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Bluetooth/GSM Based Android Controlled Robot

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Abstract: ***The project aims in designing a robot that can be operated using Android Apps. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth module feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boasts a healthy array of connectivity options, including Wi-Fi, Bluetooth, and wireless data over a cellular connection (for example, GPRS, EDGE (Enhanced Data rates for GSM Evolution), and 3G). Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDAs (personal digital assistants), and mobile phones. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system. In achieving the task, the controller is loaded with a program written using Embedded 'C' language.***

Keywords: Robot, smart phones, arduino UNO, Bluetooth module, GSM.

I. INTRODUCTION

Android controlled robot project make use of an Android mobile phone for robotic control with the help of Bluetooth technology. This is a simple robotics projects using microcontroller. We have already seen Mobile Controlled Robot using DTMF technology which uses call-based method to control robot. Also, many wireless- controlled robots use RF modules. The control commands available are more than RF modules. Smartphone controlled robot is superior to all these robots. This project is a Bluetooth/GSM controlled robot. For this the android mobile user has to install an application on her/his mobile. Then user needs to turn on the Bluetooth in the mobile. The wireless communication techniques used to control the robot is Bluetooth technology. User can use various commands like move forward, reverse, stop move left, and move right. These commands are sent from the Android mobile to the Bluetooth receiver. Android based robot has a Bluetooth receiver unit which receives the commands and give it to the microcontroller circuit to control the motors. The microcontroller then transmits the signal to the motor driver IC's to operate the motors

II. LITERATURE REVIEW

This section discusses the existing systems. [1] Smart phone Bluetooth controlled robot by Upkar gupta, Darmendrakumar sharma, Feku sharma the operating system of smart phone is android which can develop effective remote control program. At the same time, this program uses blue-tooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot which would allow a non-expert to interact with and adjust the functionality of a system which uses ATmega328 controller, a single board micro-controller intended to make the application of interactive objects or environments more accessible. The surveillance is always has been a quite sensitive task. And it includes so many risks. So it's better to use robot for this job instead of people. And if you are able to control the robots with efficiency and accuracy then you can guarantee yourself with good results and success. [1]

We select all equipment's based on data sheets. It is feasible to implement Bluetooth communication between smartphone and microcontroller. It can be used in various industries for picking various objects where human intervention is not desired. On a large scale, it can be used to develop robots with military applications. It can be used to target enemy without any human being crossing the territory. It provides for more development of applications based on android operating system. Such as, Application based on sensors (accelerometer, gyroscope) etc.

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The development of apps for Android in Android SDK is easy and free of cost. With tremendous smart phone in markets, it is bound to have many more applications in near future. It is robust, sensitive and fast moving, hence can be applied in rescue operations [2].
The semantics in which the Arduino is used by artists and designers points to its success and growth within its intended audience. The findings situate the Arduino microcontroller differently than former art and design tools. The most significant finding shows that both form and function in art and design pieces are strong contenders in reasons why modifications are made to the Arduino microcontroller. The usability, community and open source initiative of the Arduino microcontroller empower artists and designers to manipulate their tool and iterate new versions of Arduino microcontroller.[3]
We select all equipment's based on data sheets. It is feasible to implement Bluetooth communication between smartphone and microcontroller. It can be used in various industries for picking various objects where human Intervention is not desired. On a large scale, it can be used to develop robots with military applications. It can be used to target enemy without any human being crossing the territory. It provides for more development of applications based on android operating system. Such as, Application based on sensors (accelerometer, Gyroscope) etc. The development of apps for Android in Android SDK is easy and free of cost. With tremendous smart phone-in markets, it is bound to have many more applications in near future. It is robust, sensitive and fast moving, hence can be applied in rescue operations. [4]

