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Speech control Robot using Node MCU

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Abstract:
The movement of robot controlling via IoT technology. The field of robotic technology is implemented in many domains. Specific tasks are performed by robots which humans cannotand also humans are takes more time to complete. Robots are followed human instructions and perform the tasks such as security operations, act as spy robots etc. In this paper, we discussabout a smart robotic vehicle that operates onhuman voice commands, givenremotely by using an Android platform basedsmart IoT device. The roboticassistant is developed on an NodeMCU ESP8266 microcontrollerbased platform. The voice commands are carried out and this signal is converted to text format and then communicated through wifi network. This robot is able to move in different directions like left, right, stop, backward, forward.

Keywords –Android App, Google Assistant, smart phone, NodeMCU ESP8266, Robot, L293d driver IC module

1. Introduction:

Today we find most robot works for people in industries, factories,warehouses, and laboratories. Robots are useful in many ways. Robot can built, assemble a car. Yet robots cannot perform every job,roles include assisting research and industry. Finally this advanced technology improves new hopes and potentials[1].The Mars Rover, which was sent to Mars to explore various features of theplanet is an autonomous robot which is programmed such that it performs the desired task as it is intended to do. The main purpose of using hand gesturesand voice control is that it provides a morenatural way of controlling the robot and withthis feature robot can be used as a wheelchair, and for spy robot,

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vigilance. Voice-controlled robot controlled using a smartphone, Google Assistant, IFTTT, and Adafruit.io platforms[2]. An ESP8266 NodeMCUboard was used in this project. Speed of the motors are controlled by wifi network used in NodeMCU. Other development boards might also be used (NodeMCU), and the models of robots and other IoT gadgets.

2. Existing system:

Previously developed robot used ZigBee modules are used, which is a costly device.

3. Proposed system:

A 6V,1.3Amp Volt DC Power Supply has been apply to NodeMCU ESP8266 Microcontroller and Motor Driver[3]. The NodeMCUMicrocontroller text input and gives outputto the Wi-Fi module. Fig.1. explains Here by directional arrow has been between the NodeMCUMicrocontroller and Wi-Fi module.

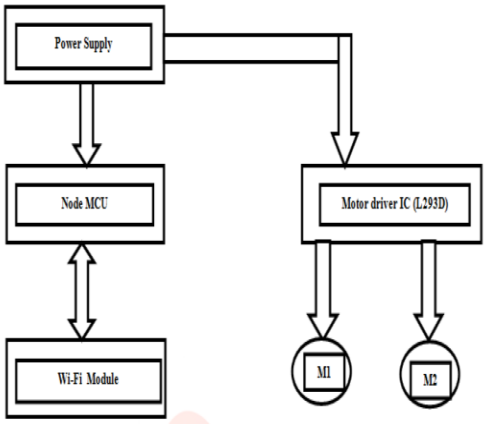

Fig.1. Block diagram of Speech controlled robot

4. Implementation process:

Here designed a Blynk and Google assistant is used to control the robot[4]. A smartphone running Blynk app was used as a remote control, and different input methods were used.

Circuit description:

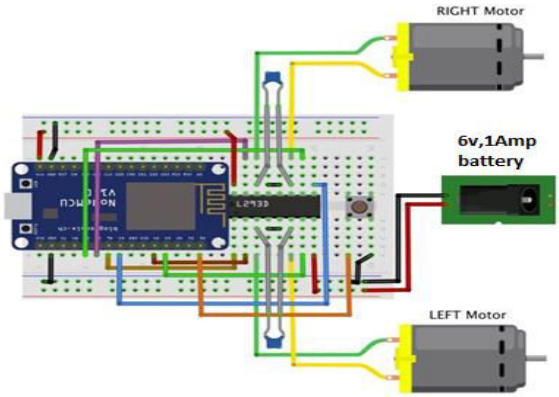

Fig.2. Circuit diagram of SCR

As shown in fig. 2. This time develop this project in different way to control the same robot: voice commands. It might be useful we will remotely control a robot without using hands, One might think of a robotic voice controlled wheel chair, for instance[5]. A robotic kit was used, along with some of favorite tools: Adafruit.io, IFTTT and Arduino IDE.

1. **Download and install Arduino IDE latest version and Adding ESP8266 board with** open file

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menu>*select Preferences* (Ctrl +, on Windows OS)[6]

Next go to Tools menu >select Board option > select Boards Manager for adding your NodeMCUESP8266 board.

