Android based Wi-Fi Controlled Robot based on Voice Recognition

Deep Ruparel[1*], Charmi Sanghavi[2], Abhay Rajde[3], Manish Bhelande[4]
[1,2,3]*Student*, [4]*Assistant Professor*
Information Technology, Shah & Anchor Kutchhi Engineering College, Mumbai, India.

***Corresponding Author**
E-Mail Id:-deep.ruparel@sakec.ac.in*

Abstract
The paper consists the process of creating a car which operates based on our voice commands. Robotics is becoming the fastest developing technology in the field of science. This car receives the commands using any smartphone that consists of google assistant. The car consists of a Wemos D1 ESP8266 which consists of a Wi-Fi module which is connected to our smartphone. This allows us to control our car wirelessly thus providing us with a future scope to implement voice control car which can soon be seen plying on the roads.

Keywords:-IoT, arduino, wemos d1 esp8266, ultrasonic sensor, android, wireless, microcontroller.*

INTRODUCTION
Robots are a bundle of frameworks which incorporate mechanical, electrical, figuring and robotization fields of innovation which can be utilized to perform different errands in modern just as homegrown purposes. What is more, with expanding advancements in this field robots would now be able to be controlled with lesser direct human intercession to accomplish a more regular connection with machines. An approach to achieve such is to control a robot by means of voice orders. Some fundamental uses of robots using voice acknowledgment are to help individuals with inability, executing present orders and so on to handle the voice orders a straightforward and productive strategy is to utilize a cell phone. Cell phones are incredible gadgets equipped for performing numerous capacities like a PC. With their own free working framework and web network they are progressively being used in numerous applications. This robotic vehicle is built using Arduino IDE. Arduino is an open source platform available that enables us to prepare short and quick IoT projects for real time data.

The speech recognition is an interdisciplinary subject, natural, intuitive, consistent with human's cognitive law, and it is becoming the key technology of human-computer interface in information technology.

Applying speech recognition technology to the car makes car more intelligent, and more humanistic. One of the applications of the new speech recognition machinery is the application of voice control cars. This project is designed to create an obstacle avoider robotic vehicle based on voice recognition controlled using mobile through Wi-Fi communication.

SYSTEM DESIGN
The design of the system is pretty simple and cost effective. The following things are kept in mind while designing this project:
Low cost Simple design
Low profile structure High efficiency
Our project aims to achieve the target to

design a system that can provide following functionalities with a simple and easy- to-use interface:

a) Use an android application that will act as a remote of the robotic vehicle.

b) Develop a robot using WEMOS D1 ESP8266 board.

c) Connect with an android smartphone using a WIFI modulator for monitoring and controlling the DC motor.

The focus here is to design a car that can easily connect with a smartphone as majority of the people around us have smartphones. Most of the smartphones are already equipped with google assistant and have Wi-fi inside them. So creating a car that makes use of both these commonly found modules and integrate them together into a car that accepts command through our voice. Smartphone, Wi-fi, robot are currently the hotshots in these times and can be easily used to make better world for mankind.
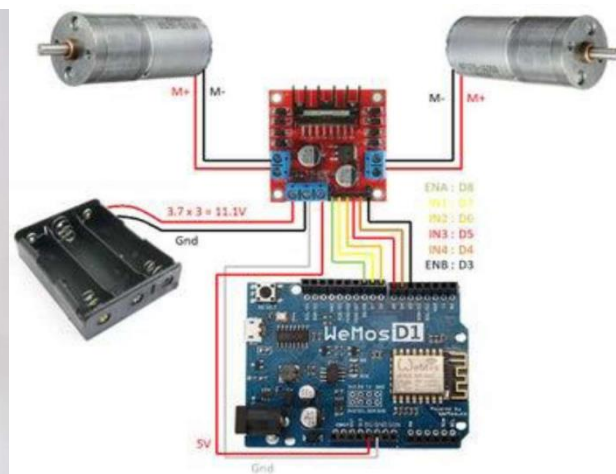

Fig.1:- WEMOS D1 ESP8266

HARDWARE REQUIREMENTS
The system consists of the following parts:

Table 1:-Hardware requirements

Sr. No.	Components	Sr. No.
1.	WEMOS D1 ESP8266	1.
2.	Ultrasonic sensors	2.
3.	DC Motors	3.
4.	L298N Dual Channel H-Bridge Module	4.

