Voice-Controlled Payload Dropping Mechanism for Drones

Introduction

My model is about payload dropping with voice control for drones assistance .we can control drop and catch item on basis of our vice. In future this can be used to make drone assistance in work ike in industries ,home, college, agriculture etc.here I have shown step wise how I made it.

STEP 1 :- Collecting Components

In this Step we have to Collect components first.

1.   Arduino UNO- we can use any variant of Arduino ,I am using uno .Price :-700/-

2.   Voice Recognition Module:-DFRobot Gravity: Offline Language Learning Voice Recognition Sensor

This model we need it price is around 1600/-

3.   TowerPro Servo Motor MG90 . Price:- 150/-

4.   3D Printed Gripper Parts: I have ordered 3d parts and screws for gripper from robu.in.i provided then STL file. Price:-1200/-

5.   9v 2 amp charger. Price:-150/-

6.   Jumper wires and cables .

7.   Sun board

8.   Basic things like tape, cutter ,hot glue gun etc.

## STEP 2 :- Printing 3d parts and assembly of gripper mechanism

From this website I have given 3d design STL file of gripper Mechanism https://thangs.com/designer/singh.vikas5081/3d-model/Robotic%20Arm%203D%20Model.STEP-198882

And I give this parts to rob.in website for printing and also ordered other components required from them like Arduino,charger etc.

When I get all parts then I connected all 3d parts with screw and nut.also added servo motor in it.

I fixed jaws gear carefully.here are 3d parts photos and after assembly how gripper look.

3D Parts

gear1.STL

grip link 1.STL

gear2.STL

Gripper 2.STL

Gripper 1.STL

Gripper base.STL
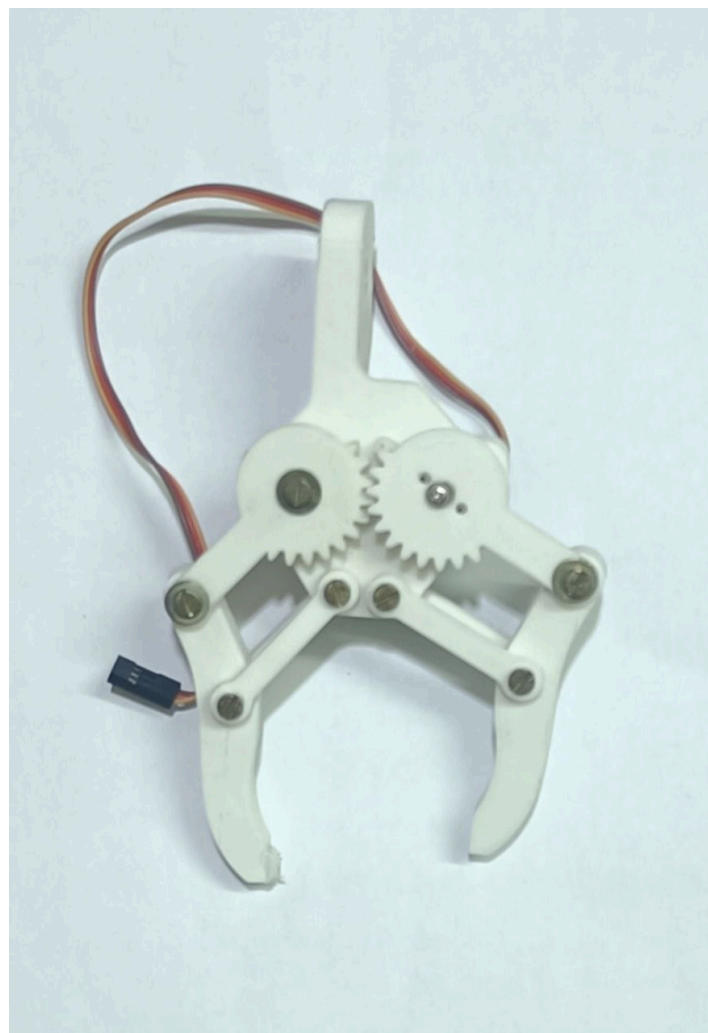
STEP 3 :- Connecting All Components .Circuit Diagram

Arduino,Servo conncetion And
Vice Control Drop Mechanism
Circuit Diagram.

