the MQTT client class by passing in the WiFi client and MQTT server
and login details.
Adafruit_MQTT_Client mqtt(&client, AIO_SERVER, AIO_SERVERPORT,
AIO_USERNAME, AIO_KEY);
```

```
// Setup a feed called 'onoff' for subscribing to changes.
Adafruit_MQTT_Subscribe Light1 = Adafruit_MQTT_Subscribe(&mqtt,
AIO_USERNAME"/feeds/servo"); // FeedName
```

```
void MQTT_connect();
```

```
void setup() {
  Serial.begin(115200);
```

```
  pinMode(Relay1, OUTPUT);
  pinMode(D3,OUTPUT);
```

```
  // Connect to WiFi access point.
  // Serial.println(); Serial.println();
  // Serial.print("Connecting to ");
  // Serial.println(WLAN_SSID);
```

```
  // WiFi.begin(WLAN_SSID, WLAN_PASS);
  // while (WiFi.status() != WL_CONNECTED) {
  //   delay(500);
  //   Serial.print(".");
  // }
  // Serial.println();
  //
  // Serial.println("WiFi connected");
  // Serial.println("IP address: ");
  // Serial.println(WiFi.localIP());
  // digitalWrite(Relay1,1);
```

```
  Server.on("/", rootPage);
  // Setup MQTT subscription for onoff feed.
  if (portal.begin()) {
```

```

    Serial.println("connected:" + WiFi.SSID());
    Serial.println("IP:" + WiFi.localIP().toString());
  } else {
    Serial.println("connection failed:" + String(WiFi.status()));
    while (1) {
      delay(100);
      yield();
    }
  }
  mqtt.subscribe(&Light1);
}

void loop() {

  MQTT_connect();
  digitalWrite(D3,HIGH);
  Adafruit_MQTT_Subscribe *subscription;
  while ((subscription = mqtt.readSubscription(5000))) {
    if (subscription == &Light1) {
      // Serial.print(F("Got: "));
      String a=(char *)Light1.lastread;
      // Serial.println(a[0]+a.substring(1));
      if(a=="Address"){Serial.println(WiFi.localIP());
        continue;}
      Serial.write((char *)Light1.lastread);
      int Light1_State = (a.substring(1).toInt());
      // Serial.println(Light1_State);
      // digitalWrite(Relay1, (Light1_State));

    }
  }
  portal.handleClient();
}

void MQTT_connect() {
  int8_t ret;

  // Stop if already connected.
  if (mqtt.connected()) {
    return;
  }

  // Serial.print("Connecting to MQTT... ");

  uint8_t retries = 3;

  while ((ret = mqtt.connect()) != 0) { // connect will return 0 for connected
    // Serial.println(mqtt.connectErrorString(ret));

```

```
// Serial.println("Retrying MQTT connection in 5 seconds...");
mqtt.disconnect();
delay(5000); // wait 5 seconds
retries--;
if (retries == 0) {
    // basically die and wait for WDT to reset me
    while (1);
}
}
// mqtt.publish(AIO_USERNAME"/feeds/test",(WiFi.SSID()));
// mqtt.publish(AIO_USERNAME"/feeds/test",{ip:WiFi.localIP()});
}
```

After this Open wifi in your mobile device and wait for about 1 min.
A hotspot with the name of esp8266 will pop up. Connect to it and click on
Add SSID and put the WiFi Credentials which you want to use for Node
MCU.

After that when the LED Glows it indicates that the Device is connected and
active.