**Voice Controlled car**

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**Introduction**

This world is full of robotics,it reduces the human efforts and helps us to get our work done faster in a smart way. This project is all about the voice-controlled robot vehicle which is developed by the NodeMCU ESP8266. NodeMCU ESP8266 is an open source IoT(internet of things) platform. The vehicle is controlled by the android application that is the Google assistant or the Alexa. The vehicle can perform functions by recognizing the human voice that is transmitted to the Google assistant or alexa. The functions that can be performed are moving forward, backward, left and right.

Microcontroller ESP8266. Arduino development boards are widely used. But when it comes to ESP8266, then it has many advantages over Arduino development boards. ESP8266 is in the series of low power and low cost on chip microcontroller. It comes up with already integrated dual mode Bluetooth and Wi-Fi. It is especially aimed to provide versatility, robustness and reliability in a large number of applications. Some applications in which this microcontroller is extensively used are MP3 decoding, voice encoding and music streaming. Best RF and power performance can be easily achieved using this microcontroller. ESP8266 comes up with a USB port so we can say that it is a plug and play device i.e. just plug in cable and your device is turned on and you are able to program it just like Arduino development boards. We will go in details of programming this board later.

If we compare this microcontroller with Arduino boards then we have a big advantage of this microcontroller over Arduino development boards and that is of Wi-Fi. Although Wi-Fi can be used with many Arduino boards but this feature comes up in form of shields / adapters. If we attach Wi-Fi shield with our Arduino board then we can access internet in our Arduino board otherwise it’s not possible. ESP8266 comes up with integrated Wi-Fi module. Same is the case with Bluetooth which is available in Arduino in form of some modules and when it comes to ESP8266, this feature is already integrated. So if we are interested in using Wi-Fi and Bluetooth then this board is less expensive as compared to Arduino boards as these adapters for Wi-Fi and Bluetooth are expensive.

**KEY FEATURES OF ESP8266**

* Built in Wi-Fi module of standard 802.11
* Wi-Fi module operate in range of 2.4 GHz – 2.5 GHz
* Three modes of operation: 1. Access point. 2. Client. 3. Access point + station
* Dual core microprocessor of 32 – bit
* Operating voltage is 3.3 V
* Clock frequency from 80 MHz and goes up to 240 MHz
* SRAM memory is of 512 KB
* ROM memory is 448 KB
* External flash memory is supported and is up to 32 Mb i.e. 4MB
* Maximum current in each pin is 12 mA but 6 mA is recommended to use
* It has 36 general purpose input / output pins
* General purpose input / output pins comes up with PWM / I2C and SPI functionality
* 5 to 3.6 V operating voltage
* Deep sleep current of 2.5 µA
* 10 electrode capacitive touch support
* Hardware supported encryption for AES, ECC, RSA – 4096, SHA2
* On board PCB antenna or IPEX connector which act as external antenna
* Operating temperature lies in range of -40°C to +125°.

**Broad Area**

Internet of things is a concept that connects all the devices to the internet and let them communicate with each other.

Devices and objects with built in sensors are connected to an Internet of things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs. Without human intervention,the machines can communicate with each other leading to faster and timely output.

The IoT was initially most interesting to business and manufacturing, where its application is sometimes known as machine-to-machine (M2M), but the emphasis is now on filling our homes and offices with smart devices, transforming it into something that's relevant to almost everyone.

**Examples of IoT**

We can make any device a part of an IoT network if we can connect it to the network and provide control. An IoT device can be a simple toy for a baby or a self-driving car. For example, a light-bulb, motion sensor, smart thermostat, and connected streetlight can be part of an IoT network if we can control these using a smartphone app.

**Some examples of IoT devices are as follow.**

* Smart TVs
* Smart speakers (Amazon’s Echo and Google Home)
* Home security systems
* Smart thermostats
* Smart electric meter
* Commercial security camera

**Essential requirements for IoT connectivity**

Connectivity is the heart of an IoT network. We have different methods to connect and share data between devices. These methods can be a standard Wi-Fi, Bluetooth, Ethernet, or Long Term Evolution (LTE). Edge Computing is the latest trend where more processing is done on-device and less and more useful data is sent to the cloud to reduce cost.

**Benefits of IoT**

* IoT enables the enterprises to have more and better access to the data related to their products, services, and internal systems.
* We can apply Data Science to analyze this large amount of data to draw insights about the products, services and associated systems.
* An enterprise can use these insights from the data to reduce waste, make more profit, and improve the satisfaction of customers and employees.
* Data from the components and machinery tell us about its present condition and predicts its future outcome.
* With this real-time data collection and analysis, we can take corrective action at the right time to minimize the downtime and maximize the run-time of the system.
* In the logistics and transportation industry, the data collected from these sensors make the supply chain more efficient.
* In the healthcare industry, the use of IoT devices can provide real-time location and body parameters of the patient to provide timely care and support.

**Specific area**

The voice controlled car is controlled uses human voice. The voice is been transmitted by the android mobile application.

This voice-controlled vehicle is developed by NodeMCU ESP8266 Microcontroller. Best RF and power performance can be easily achieved using this microcontroller. We can control the vehicle by our voice from anywhere using the mobile application.

The communication is done using the Message Queue Telemetry Transport (MQTT) Protocol. Which is a lightweight protocol that allows multiple devices to connect to a shared server, called the MQTT Broker, and subscribe or write to user defined topics. When a device is subscribed to a topic, the broker will send it a notification whenever that topic changes. MQTT is best suited for applications with low data rates, strict power constraints, or slow Internet connections.

