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VOICE CONTROLLED ROBOT WITH SURVEILLENCE CAMERA USING LabVIEW

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Abstract: In the digital world it would be cool to make a robot which obeys human speech commands and perform tasks. It will be very much fun if we can control robot with our speech. There are movies like iron man where he makes himself a totally different network for himself which is overrated. The idea of making this came from a movie called I robot, here the people uses robots for the help just by giving commands. The reason we chose voice was there are robots which work on gestures and line robots. But the voice control we used overcomes the flaws in these other ones. Voice recognition technology is made possible for the computer to analyze and follow the voice command and to understand human languages. Although there are many robots designed on touch and other devices aiding on control, the control over voice with ease of operation is left untouched. The main intention is to make a gateway for simple operation for the automation in voice controlled robot. As a solution, the robot with voice control is designed in the paper by combining the speech recognition technique with the help of LABVIEW programming concepts. The appropriate control signal for the robot will be provided by the LABVIEW. The usage of LABVIEW for the interpretation of voice signals makes the research easier compared to other sound-based robot control system.

Keywords: Speech command, Voice control, Voice recognition, LABVIEW.

I. INTRODUCTION

The research in the area of the voice recognition has been going on from past forty years. But, still here was a need for improvement in the speech recognition system. The speech recognition system can be defined as the process of converting the acoustics sound signals, captured by the microphone or telephone, to a set of words. An easy way to control robots is to give voice commands to them. This allows the user to take some rest or to concentrate on other things. At present many ways are used to control robots but the most efficient way is by giving voice commands. There are various voice control mechanisms developed till date and in separate fields. For example, there is a design of a voice controlled robotic gripped arm which is built on official Bangla voice control using neural networks for medical systems.

Likewise, a voice- controlled wheelchair makes it easy for physically disabled person who cannot control their movements of hands. The powered wheel chair depends on motors for movement and voice recognition for command. The circuit comprises of an Arduino, Voice recognition module and Motors. In similar manner the one robot we developed is much easier to process through Virtual Instruments.The objective is to use NI myRIO which is a real time embedded device developed by National Instruments. It is used to develop applications that utilize its on board FPGA and microprocessor. It requires the graphical programming language LabVIEW to create voice controlled robot. Using this device, it is quite easy to design complicated systems and to solve real life problems quite efficiently and quickly.

Sensors like temperature and gas, helps to detect any fire or leakage of gas in that place. The camera and sensors (temperature, gas) acts a safety and surveillance purpose. Using labVIEW is quite easy and simple to design complicated systems and to solve real time problems.The main objective is to make a gateway for simple operation for the automation in voice- controlled robot. Voice controlled robot is a mobile robot, where the motions can be controlled by user giving specific commands.

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II. METHODOLOGY

It is aimed to control a robot with speech commands. Voice recognition module accepts the voice input given by the user, and then transfers the signal to the NI myRIO controller which then activates L293D motor driver which acts as interface between the dc motors and the controlled circuit.DC motors are mounted on robot chassis for movement of vehicle. Driver module provides the control over rotation of DC motors, thereby controlling direction of vehicle. MyRIO being an embedded system controls all the operations of the robotic vehicle. A web camera is mounted upon the vehicle. User interface, live streaming of video is available at front panel. Using LabVIEW, we can also store the voice commands given by the user and further when the user repeats commands; it matches the predefined commands and sends the signal further.

