VOICE CONTROLLED ROBOT USING NODEMCU

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Abstract- Voice Controlled Robot is a robot which can be motion-controlled by giving specific voice commands on the mobile application by user. The first important aspect in the term -voice control is speech recognition. Speech recognition is the capability of an electronic device to understand and respond to spoken commands. It involves the processing of speech to the textual commands. This allows it to be used in a lot of applications ranging from controlling machineries to being our Personal Digital Assistant (PDA). An Android Application will be the speech recognition platform which will communicate with the robot via the Internet. Moreover, the robot will also be capable to detect obstacles and give the live transmission with the help of ultrasonic sensors and a camera mounted on it. Our proposal is a technique which is based on IOT with Artificial Intelligence. It can be useful for numerous applications such as assistive robots for elderly and people with disabilities or as working robots in many industrial applications. It can also be used for navigation in thermal plants and nuclear plants.

An Arduino IDE using Embedded C is used as the software to run the Application.

Index Terms- Nodemcu, Speech recognition, Android application, sensors, Artificial Intelligence.

1. INTRODUCTION

Internet of Things (IOT) refers to the network of connected physical electronic devices which can communicate and exchange data among themselves and respond to commands without any human intervention. It has been formally defined as an "Infrastructure of Information Society" because IoT permits us to amass information from all kind of mediums such as humans, home, wearables, transportation, animals and kitchen appliances. Thus, any object in the physical world which can be provided with an address to enable data transmission over a network can be made part of IoT system by embedding them with electronic hardware such as sensors, software and networking gear.

IoT devices when implemented with artificial intelligence will make a much more smarter device because the machine can learn on its own and make an efficient use of its resources. AI is a simulation of programs which can mimic human cognition. These programs includes learning, reasoning, problem solving and self- correction. Numerous applications of AI are Speech recognition and Machine Learning. Artificial intelligence has made its way into a number of areas. The three main examples of it are:

AI in healthcare: The biggest stake is on improving patient reports and outcomes and reducing costs of treatments. Companies are applying machine learning to make better and faster diagnosis with technology [1]. AI in education: AI can personalize learning, automate grading, provide smart content and provide a new height to teaching efficiency. AI can assess students and adapt to their needs [2]. AI in finance: AI is helping in most of the domains of finance industry such as Risk Assessment, Trading, Financial Advisory, Personal finance and Fraud Detection. Applications such as Mint or Turbo Tax, is disrupting a large number of financial institutions. These applications can collect personal data and provide financial advices [3].

2. LITERATURE SUREVEY

A smartphone is used to simplify and to increase the efficiency of processing of the voice commands. With their own independent OS and internet connection they are increasingly being used in numerous applications [1]. One of the major features that we shall be making use of is - the Internet. An internet connection will allow the phone to communicate with the robot. Several Operating Systems

are used for smart phones but the most common and efficient one is the Android OS developed by Google Inc. The Internet exchanges data easily and is a very proficient way of communication between two devices such as microcontroller and a smart phone [2]. The robot can either maintain preset linear speed or can have variable speed on flat surfaces. The voice recognition is done with the help of a micro controller: NodeMcu. For detection and avoiding obstacles, an ultra-sonic module is implemented, which is programmed to stop the robot if there is any obstruction in its way, and it will inform the user to use another voice command[3].