III. BLOCK DIAGRAM & WORKING PRINCIPLE

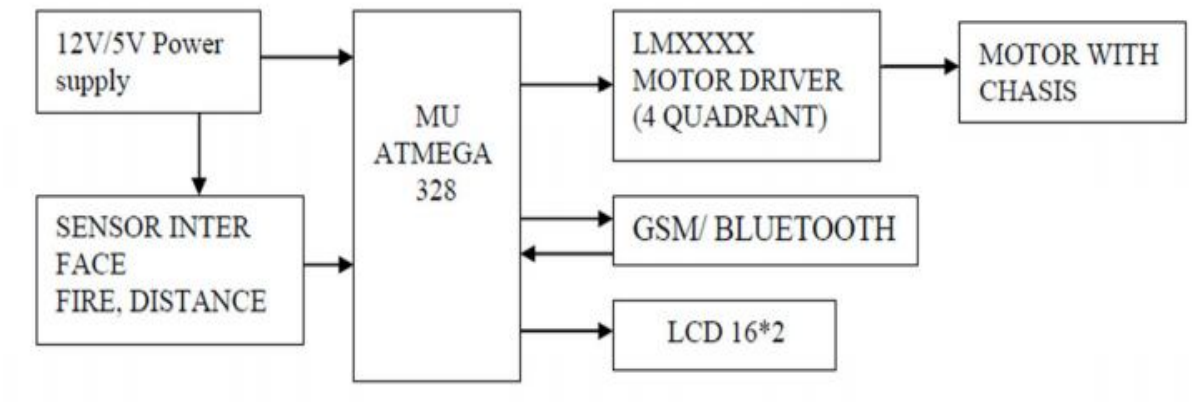


Fig 1: Block Diagram & Working Principle

The android application-controlled robot communicates via Bluetooth to the Bluetooth module present on the robot. While pressing each button on the application, corresponding commands are sent via Bluetooth to the robot. The commands that are sent are in the form of ASCII. The ARDUINO on the robot then checks the command received with its previously defined commands and controls the DC motors depending on the command received to cause it to move forward, backward, left, right or to stop. Thus, allowing us to create an android controlled robot. The major building blocks of the project are:

1) Regulated Power Supply.
2) Microcontroller.
3) Android smart phone.
4) Bluetooth module.
5) DC motors with driver.
6) Crystal oscillator.
7) Reset.
8) LED indicators.

A. Software's Used Are

1) ARDUINO compiler for Embedded C programming.
2) Proteus for Circuit design.

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IV. SYSTEM DESIGN

The design of the system is kept as simple as possible. Few things like cost-effectiveness and simplicity in design, low profile structures etc. have been kept in mind before designing the project. Our system aims to achieve the target to design a system that can provide following functionalities with a simple and easy-to-use interface:

1) Develop an android application that will act as a remote of a robot.
2) Develop a robot which will be helpful for travelling.
3) Here the focus is on the latest technology of android and robot also called as 'Mobot'.
4) An android smart-phone and the technology of android are vast and can be used to interact with embedded system.
5) Mobile, robot and Bluetooth are the on-going technologies which can be used for the benefit of mankind.
6) Hardware of this project consists of Arduino UNO, Bluetooth module and a motor driver IC.
7) The Bluetooth module is connected with the Arduino UNO board for the connection with the user.
8) Through the Bluetooth module for monitoring and controlling the particular motor reaches the board and process Accordingly and the output of the Arduino goes to the motor driver IC and it controls the particular motor.

The system consists of following parts:

A. Arduino UNO

Microcontroller will act as the brain of the robot. The robot movement will be decided by the microcontroller. In this system we will be using microcontroller named Arduino UNO which contains ATMEGA 328P microcontroller chip. The microcontroller is programmed with the help of the Embedded C programming. Arduino has it own programming burnt in its Read Only Memory (ROM). C program is very easy to implement for programming the Arduino UNO.



Fig 2: Arduino UNO

B. Bluetooth Module (HC-05)

The Bluetooth module will act as an interface between Smartphone and microcontroller. We will be using HC-05 Bluetooth module for the system, which can be used as either receiver or transmitter. Generally our transmitter will be smart-phone and receiver will be Bluetooth module (Figure 2). Bluetooth module will give the commands given by Smartphone to the microcontroller.