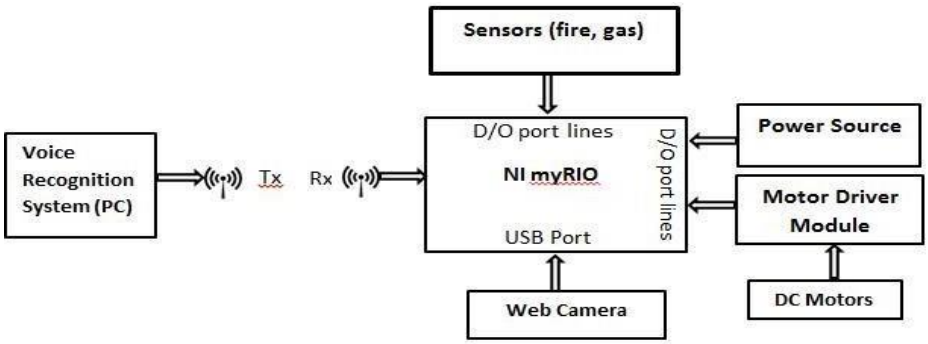

Figure 1: Block Diagram of Voice Controlled Robot

The above block diagram of voice-controlled robot consisting of electronic and electrical components namely, DC motors to steer the robot movement and the power supply. All these components interfaced with NI myRIO and the LabVIEW software. LabVIEW takes various inputs from connected sensors, voice recognition system and processes it according the defined program and then provides the output to the DC Motor for the robot movement.

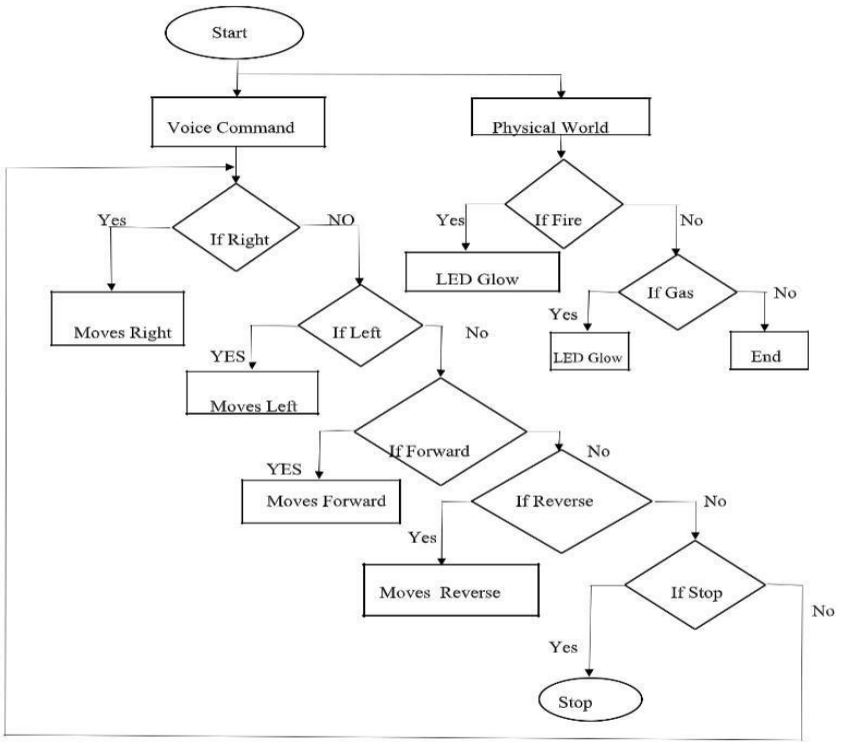

Figure 2: Flowchart of Voice Controlled Robot

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STEP 1: VOICE INPUT

Voice command by user is given as input to the voice recognition module. Windows speech recognition model. It's an inbuilt speech recognition system, where the laptop microphone acts as a sound input and process the command to the LabVIEW software. VR module is trained regarding the commands that the mechanism ought to respond consequently.

STEP 2: VOICE RECOGNITION

The code is developed in such a manner that it recognizes 5 commands: i.e., FORWARD, REVERSE, LEFT, RIGHT and STOP. In LabVIEW, the received speech signal will be analyzed; operated and corresponding command will be given as output.

STEP 3: WIRELESS TRANSFER

The output from the LabVIEW will be transmitted to the robot unit via Wi-Fi module interfaced to control unit using NI my RIO.

STEP 4: MOVEMENT OF ROBOT

Based on the signal received from the control unit, the controller will deactivate or ON the motors concerned with the robot movement. The robot is capable of moving in all 4 directions (Forward, Reverse, Left and Right) including Stop. The movement is done with the help of motors and drivers.