The voice-controlled vehicle is been created as an example to show how voice enabled devices can help improve the whole human behaviour and simplify the day to day human activities

A lot has changed since mobile devices entered our everyday lives. For one thing, they’re no longer only machines to make and receive calls - you can control your house or your car with a phone, shop, do creative work or manage a business.

Voice control makes these operations just so much easier and faster.

* **Hands-free** - can be used while driving, vacuum cleaning the house, making dinner or by people with limited hand mobility;
* **Fast** - people that live fast know that making a quick call takes way less time than typing a long email and waiting for a response. It’s the same with voice control - you cut down on all the clicks by using speech recognition;
* **Simple** - the accessibility of voice control is just incredible, anyone can use it without any technical skills;
* **Cross-platform and multilingual** - voice control can be used from any device, whether it’s iOS or Android, and in any language.

Voice-enabled features have many applications - not just for drivers and households. Here are a few fields where they can come in handy:

* Healthcare. Patients with physical impairments that have limited ability to use their hands will majorly benefit from voice control. Ultimately, it makes mobile devices more accessible to disabled people and can resolve many day-to-day issues for them;
* Social media. Voice messages are on the rise in social media, and many users prefer interacting through them as opposed to regular texting. It’s fast, fun, and allows better emotional expressivity, making communication more real;
* Education. Learning is more efficient and interactive if you can make use of voice-enabled features, especially while learning languages and music;
* Traveling. People that travel a lot will know the struggle of language barriers. Due to voice recognition and voice generation features, translation apps can help with communication abroad.

The main objective of the project is to control the voice controlled car in a desired position. Also the main objective of the project is to control the robot by the voice. Human Robotic Interaction is achieve. The goal of voice controlled Robot is to listen and act on the commands received from the user. The proposed system consist of two blocks: transmitter and receiver block both use the microcontroller and a battery for the power source. Using human voice we can control the robotic vehicle by using smartphone. The project is designed to control a robotic vehicle by voice commands.

**Project definition**

It is a voice controlled robot vehicle built using NODEMCU esp8266 Controller.It is basically connected to a Wi-Fi and the vehicle is controlled by various instructions like forward, backward,left and right.The instructions are given by the android mobile application.The car is controlled by the wi-fi network in android application. The wi-fi robot car can be easily moved from one place to another place by using the Android application. We can make the car do various tasks using wi-fi network technologies.

The robot car is operating with Nodemcu esp8266 controller and the command is given by the android application in a mobile phone using the wi-fi network.The Nodemcu esp8266 as inbuilt wi-fi module and the devices connected with robot.Android application will transmit command using wi-fi to the car so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop.

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**Objective of Project**

* Cost efficient
* Time efficient
* Less manual work
* Can be controlled from anywhere
* Controlling the robotic car in a desired position
* It is fast
* Supports multiple languages
* Simple & Convenient
* Hands-free
* Help handicapped people
* Help old aged people

**Existing system**

In the existing system, a speech recognizing system is the process of capturing spoken words using a microphone or smartphone and converting them into a digitally stored set of words.In the present day home automation is getting the chance to be mainly vital with the true aim of improving our current situation. More over people tend to think the automation is all about switch on/off this helps us prove that there is more to it than on and off

Here the input is in multiple ways that is amazon alexa and google assistant we can also control the car using the adafruit application which is used as a transmission median to carry out the work. In the existing system there is only one input that is either Amazon alexa or google assistant.

The other issue with existing projects is the use of ESP8266. ESP8266 provides a wide variety of built in components the allow the user to automate more.

The quality of a speech recognition systems is assessed according to two factors namely accuracy (error rate in converting spoken words to digital data) and speed (how well the software can keep up with a human speaker).

**Limitation of application**

* Voice assistants support only one-way “conversations”. The appliances cannot talk back, asking for clarification of intent. Building checks into the skills executed in the cloud does not completely solve this problem.
* The commands are independent of the state of the device. The user has to know whether the car is on, when the car should stop, etc.
* Continuous spoken words cannot be accepted by the system due to overlapping and hence there needs to be a silence or pause between two consecutive words. Thus, only isolated words would be feasible.
* The system is a speaker dependent system. Too many speakers speaking simultaneously would result in overlapping of the signals and interruptions.
* There is a limitation on vocabulary size as well. Languages with large vocabulary are difficult for pattern compared to languages with small vocabulary, since chances of having ambiguous words are less
* Voice assistants use single commands. For now, these consist mostly of fixed phrases. Effectively, they push one button or set one dial.
* As more flexible natural language understanding technology is becoming available, interpretations of speech commands may be become ambiguous. With commands resulting into actions, misunderstandings can be risky.

**Requirements analysis**

**User requirements**

* Arduino IDE.
* Android Studio.
* Personal computer.
* Smartphone (Android).
* Internet connection.

**Software requirements**

* Hive MQ.
* Android Studio.
* Arduino IDE.
* ESP8266 board Library.

**Hardware requirements**

* NODEMCU ESP8266 Controller.
* Motor Driver L239D.
* Jumper cables.
* DC Motors 9v.
* 9 Volt battery.
* 9v to 5v adapter(for ESP8266).
* Ultra Sonic sensor.

Rahul R Singh