SERVO

Servo Motor

9V-2Amp Adapter

Voice Recognition Module
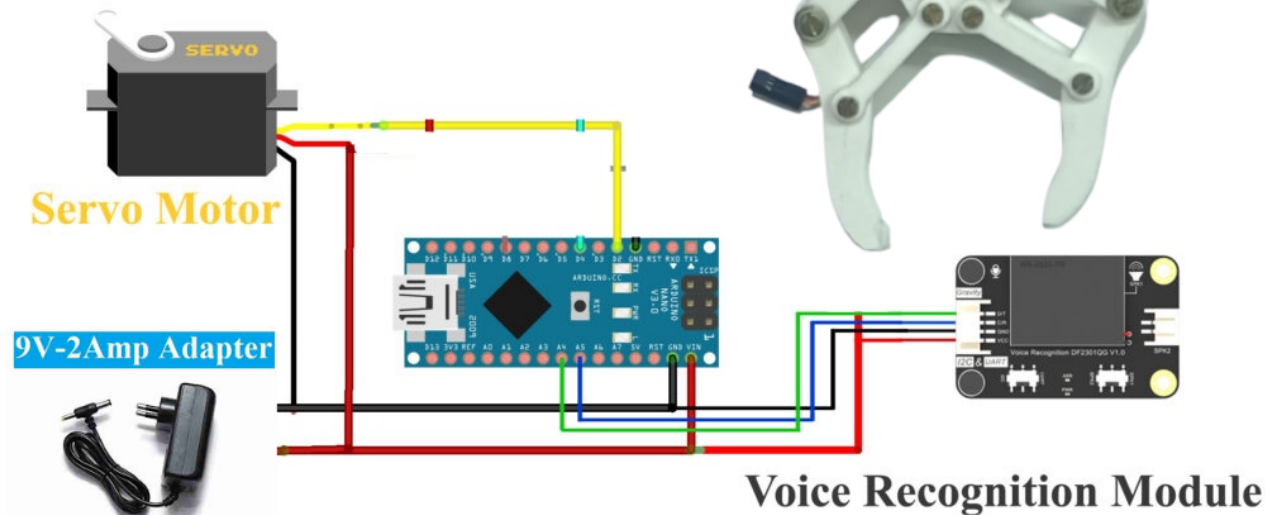
   In circuit diagram we Cleary see all components are connected to Arduino as it is the brain of our model.
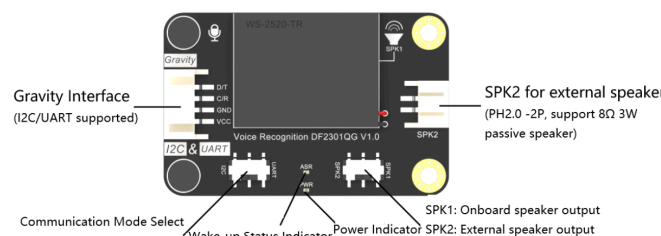
Connections:-