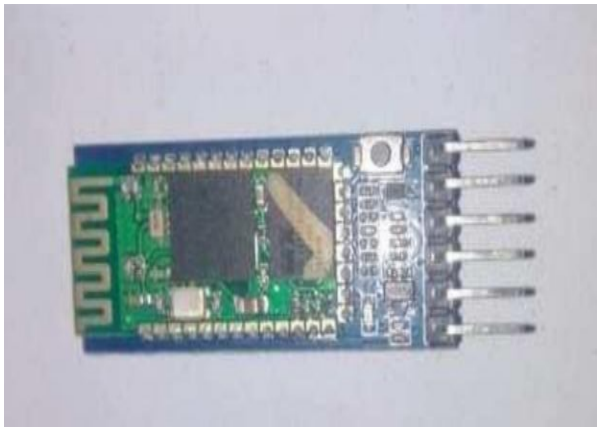


Fig 3: HC-05 Bluetooth wireless UART Module

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C. Smart Phone

The smart phone is the transmitter of this circuit. It sends the data to microcontroller through Bluetooth module. It also helpsto send the instruction of forward, backward, left, and right to the microcontroller. Actually, the smart phone is used as a remote of this system. Here we the Bluetooth RC Controller application (Figure 3) as the operating remote of this system. The advantage of this project is that the application software designed for android phones is kept simple but attractive with all necessary built-in functions. The novelty lies in the simplicity of the design and functioning.

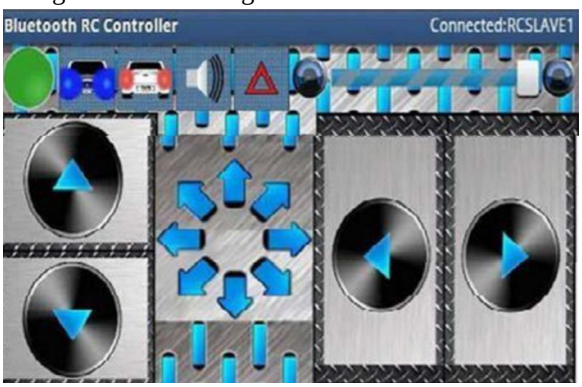


Fig 4: Smart phone

D. Motor Driver Module-L298N

L298N is a high voltage, high current motor driver chip. The chip uses 15-pin package. The main features are: high voltage, maximum operating voltage up to 46V; output current, instantaneous peak current up to 3A, continuous operating current of 2A; rated power 25W. Contains two H-bridge high-voltage and high current full-bridge driver can be used to drive DC motors and stepper motors, relays, coils and other inductive load; using standard logic level signal control; having two enable control terminal, in allows input signal without being affected or disable the device has a logic supply input, the internal logic circuit part of the work at a low voltage; can be an external sense resistor, the amount of change back to the control circuit. Drive motor using L298N chip, the chip can drive a two- phase stepper motors.