3. PROPOSED SYSTEM

3.1 BLOCK DIAGRAM
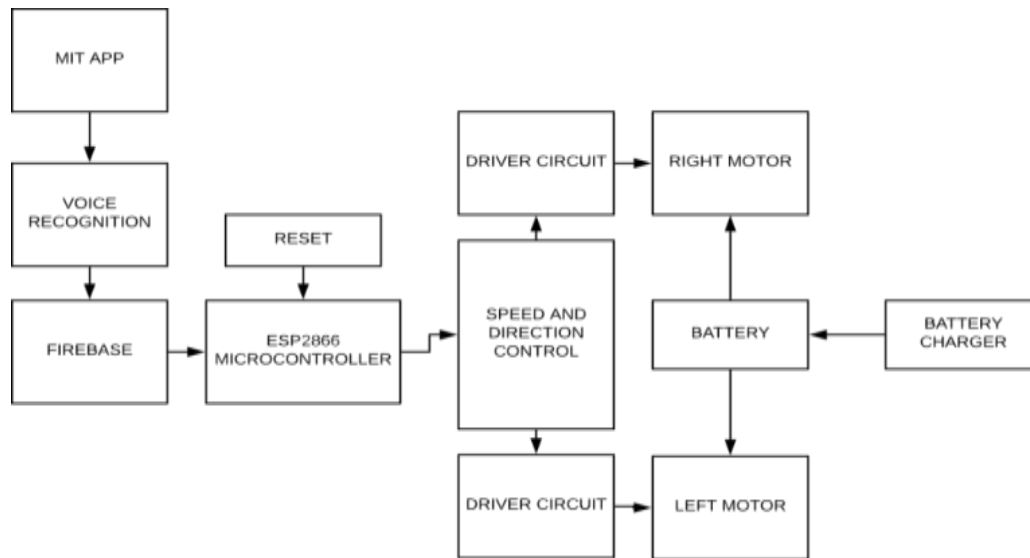
3.2 HARDWARE

It includes NodeMcu, a L298 serial motor driver, a control circuit and ultrasonic transmitter and receiver. Node MCU is a microcontroller and a low-cost open source IoT platform. It includes firmware which runs on the ESP82666 Wi-Fi SoC from Espressif Systems and hardware which is based on the ESP-12 module. This firmware uses 'Lua' Scripting language .The L298 H- Bridge is Serial Motor Driver board which has dual bidirectional motor based on L298 chip. It contains two 'H bridges' which are of high voltage and current full bridge drivers that can drive two DC motors. First one is, L298 motor which can independently control two motors of up to 2A each in both directions. The second is L298 IC, which amplifies an output current as the current from the microcontroller is not enough to drive the DC motor directly. The HC-SR04 ultrasonic sensor measures distance from an object using Sonar. It provides 2 cm – 400 cm non-contact measurement function, and the ranging accuracy that can reach upto 3mm. Additionally, it also includes a simple sound making module called Digital Buzzer that you can use to low/high it. The buzzer will send sound signals whenever the robot senses any obstacle around its path.

3.3 SOFTWARE

Firebase is an application development platform for both web and mobile. It is embedded into your app and will store your data online. Firebase can also be used as the Authentication system. A user can send and retrieve the required data at any time. The voice commands to the robot are processed via an android application and transferred via Internet. Due to its flexibility and numerous features, Android OS is used as speech recognition platform. Android OS also allows an easy and reliable connection with the Google Speech processing libraries for smooth speech recognition. MIT App Inventor 2 is a tool which allows easy creation of android Apps via drag and drop block programming. This provides people with little to no experience in Java programming, a way to develop simple applications to suit their purposes. Now, once the app launches, the user will have to connect to

the robot via the Internet.. After clicking the microphone button it will record the speech. The recorded audio is processed and the transcribed text is displayed and will be sent to internet in the form of a string or character array.

4. CONTROLLING OF ROBOT

Now, the commands will be received in text form by the robot. This is done by the connected Bluetooth receiver at the robot end. Initially the robot will wait for an incoming connection. When available, the text will be parsed character by character to the robot. The Arduino will then build the characters into a single word. A small delay of 100 milliseconds is implemented in building the word, so as to prevent overwriting or loss of any character. Once the command has been received the Arduino then compares the text to the preprogrammed instruction set as follows:

a. Slow Forward: This will activate both motors and will move robot forward at low speed.

b. Fast Forward: This will activate both motors and move robot forward at full speed.

c. Slow Backward: This will activate both motors and will move robot backward at low speed.

d. Fast Backward: This will activate both motors and moves robot backward at high speed.

e. Sharp Right: This will activate both motors (Right Motor Reveres and Left Motor forward)

   and makes a 90-degree point turn.

f. Slow Right: This will activate left motor and makes a 90-degree wide turn.

g. Sharp Left: This will activate both motors (Right Motor forward and Left Motor reverse)

   and makes a 90-degree point turn.

h. Slow Left: This will activate right motor and makes a 90-degree wide turn.