- Add a comma at the end of the previous URL in text box on Arduino IDE and the one above. Then click ok button in this preference window[7].

- Add zip folder of esp8266 by ESP8266 Community download from github.

Now Arduino IDE will be ready to work with a lot of ESP8266 based development boards, like the generic ESP8266, NodeMcu, Adafruit Huzzah, Sparkfun Thing, WeMos, etc.

2. **Adding the libraries**

Arduino http client library form https://github.com/arduino-libraries/ArduinoHttpClient, Arduino IO library from https://github.com/adafruit/Adafruit_IO_Arduino and Adafruit MQTT library fromhttps://github.com/adafruit/Adafruit_MQTT_Library[8].

Navigate to Sketch-> Include Library -> Manage Libraries

3. **Configure IFTTT**

Here we are using a connecting apps and device application using IFTTT (service will trigger given action by that) free platform. To connect personal smartphone with other gadgets, or to share data between your favorite webservices (like Google, Facebook, Twitter, Instagram, etc.) and other physical devices, for instance[9]. This way to create small applets connecting webservices and devices. and used Google Assistant to send voice commands from a smartphone to Adafruit.io, which is then received by the robot[10].

Install Google Assistant

Here need to install Google Assistant App on Android smartphone or iPhone.

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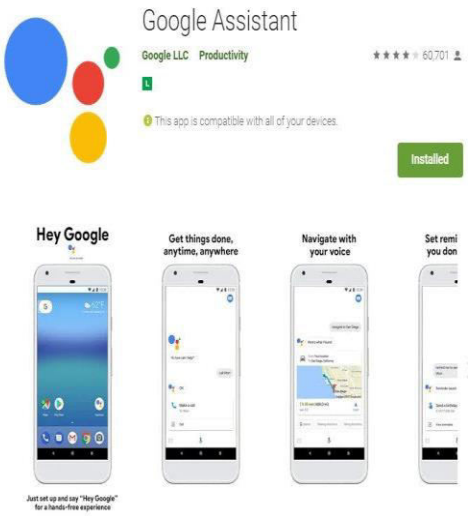

Fig.3. Google Assistant

This virtual Google assistant developed by Google MNC. It has a feature of IFTTT service[11]. It's artificial intelligence is able identify voice commands, perform searches and other tasks.

4.1.IFTTT Applet

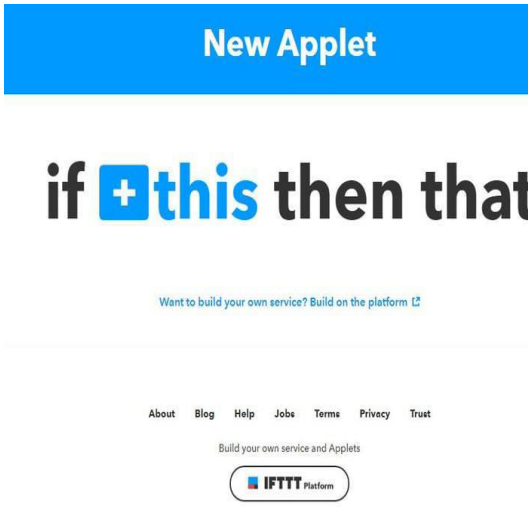

Fig.4. IFTTT applet

IFTTT used to create a voice command and make robot moving in different directions.

Create the applet on the website[12]:

1 - Click +This;

2 - IFTTT allows you to configure more than one phrase as a trigger.

- Turn $ # degrees
- Rotate $ # degrees
- Move $ #

5 - Also define the message it will say in response if it understands command. In this case configured it to Say "Turning $"[13].

6 - Now choose +That;

7 - Configure Feed name as "voice command". Select Add ingredient option
and add the TextField and NumberField. Add ":" between then. This will work as a delimiter later on Arduino code.

8 - Finish your applet and turn it on.

Robot has 2DC motors and 2 wheels.