STEP 5: USING OF CAMERA AND SENSORS

Further improvisation can be done by adding fire Sensor, gas sensor and a camera for safety and surveillance.

III. RESULTS AND DISCUSSIONS

The voice-controlled robot is designed and implemented using LABView. The robot is being operated here autonomously with the commands that will be pre-configured in the system software. The robot unit which mainly comprises of the hardware part will be responsible for activation of the motors based on the command received through the WI-FI receiver. Ni my RIO is interfaced between the robot hardware and the LABView software.

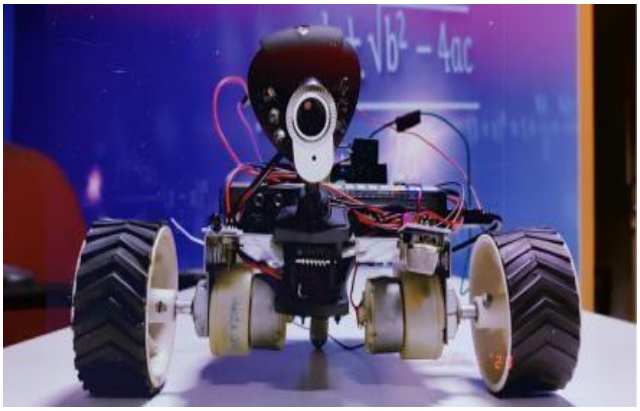

Figure 3: Front View of Voice Controlled Robot

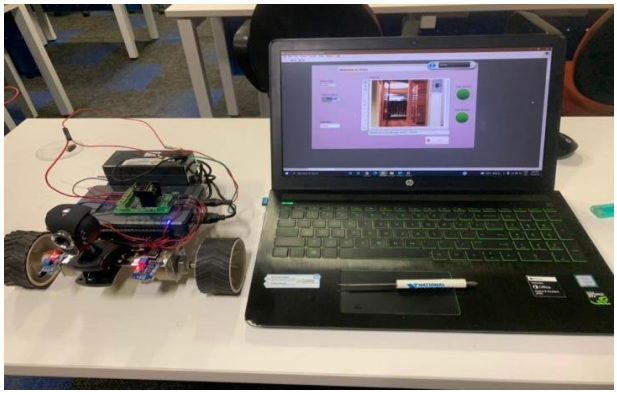

Figure 4: Working of Voice Controlled Robot

The human voice is given as the input and then processed in LABView which then is given as the input to the Wi-Fi transmitter/receiver. The end output will be the movement of the robot following the commands given by the human source. The robot should move according to the speech commands given and matched with the predefined commands stored in the voice recognition module. If there is any fire or leakage of gas the sensors should detect and glows an LED inside the LabVIEW. A camera is embedded into the front of the robot which will show everything in front of him and also display the same on the computer screen (front panel).

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IV. CONCLUSION

The robot moves according to the speech commands given and matched with the predefined commands stored in the voice recognition module. It is found that the voice recognition module consumed less memory as there are only a few commands stored in it. As speech is the input for the project, this can be used by any person with or without technical knowledge and make the use of the robot according to the needs. Use of LabVIEW makes this project compatible to any device and can be altered according to the requirement of the customer without much effort. Many industries, hospitals can be helped in large scale by bringing this out, as the motors we used will run with the help of battery or some small power supply, which can be taken as a reference. We ran some tests by adjusting the frequency to avoid minor disturbances and for its efficient working also time delay is given where it can be adjusted. Using the speech processing unit makes the system work with better ease and accuracy. The robot is simple to design and also works with better efficiency, thus making the system reliable and cheap. Further the system can be used in different applications for improved use to serve for humans. This helps in better quality output, less overhead of humans, cost efficient, with increased accuracy and efficiency.

Implemented at a larger scale by embedding more sensors for different application. We can have various sensors for different application which can detect various causalities, like temperature detector, pressure detector, oil leakage detector and so on.The voice recognition capability of robot can be improvised using Natural Language Processing (NLP).Voice based feedback can also be added. The robot can also be enabled with AI, so that there is memory of previous commands given.

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