i. Zigzag: This will activate both motors alternatively to move forward in a zig zag pattern. j. Stop: both motors deactivated

```
if(readvoice == "zigzag")
{
    digitalWrite(ENA, HIGH);
    digitalWrite (IN1, HIGH);
    digitalWrite(IN2,LOW);
    digitalWrite(ENB, LOW);
    digitalWrite (IN3, HIGH);
    digitalWrite(IN4,LOW);
    delay(5000);
    analogWrite(ENA, 125);
    digitalWrite (IN1, HIGH);
    digitalWrite(IN2,LOW);
    analogWrite(ENB,125);
    digitalWrite (IN3, LOW);
    digitalWrite(IN4,HIGH);
    delay(2000);
    digitalWrite(ENA, LOW);
    digitalWrite (IN1, LOW);
    digitalWrite(IN2,HIGH);
    digitalWrite(ENB,HIGH);
    digitalWrite (IN3,LOW);
    digitalWrite(IN4,HIGH);
    delay(5000);
}
```
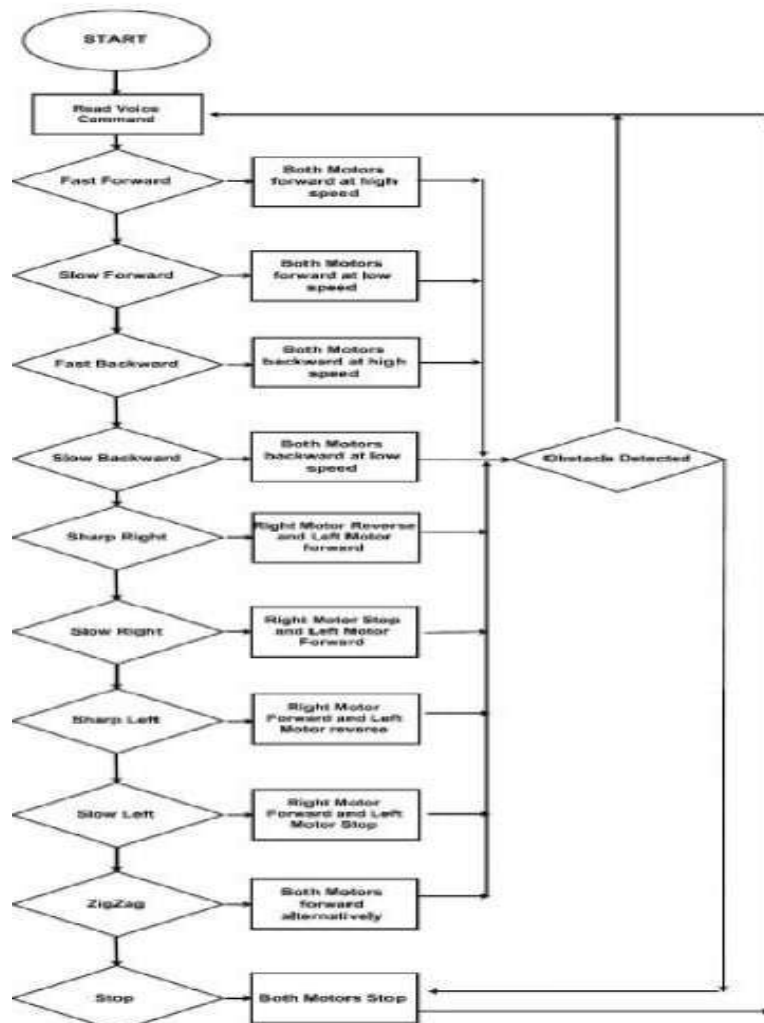
5. SCOPE FOR FUTURE WORK

This work can be optimized by the deployment of servo motors. And for automated tracking, an automatic targeting system can be utilized and implemented in the robot. Using a long- range module instead of short range Zigbee module can be implemented. To optimize the robot's   performance, technologies like Image processing can be used to detect and identify objects. Techniques of power optimization like sleep and wake-up schedules can be incorporated.

6. RESULT

This can help the elderly and disabled as they can listen to the voices of their masters and act accordingly. They can be used in numerous assistances like wheel-chair assistances, navigation in thermal and nuclear plants, and many industries.

7. REFERENCES

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