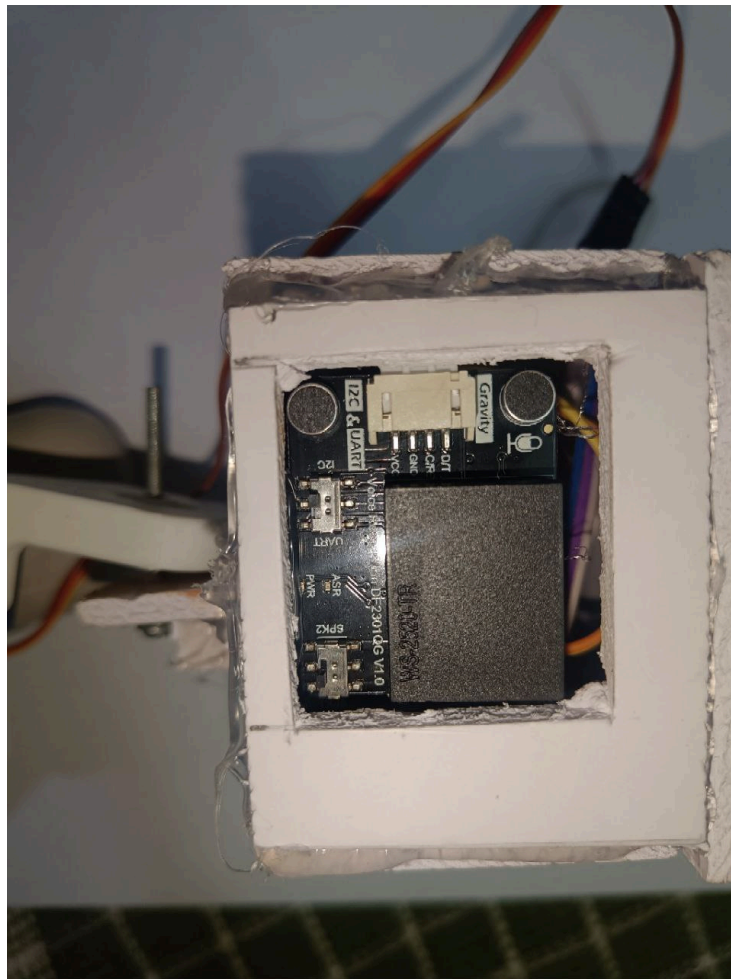**Servo motor(Gripper Mechanism)- RED to Arduino VCC,Black to Arduino GND and yellow to Arduino D9**

Vice recognition module :- RED to VCC of Arduino and black to GND.

SPA and SCI of Module to Arduino SPA and SCI.

9V charge :- Connect charger male jack to female jack of Arduino.

Gravity Interface
(I2C/UART supported)

SPK2 for external speaker
(PH2.0 -2P, support 8Ω 3W
passive speaker)

Voice Recognition DF2301QG V1.0

I2C & UART

Communication Mode Select

Wake-up Status Indicator

Power Indicator

SPK1: Onboard speaker output
SPK2: External speaker output

STEP 3 :- Making Box to place electronics item secure in box.

First I have taken measurement of all modules and board .after that according to size I have cute signboard sheet in a size which all the components will fit perfectly.i mark down boxes for charging port and vice module box.cutted all the pices.after cutting I connect all pices using glue and stick together.after that I muted all electronics item inside box and completely packed all modules and packed so that not any wire will be loose.

Finally in image we can see I have build box as I told.and thus this step is completed.

STEP 4 :-Uploading code to Arduino

Here is complete code which I used to Program board.

```
#include "DFRobot_DF2301Q.h"
#include <Servo.h>
#define SERVO_PIN 9

DFRobot_DF2301Q_I2C asr;
Servo servo;

void setup() {
  Serial.begin(115200);
  servo.attach(SERVO_PIN);
  while (!asr.begin()) {
    Serial.println("Device connection failed");
    delay(3000);
  }
  Serial.println("Device connected");
  asr.setVolume(20);
  asr.setMuteMode(0);
  asr.setWakeTime(20);
}
void loop() {
  uint8_t CMDID = asr.getCMDID();
  if (CMDID == 5) {
    servo.write(90);
    Serial.println("Received command: catch");
  } else if (CMDID == 6) {
    servo.write(180);
    Serial.println("Received command: drop");
  } else if (CMDID != 0) {
    Serial.print("Unknown command ID: ");
    Serial.println(CMDID);
  }
  delay(300);
}
```

Connect arduino to computer and open arduino ide.it is open source ide.

