ROBOTIC ARM CONTROLLED BY VOICE

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Abstract - *Robotics has become an interesting area of research in the field of Electrical Engineering. This is due to the vast potential it holds in reducing human effort in performing tasks faster while still maintaining operational accuracy. The recently introduced Android operating system used in many devices such as mobile phones, tablets and digital cameras is user friendly and can be extended to control smart and intelligent systems such as robots. This paper designed and developed a pick and place robotic arm vehicle using an android application to control the robot through voice commands. Arduino programming language, which is an open source and simplified version of C++ known for its friendly architecture was used to program the controller (ATMEGA328P). The integration of control unit with blue-tooth device was done to capture and read the voice commands. The robotic vehicle then operates as per the command received via android application. The device was designed to lift a maximum combined mass of 250g and it can communicate at maximum distance of 12m with high precision.*

Key Words: *Robotics, android, accuracy, intelligent, controller and precision.*

1. INTRODUCTION

A robot is an integral part in automation of flexible manufacturing systems that are greatly in demand these days. Robots are now more than just machines; rather robots have become the solution of the future as cost of labor and customers' demands keep increasing. Though the cost of acquiring a robotic system is quite expensive, but as today's rapid development and a very high demand in quality with ISO (International Standard Organization) standard scan only be guaranteed using robotic systems. Robots are indispensable in many manufacturing industries, because the cost per hour to operate a robot is a fraction of the cost of the human labor needed to perform the same function. Moreover, once programmed, robots repeatedly perform functions with a high accuracy that surpasses that of the most experienced human operator [1, 2]. Human operators however remain more versatile as reprogramming and parts replacement may be required in order to alter the nature of operation of robots when tasks change. This paper is aimed at designing and developing a pick and place robotic arm vehicle with a circular plastic gripper in order to accommodate varying dimensions of objects. The robotic vehicle is android voice application controlled for remote operation. There are so many hazardous situations in day to day life. There are so many occasions where the human can't work .In such situations, without a considerable amount of

safety precautions like in the disposal of hazardous wastes, radioactive substances, remote handling of explosive devices and lighting and hostage situations among others, work is impossible. These robots can safely work at hazardous conditions ensuring the human safety and replacing massive human work force. It can be also applied in medical sciences, surgeries, defense, artificial intelligence, super markets, and also in manufacturing. Android is a new operating system which has now taken center stage in many of our electronic devices and as such incorporated in the project. This robot can safely work in hazardous and risky conditions ensuring human safety and replacing massive human work force.
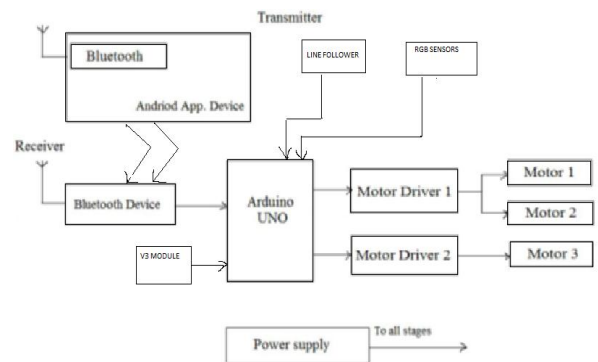
1.1 BLOCK DIAGRAM

Fig-1: Block Diagram

The block diagram in figure 1 shows all the major components that is required for a voice controlled robotic arm using a microcontroller. The voice inputs are given through a microphone to the voice recognition module. The digital output corresponding to the voice command is provided to the microcontroller (it requires an external power supply of 5V). Microcontroller will generate the control signals to operate the four motors of the robotic arm. These signals are given to the motor drivers (to meet the additional power requirements of the motors). Motor drivers control the direction of rotation of the four motors.

1.2 Major Components

The major components used are Speech Recognition kit SR07, Arduino Mega 2560 microcontroller, motor driver L293D and the robotic arm.

