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Voice Controlled Robot Using Raspberry Pi

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Abstract: Voice controlled robotic framework is exceptionally helpful in territories where there is high hazard for people to enter. Voice controlled robotic framework is controlled through voice orders got by means of android gadget. The reconciliation of control unit with Bluetooth gadget is accomplished utilizing a Bluetooth module to catch and read the voice summons. The robotic vehicle works according to thesummon got through android gadget, for this Raspberry pi is incorporated in the framework. The controlling gadget might be any advanced mobile phone having an Android OS. The transmitter utilizes an android application required for transmitting the information. The beneficiary end peruses thesesummons and translates them into controlling the robotic vehicle. The android gadget sends orders to advance the vehicle in, in reverse, right and left bearings. Subsequent to getting the charges, Raspberry pi works the engines keeping in mind the end goal to move the vehicle in four ways. The correspondence between android gadget and recipient is sent as serial correspondence information. Raspberry pi program is intended to move the engine through an engine driver circuit according to the charges sent by android gadget.

Keywords: Portable Document Files (PDF), Single Board Computer (SBC).

I. INTRODUCTION

A Voice Command System basically implies a framework that procedures voice as an info, deciphers or comprehends the importance of that information forms it and produces a suitable voice yield. Any voice command framework require three fundamental segments which are discourse to content converter, inquiry processor and a content to discourse converter. Voice has been an exceptionally fundamental piece of correspondence these days. Since, it is quicker to process sound and voices than to process composed content, thus voice command frameworks are ubiquitous in PC gadgets. reconnaissance should be possible through raspberry pi zero w camera in our robot video live gushing from PC or cell phone utilizing android application. The vehicle ought to be generally shoddy and easy to assemble so it can be reproduced by a school or undergrad. The principle target of this venture is to diminish man power. It is an intuitive robot i.e It can speak with people and plays out the undertaking given by the client and furthermore perceive the voice and face. The robot can be controlled in two ways. Remote control will get associated with robot through bluetooth dongle which gives a conventional scope of 10 meters of operation WebIOPi is an electronic remote interface which can control robot through web making this robot IoT. Here we are utilizing computerized reasoning by utilizing raspberry pi PC.

II. LITERATURE SURVEY

Artificial intelligence is a territory of software engineering that arrangements with enabling machines to appear like they have human intelligence. Extreme AI would be an entertainment of the human manner of thinking that is a manmade machine with our scholarly capacities. This would incorporate the capacity to learn pretty much anything, the capacity to reason, the capacity to utilize dialect and the capacity to figure unique thoughts. Roboticists are no place close accomplishing this level of artificial intelligence, yet they have gained a considerable measure of ground with more constrained AI. Robotics is a branch of building that includes the origination, plan, fabricate, and activity of robots, that can take every necessary step of a man and that works naturally or is controlled by a PC. RPi has been utilized for different applications, in the creators have proposed a framework which centers around cost sparing and improving the nature of administration in the field of innovation helped instructing. Raspberry Pi and its web interface stores records that have been sent from remote PCs and view these power point records or Portable Document Files (PDF) on the mixed media projector. It focuses to substitute workstations with Raspberry Pi, which won't just significantly lessen the cost included, yet in addition will help accomplishing nature of administration as the framework will devour a littler measure of energy. In another execution creators proposed a picture catching procedure in an implanted framework in light of Raspberry Pi sheets. The greater part of the acknowledgment frameworks depend on a PC, the convenientce of which is constrained by its weight, measure and the powerful utilization.

III. PROPOSED SYSTEM

The system proposed here is a multifunctional assistive robot based on field of artificial intelligence by using

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raspberry pi zero w. Raspberry Pi is a credit-card sized minor computer as shown in Fig.1. It's a small PC which carries all the functionality that are delivered by a desktop PC. It performs some daily tasks like face detection with live streming for home security and also detection of events, PDF reading, newspapers, stories, articles and voice recognition.



Fig1. Block diagram of voice controlled robot using raspberry pi zero.

A. Raspberry Pi Zero

The Raspberry Pi is a popular Single Board Computer (SBC) in that it is a full computer packed into a single board. Many may already familiar with the Raspberry Pi 3 and its predecessors, which comes in a form factor that has become as highly recognizable. The Raspberry Pi comes in an even smaller form factor. The introduction of the Raspberry Pi Zero allowed one to embed an entire computer in even smaller projects. This guide will cover the latest version of the Zero product line, the Raspberry Pi Zero - Wireless, which has an onboard WiFi module. While these directions should work for most any version and form factor of the Raspberry Pi, it will revolve around the Pi Zero W as shown in Fig.2.



Fig.2. Raspberry Pi Zero W.

The most noticeable differences between the Raspberry Pi Zero (and Pi Zero W) and the Raspberry Pi 3. Both boards are identical in features except that the W has built in Wi-Fi and Bluetooth. Getting started with the Pi Zero board can be a little more cumbersome than with the Pi 3 because many of the connectors need adapters to connect to standard size connectors. Otherwise, to get started, all you need is a USD card with a Raspberry Pi image on it and power.