WEMOS D1 ESP8266 Board
Wemos D1 board is truly simple to utilize and program with Arduino IDE. It has a similar impression of and standard Arduino Uno! This path a large portion of Arduino safeguard will likewise work with this board. It has implicit Wi-Fi module, so you can utilize it in a variety of projects. You can likewise utilize other ESP8266 based sheets

In synopsis, the board is constrained by the ESP8266 chip (a 32-Digit processor) and has a bigger glimmer memory contrasted with an Arduino Uno. It comprises of 11 advanced I/O pins and 1 simple (input) pin. the board can be associated utilizing a Miniature B type USB link.

It consists of following specifications

Microcontroller	ESP-8266EX
Operating Voltage	3.3V
Digital I/O Pins	11
Analog Input Pins	1
Clock Speed	80MHz/160MHz
Flash	4M bytes
Length	68.6mm
Width	53.4mm
Weight	25g

ULTRASONIC SENSORS
Ultrasonic sensors are a kind of acoustic sensor isolated into three general classes:

transmitters, beneficiaries and handsets. Transmitters convert electrical signs into ultrasound, recipients convert ultrasound into electrical signs, and handsets can both communicate and get ultrasound.

Likewise to radar and sonar, ultrasonic transducers are utilized in frameworks which assess focuses by deciphering the reflected signs. For instance, by estimating the time between conveying a message and accepting a reverberation the distance of an article can be determined. Uninvolved ultrasonic sensors are essentially amplifiers that distinguish ultrasonic commotion that is available under specific conditions.

IoT ultrasonic sensors are intended for non-contact recognition of strong and fluid items. These sensors are utilized for a wide assortment of capacities from observing the degree of water in a tank to liquid distinguishing proof/fixation, to identifying object vicinity. Ultrasonic sensors have gotten irreplaceable for IoT conveyance and are generally utilized for building savvy, associated items. See more about the various kinds of sensors, how they work, and their applications for everything from savvy vehicle inversion frameworks to keen waste containers.

Fig.2:-Ultrasonic Sensors

DC Motor
A DC engine is any of a class of turning electrical machines that converts direct flow electrical energy into mechanical energy (Figure3). DC motors are very easy to use. DC motor can be used in different speed and torque, which is not possible with AC motor. The Motors that we have used operate on 12v with 100 rpm.
Specifications:
RPM: 100.
Operating Voltage: 12V DC
Gearbox: Attached Plastic
(spur) Gearbox Shaft diameter: 6mm with internal hole Torque: 2 kg-cm
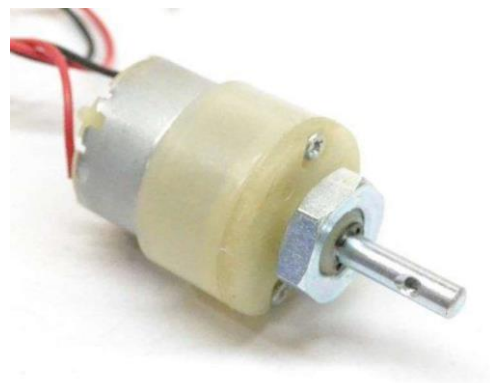No-load current = 60 mA (Max)
Load current = 300 mA (Max). [4]

Fig.3:-DC Motor

L298N Dual H Bridge Stepper Motor Driver Board
A H bridge is an electronic circuit that switches the extremity of a voltage applied to a heap. These circuits are frequently utilized in advanced mechanics and different applications to permit DC engines to run advances or in reverse.

H-Scaffold's are regularly utilized in controlling engines speed and bearing, yet can be utilized for different ventures, for example, driving the splendor of certain lighting activities like powerful Drove clusters. DC motors are controlled using Motor driver IC. It is interfaced with the microcontroller.