The Arduino Mega is a microcontroller board based on ATmega 2560. It has 54 digital input or output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB

connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.
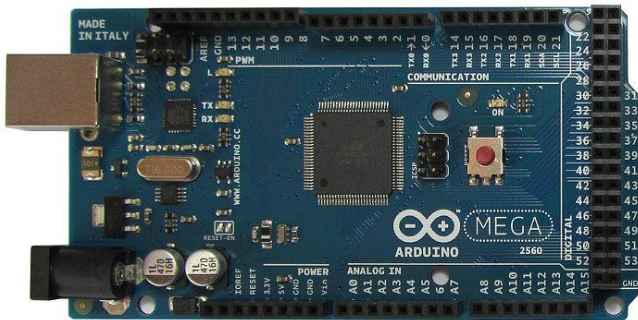

Fig -2: Arduino Mega Microcontroller

The L293D is a quadruple high-current half-H driver. It is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V.

Fig-3: Motor Driver L293D

The speech recognition kit is a complete easy to build programmable speech recognition circuit; programmable, in the sense that the words to be recognized are trained into the module. This kit allows the user to experiment with many facets of speech recognition technology.

**Fig -4:** Speech Recognition SR-07

2. ALGORITHM

This assistant robot will be initiated by a command given by the user from the android application.

- Bluetooth Module HC-05 is used for communication between robot and android application.

- The application will have a no. of commands like 'forward', 'reverse','left','sharp left', 'right','sharp right','stop' to control the robot.

- The Robot will be guided to a specific point.

- It will sense the colour of the object to be carried using the RGB sensor.

- It will grab the object using the robotic arm provided on the robot.

- The Robot will then return back to the user as per the command given.

3. FLOWCHART

Initially the output from the voice recognition module is of the state 00. The BCD of this state is given to the Arduino board. When a command is given to the voice module the corresponding number in which that particular word is stored is displayed on the 7-segment display. The BCD corresponding to it is given to the microcontroller. The nine conditions are then checked. If a particular condition is satisfied, appropriate signals are taken from the Arduino to the motor driver which drives the required motor.
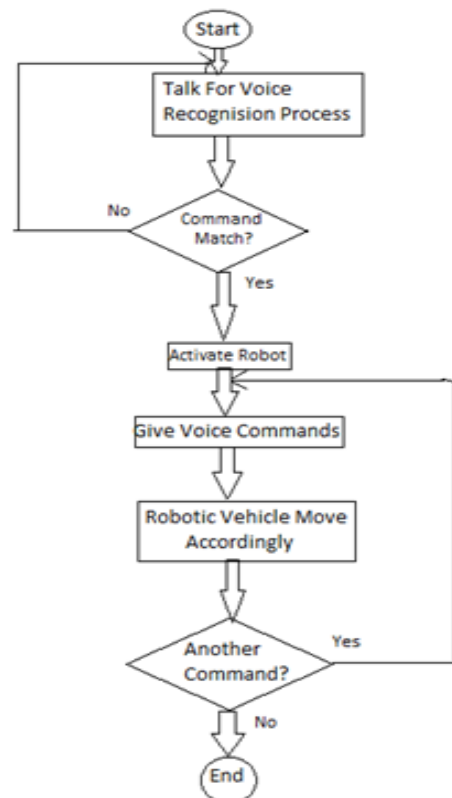
3.1 WORKING

This project presents the working of a robotic arm using voice control. The main aim of this project is that it can be very useful for paralyzed people or people with motor impairments. The appropriate words to be recognized are

first trained by the user using the speech recognition module. The words are stored in numbers ranging from 1 to 9 which is displayed on the 7-segment display. During working, when the user says a particular trained word into the microphone of the speech recognition module, the words are recognized by it and the corresponding BCD of the number in which the word is stored is taken out as the output. The output of the speech recognition kit is sent to the Arduino microcontroller. According to the inputs received by the Arduino, appropriate signals are now sent to the motor driver to rotate the required motor in the specific direction. Pulse width modulation is used to set the required speed with which the motor has to rotate. Thus, each part of the robotic arm can be controlled by controlling the direction of that particular motor. The motor continues to rotate until the user says a second command or a stop command. When the stop command is said all the motors remain ideal.

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