Now copy this code and paste it in ide.before uploading this code we have to install this library from library manager "DFRobot_DF2301Q.h" .just go to library section there u will find searching option there u have to search this library and install it .before uploading let understand code first.

This code controls the servomotor through voice commands of the DFRobot voice recognition module. When the system starts, it logs on to the module and sets the volume and other settings. The servo motor is connected to pin 9 of the Arduino. In the main loop, the code listens for voice commands. When it detects a "catch" command, the servo is going to lock the gripper. When it detects a "drop" command, the servo is going to open the gripper. If it receives an unknown command, it prints an error message. The code constantly repeats this process, allowing voice control of the gripper.

Now we can upload code and test it.

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STEP 5:- Testing and attaching gripper to Box.

In this step our final model is created in image you can see how is it build finally.I attached gripper to box and connected 9v charger to arduino .gaved power supplyI tested model by giving command "catch" and "drop" it works perfectly as it should work.i tried different objects to pickup and drop .it working perfectly.
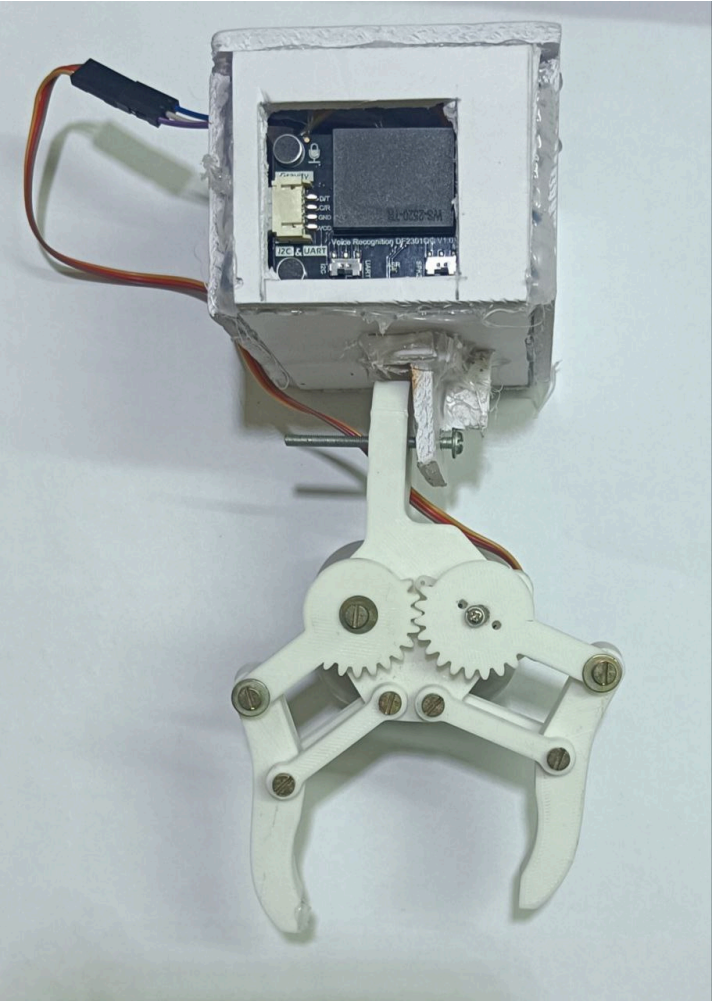
STEP 6:- Conclusion

For drones, this voice-controlled system is a game changer. Reduced workload for the operator makes drone operations more efficient and safer, especially in tough conditions. The modular design means it easily fits into existing drones and can adapt to future technologies. It's perfect for delivery services, search and rescue, and other tasks where accurate control is crucial. Overall, this technology represents a big step forward, combining voice control with a precise gripper, and setting a new standard for both commercial and industrial drones.