B. About Raspbian

Raspbian is an unofficial port of Debian Wheezy armhf with compilation settings adjusted to pro-duce optimized "hard float" code that will run on the Raspberry Pi. This provides significantly faster performance for applications that make heavy use of floating point arithmetic operations. All other applications will also gain some performance through the use of advanced instructions of the ARMv6 CPU in Raspberry Pi. Although, Raspbian is primarily the efforts of Mike Thompson and Peter Green, it has also benefited greatly from the enthusiastic support of Raspberry Pi com-munity members who wish to get the maximum performance from their device. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. How-ever, Raspbian provides more than a pure OS: It comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi. The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was com-pleted in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible. Note: Raspbian is not affiliated with the Raspberry Pi Foundation. Raspbian was created by a small, dedicated team of developers that are fans of the Raspberry Pi hardware, the educational goals of the Raspberry Pi Foundation and, of course, the Debian Project.

B. Bluetooth Module HC-05

HC05 module is an easy to use Bluetooth SPP(Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication as shown in Fig.3. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04 External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). The Bluetooth module HC-05 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT Commands. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc.

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Fig.3. HC-05 Bluetooth Module.

C. DC Gear Motors

Motors take electrical energy and produce mechanical energy. Electric motors are broadly classified into two different categories: Direct Current (DC) motor and Alternating Current (AC) motor as shown in Fig.4.



Fig.4. DC Geared Motor.

A DC motor is an electric motor that runs on direct current power. In any electric motor, operation is dependent upon simple electromagnetism. A current carrying conductor generates a magnetic field, when this is then placed in an external magnetic field, it will encounter a force proportional to the current in the conductor and to the strength of the external magnetic field. It is a device which converts electrical energy to mechanical energy. It works on the fact that a current carrying conductor placed in a magnetic field experiences a force which causes it to rotate with respect to its original position.

Connecting DC Motor with Microcontroller: Microcontrollers can't drive the motors directly. So we need some kind of drivers to control the speed and direction of motors. The motor drivers will acts as interfacing devices between microcontrollers and motors. Motor drivers will act as current amplifiers since they take a low current control signal and provide a high current signal. This high current signal is used to drive the motors. Using L293D chip is the easy way for controlling the motor using microcontroller.

D. L293D Motor Driver IC

L293 and L293D devices are quadruple high current half H-drivers .The L293D is designed to provide bi directional drive currents of upto 1A at voltages from 4.4 to 36 V as

shown in Fig.5. The L293D is designed to provide bi directional drive currents of upto 600-m A at voltages from 4.5V to 36V.Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors as well as other high current/high voltage loads in positive supply applications.



Fig.5. L293D Pin Diagram.

Let's consider a Motor connected on left side output pins (pin 3, 6). For rotating the motor in clockwise direction the input pins has to be provided with Logic 1 and Logic 0.

- Pin 2 = Logic 1 and Pin 7 = Logic 0 |Clockwise Direction
- Pin 2 = Logic 0 and Pin 7 = Logic 1 |Anticlockwise Direction
- **Pin 2 = Logic 0** and **Pin 7 = Logic 0** | Idle[No rotation] [Hi-Impedance state]
- Pin 2 = Logic 1 and Pin 7 = Logic 1 | Idle[No rotation]

IV. ALGORITHMS

Step 1: start

Step 2: initially power supply is given to the raspberry pi Step 3: Plug the power supply into the **power outlet.** This will turn on and boot up Raspberry Pi. A power indicator light will begin to glow, letting you know that you are connected.

Step 4: make a voice command to mobile phone application which is placed on the robot

Step 5: Directions are given by the operator using google assistant

Step 6: when voice command Go then the vehicle moves forward

Step 7: when voice command back then the vehicle moves backward

Step 8: when voice command left then the vehicle moves left

Step 8: when voice command right then the vehicle moves right Step 9: when voice command left spin then the vehicle spins towards the left.

Step 10:when voice command right spin then the vehicle spins towards the right

Step11: when voice command is error, robot stops moving.

Step 12: we can use manual commands instead of voice commands which is operate in arduino bluebooth application.

Step 13: surveillance can be done through raspberry pi camera in our robot

Step 14: video live streaming from laptop or mobile phone using android app.

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The speech recognition is achieved by the use of Raspberry Pi board with the Bluetooth wireless interface of the smartphone. And the output is generated by the system which has accuracy about 95% i.e. after 1-2 sec. the voice command is followed by the robotic system and the system moves RIGHT, LEFT, FORWARD, BACKWARD, LEFTSPIN, RIGHT SPIN according to commands and STOPS and also surveillance can be done through raspberry pi camera in our robot as shown in Figs6 and 7.



Fig.6.Voice Controlled Robot.

Live Streaming:





The robot can be controlled by methods for two ways. To begin with approach to control the developments of robot is by utilizing the Bluetooth controlled remote. Every single catches of remote are allocated to a specific errand and supply constantly to work. Second method for controlling the robot is through web from remote area making it IoT. Client needs to put IP address of robot into separate web program. reconnaissance should be possible through raspberry pi camera in our robot video live spilling from PC or cell phone utilizing android application.

Future Scope: So now we've just about reached the end of this guide. If you've been following this all the way through then well done! Hopefully you've learned some valuable new skills and had some fun on the way. This should not be the end of the story, but the start of a new adventure. This guide has been about preparing you with the skills to now make something really special out of your robot. I will be developing my robot further in the future. Here are some of my ideas on how this can be developed, but I'd love to hear about how you develop yours too. Improve the software, Web based interface, Dedicated app on PC / mobile phone, Tablet version, Interesting low cost screen technologies, Control the robot using Scratch or other programming languages, Add sensors & Micro switches, Ultrasound, Infrared ,Make the robot talk, Pick up Lego bricks, Improve the camera streaming.

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Fig.7. Prototype of System.

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