- LEFT Motor
- RIGHT Motor

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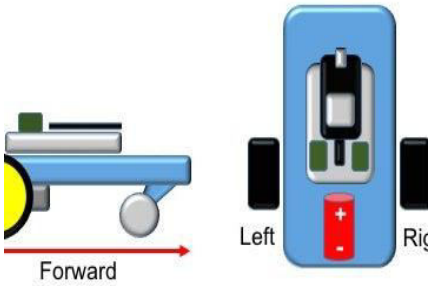
The NodeMCU 6 GPIOs will command BO motors.The eneleftmotor and enerightmotor are both high rover moves in forward direction. Connect those L293D pins (1 and 9) Directly to +VCC and forget them. NodeMCU PWM is allow to control BO motor speed either high/low[14].

Fig. 5 explains that we will define 5 possible commands:

1. STOP
2. Turn to LEFT
3. Turn to RIGHT
4. REVERSE
5. FORWARD

The first command "STOP" is simple to accomplish. All H-Bridge inputs areLOW



For moving LEFT motor FORWARD direction put:

- HIGH at pin D4 (left Motor +) and
- D3 pin LOW (left Motor -)
- HIGH at pin D8 (right Motor +) and
- Make D7 is LOW (left Motor -)

	LEFT MOTOR		RIGHT MOTOR	
Stop	L	L	L	L
Right	H	L	L	H
Left	L	H	H	L
Reverse	L	H	L	H
Forward	H	L	H	L
GPIO.	D4	D3	D8	D7

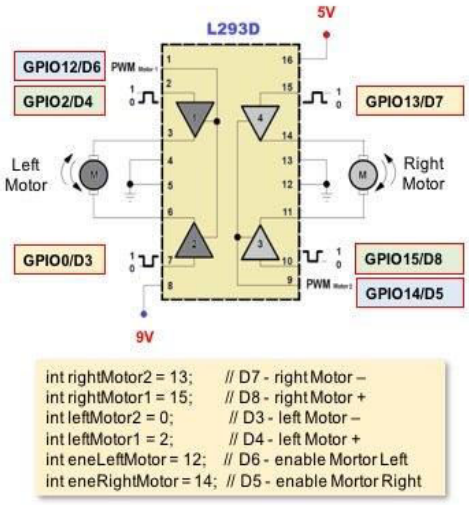


Fig.5. L293D working process

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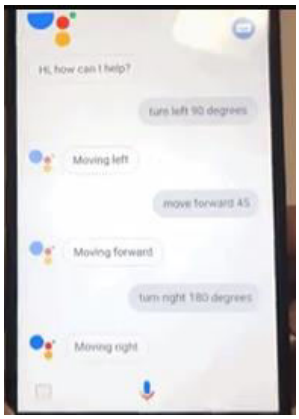

Fig. 6.Google Assistant based robot control

Launch Google Assistant on your phone. Here press the microphone icon on the app or just Say "Ok Google" and it will start listening your commands.If Google Assistant understands what just said, it will send a message to an Adafruit.io feed (using IFTTT app). Command string might assume one of the following values: stop, left, front, back or right, and will be used to select appropriate direction and speed of each track. Notice my robot uses an open-loop controller[13]. This way, angles and distances won't be precise (and might even depend on how much power there's left on the batteries). Need precision on the movements, add a closed-loop system (measure the rotation of each motor, for instance, and use it as a feedback).

4.2. Voice Recognition: Fig. 6 explains When a command for the robot isrecognized, then voice module sends acommand message to the robot'sESP8266 microcontroller[14]. The NodeMCUmicrocontroller unit analyzesthe message and takes appropriate actions.When any commands are given on the transmitter, the mobile module will take thevoice commands and convert the voicecommands into digital signals. These digital signals are send from ESP8266 to robot to performs different operations.

5. Conclusion:

Future works that can exploit are the effect ofthe distance between the mouth and the smartIoT device on the performance of the robot,The objective of the paper is to realize the smart living.

From the observation, this project depends upon:

- The bandwidth of Wi Fi module.

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- Google's speech information is conversion into textconversion.
- **GUI:**used for interacting with the user.

Controllingthe motion of robot via Google Assistance as well as from android applet is successfully obtained.Though controlling using Wifirange of distance for communication, a smart and easy means to guide a robot is achieved. Controlling the motion ofrobot via internet is one of the easiest means as it requires the user to access the designated Google assistant to guide it. As phones and mobiledevices are each time more powerful to building robot with advanced feature such as voice recognition. User voice command isconverted to text form using an online server. Using android based smart phone, voice command is converted to text in Wi-Finetwork to the Robot.

6. Future work:

In the future, robots system will include with the camera to find the position of therobots.

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