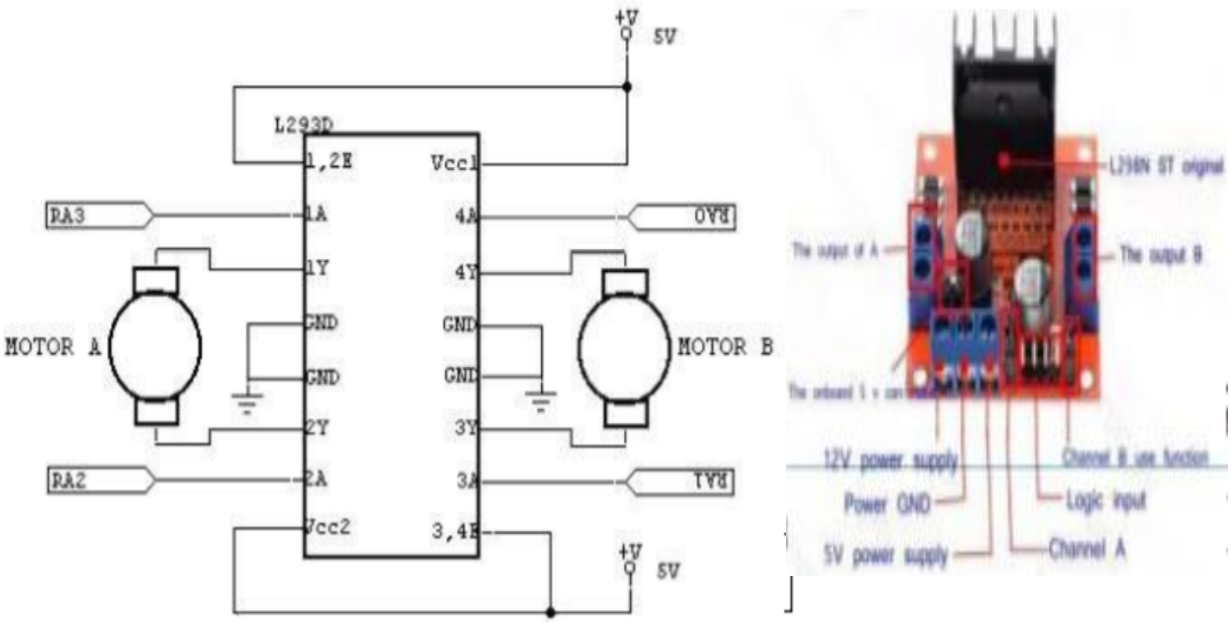


Fig 5: Motor Driver Module L298N

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E. Arduino Software (Version 1.8.1)

Arduino software is used to put the instruction of whole functions of this system to the microcontroller. Here we use programming language 'C' for coding. The program for executing this project has been written in C language. The program is burnt in the microcontroller using burner software. The program is stored in the EEPROM of the microcontroller, which is present in the Arduino board. By this software we put the data and instruction for forward, backward, left, right operation of this system. In android application when we press a button, a corresponding signal is sent through the Bluetooth to Bluetooth module (HC-05) which is connected with the Arduino board. When signal data arrives the Arduino the pin which corresponds to the particular input is set to high. Now that pin gives the output to the motor driver section. Motor driver switches accordingly the data bit, if the data bit is low then the corresponding pin of the motor driver doesn't work else high bit then the corresponding pin of the motor driver is on. We have used Arduino IDE version 1.8.1 for writing program for Arduino. There are two steps of the programming. First set up section where we define all the variables. Second loop part where the program runs continuously.

V. APPLICATIONS

1) In Domestic Use: This project can be used at homes for many purposes like picking up and placing some objects from one to other.
2) *In Spying Operations:* This robot can help in spying operations. The object recognition and android control makes it Hi-Fi.
3) *For Handicapped People:* This project can help the handicapped people especially those who had lost their feet unfortunately.
4) *Robo Races:* The tilt control of robots can be used in robo races which will be revolutionary.

Military Application and Hostage Rescue.

VI. CONCLUSIONS

We select all equipment's based on data sheets. It is feasible to implement Bluetooth communication between smartphone and microcontroller. It can be used in various industries for picking various objects where human intervention is not desired. On a large scale, it can be used to develop robots with military applications. It can be used to target enemy without any human being crossing the territory. It provides for more development of applications based on android operating system. Such as, Application based on sensors (accelerometer, gyroscope) etc. The development of apps for Android in Android SDK is easy and free of cost. With tremendous smart phone in markets, it is bound to have many more applications in near future. It is robust, sensitive and fast moving, hence can be applied in rescue operation.