The vast majority of the microcontrollers work on low voltage (5v) and current while the engines require higher voltages and current Thus, the microcontrollers can't give them such higher current. For

this reason we utilize engine driver ICs. Engine driver is a little flow enhancer. It takes a low current sign and gives out a high current sign which can drive an engine. It can likewise control the course of engine. Engine drives are of numerous sort contingent on the greatest stockpile voltage, most extreme yield current, appraised power dispersal, load voltage and number yields and so forth Here we will examine engine driver L298N. It is utilized in dc engine speed control undertaking and you can interface dc engine simple with microcontroller utilizing this engine driver. and furthermore in bluetooth controlled robot utilizing pic microcontroller. It consists of following specifications

Double H bridge Drive Chip: *L298N*
Logical voltage: *5V Drive voltage: 5V-35V*
Logical current: *0-36mA Drive current: 2A (MAX single bridge)*
Max power: *25W*
Dimensions: *43 x 43 x 26mm*
Weight: *26g*

Fig.4:-L298N Stepper Motor Driver

The software used here is:

Arduino Software (Version 1.8.9)
Arduino software is used for programming in WEMOS. Its function is to put the instruction of whole functions of this system to the microcontroller. The program is stored in the EEPROM of the microcontroller, which is present in the board. In android application when we give a voice input on the phone (i.e. voice recognition), a corresponding signal is sent

through the hc-bridge to the Wemos D1 ESP8266 board. At the point when signal information shows up the Arduino the pin which compares to the specific information is set to high. Presently the engine driver segment gets the yield from that pin. Engine driver switches likewise the information digit, on the off chance that the information bit is low, the comparing pin of the engine driver doesn't work else high bit then the relating pin of the engine driver is on. We have utilized Arduino IDE rendition 1.8.9 for composing program for Arduino.
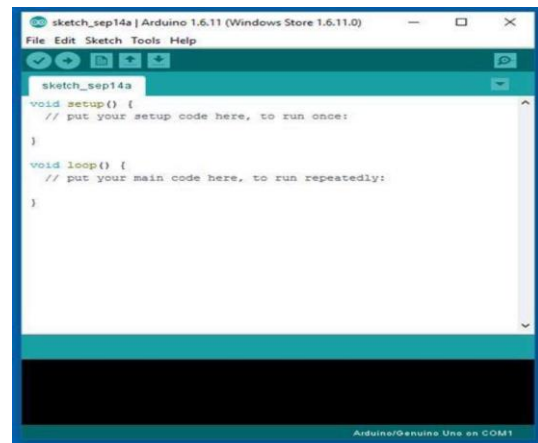

Fig.5:-Arduino IDE

Abbreviations and Acronyms
1. IDE Integrated Development Environment.
2. IoT Internet of Things.
3. PWM Pulse Width Modulation
4. EEPROM electrically erasable programmable read-only memory.

Some Common Mistakes
The connections of sensors are clear as they are respective pins have Vcc, GND

and Data mentioned on the sensor, so it is easy to connect it.

The Arduino IDE doesn't support ESP8266, so we need to download all the software properties of the ESP8266 board. Make use of good wires and connect all the wires properly to correct pins. All the connections should be tight.

Identify the Headings
This paper takes into consideration the Wi-Fi Controlled Voice Recognition Car.
The respective figure numbers and table head numbers are given for better, easy and simpler understanding of the entire IoT system. The figure numbers represent the image of that particular devices.

The table head numbers represent the tables which are made for specifications or features of the components.

CONCLUSION
The connection between Google Assistant and Wemos D1 R1 ESP8266 was successfully put up. The google assistant app and their respective states were successfully recognizing the voice commands. All the Components were found to be in working state and were working per the predicted observations. All voice commands were successfully working as implemented on the robotic car . The DC Motor was as working perfectly as per the speed given In short, the connections and code were working successfully.

ACKNOWLEDGEMENT

REFERENCES
1. A. K. & R. C.(2014). Voice Controlled Robot. *International Journal of Innovative Research in Technolog*y, vol. 1, no. 11, pp. 338344, 2014.
2. Nair, S. R., & Nair, S. R. (2012). Design of a Voice Controlled Robotic Arm for Picking and Placing an Object. *IOSR Journal of Engineering*, 2(4), 670-673.
3. Pahuja, R & Kumar, N.(2011).Android Mobile Phone Controlled Bluetooth Robot using 8051 Microcontroller. *ISCE*.
4. Piyare, R., & Tazil, M. (2011, June). Bluetooth based home automation system using cell phone. In *2011 IEEE 15th International Symposium on Consumer Electronics (ISCE)* (pp. 192-195). IEEE.
5. Kannan, K., & Selvakumar, J. (2015). Arduino based voice controlled robot. *International Research Journal of Engineering and Technology (IRJET)*, 2(01), 49-55..
6. https://blog.amt.in/index.php/2018/10/30/introduction-to-ultrasonic-sensor/