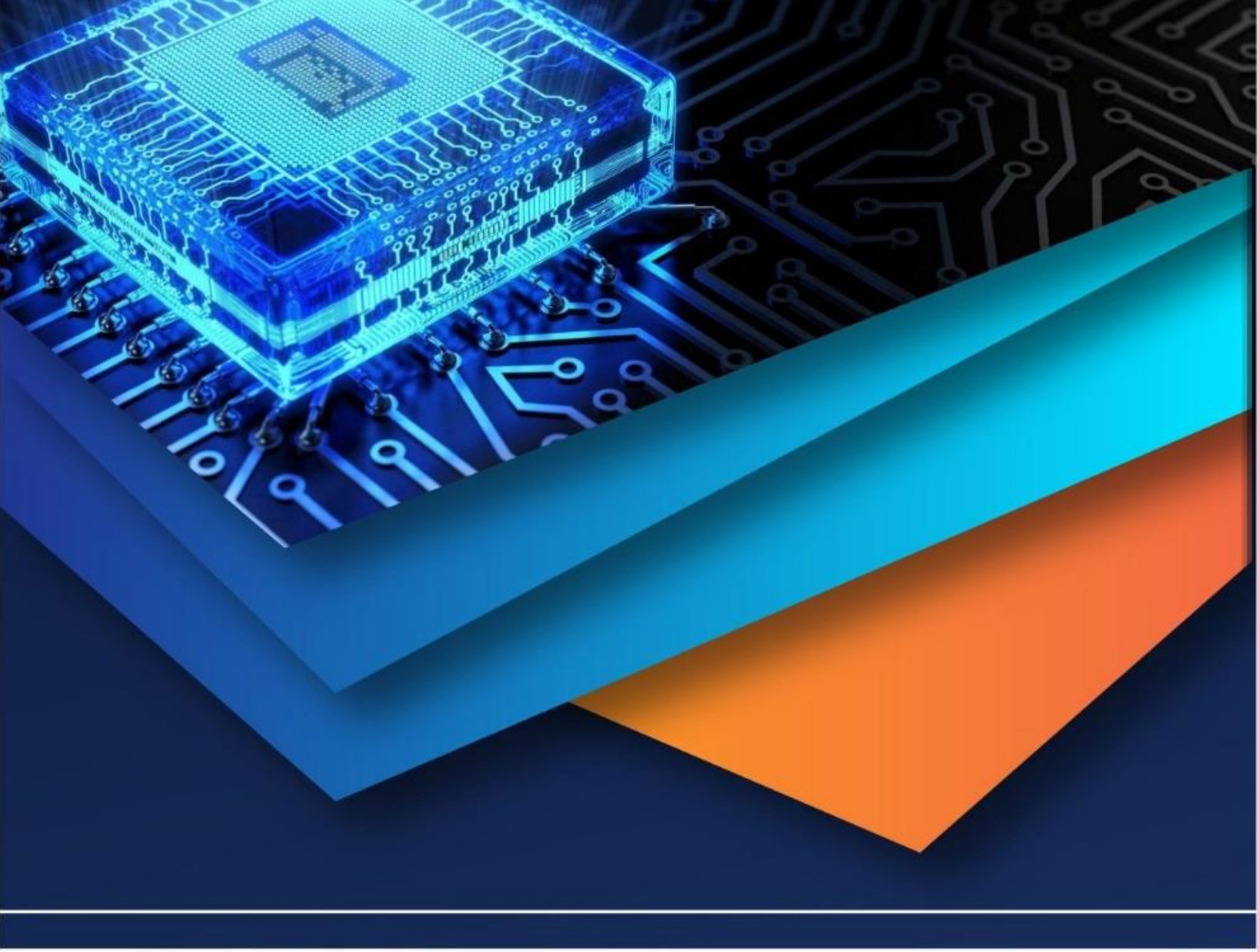
VII. ACKNOWLEDGMENT

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REFERENCES

[1] P. D. Minns, Atmega32 for Arduino Microcontroller System. Author House, 2013
[2] M. Banzi, Getting started with PIC 16f877a. "O' Reilly Media, Inc.", 2009
[3] A. M. Gibb, New media art, design, and the Arduino microcontroller: A malleable tool. PhD thesis, Pratt Institute, 2010
[4] D. Mellis, M. Banzi, D. Cuartielles, and T. Igoe, "Arduino with Proteus: An open electronic prototyping platform, " in Proc. CHI, vol. 2007, 2007

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