

Android Based Bomb Disposal Robot Using Arm Controller

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Abstract— Wireless control of robots is becoming popular and so are mobile handsets. In this paper we describe the control of a robot using an Android mobile. We use Bluetooth as the wireless interface between the mobile and the robot. An android application serves as the graphical user interface for the application. The main idea of this robot is to provide safety and security to person for handling hazardous material like bomb. This Wireless Robot uses a control application at the user end to control the robot remotely using Android technology. The technician controls the robot using this application. This communication module is hosted in an android mobile. The robot includes an interpreter which will convert the commands from the mobile into motor controls. This is in addition to a manual mode where we enter commands. The ARM used in it receives the commands from the android phone through Bluetooth model connected to it and controls the Stepper motor connected to the robotic wheels.

Index Terms— Android Mobile, Bluetooth model, Stepper motor.

I. INTRODUCTION

Robot is an integral part in automating the flexible manufacturing system that is greatly in demand these days. Robots are now more than a machine, as robots have become the solution of the future as cost labor wages and customers demand. Even though the cost of acquiring robotic system is quite expensive but as today's rapid development and a very high demand in quality with ISO (International Standard Organization) standards, human are no longer capable of such demands. Research and development of future robots is moving at a very rapid face due to the constantly improving and upgrading of the quality standards products. Robot and automation is employed in order to replace human to perform those tasks that are routine dangerous, dull and in a hazardous area. Today In the world of advanced technology, automation greatly increases production capability; improve product quality and lower production cost. In this paper, we describe the mechanisms to control a robot using Bluetooth wireless sending commands to it using an android app running on mobile Robots are indispensable in many

Manufacturing industries. The reason is that the cost per hour to operate a robot is fraction of the cost of the human labor needed to perform the same function. More than these, once programmed robots repeatedly perform functions with a high accuracy that surpasses the most experienced human operator. Human operators are however far more versatile. They can switch these tasks easily. The main idea of this robot is to provide safety and security to person for handling hazardous material like bomb.

II.BLOCK DIAGRAM

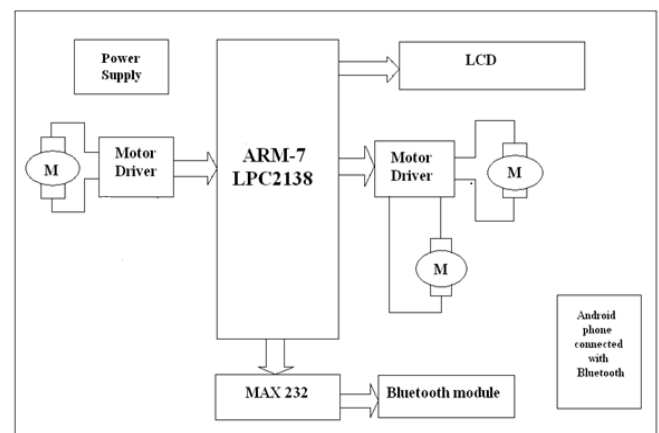


Fig.1.Block diagram

II.BLOCK DIAGRAM DESCRIPTION

Fig. 1 shows our desired work related to project it consist of motor driver, Bluetooth module,MAX232,Android Smartphone, ARM microcontroller, LCD display, dc motors. In this wireless robot project, the robot is handled by using Android Smart phone. At input side, we have Android smart phone with Bluetooth module which transmits this input signal to Bluetooth module present inside the Robot.

Bluetooth module receives the signal and verifies it. After verifying the signal it will give this signal to ARM controller by using MAX 232. Then ARM controller will identify the signal and relay to appropriate module. We are using the cutter robotic hand to cut the wire which is connected to dispose the bomb. For cutter and robotic motion we are using two motor drivers. One motor driver produces two output voltages. Two stepper motor is used for moment of robot and one motor for cutting purpose. In this way the system is used for bomb disposal application.

II. HARDWARE REQUIREMENT

The hardware requirement of this system is ARM7 Controller, Steeper motor, Bluetooth Model, Motor Driver, Android application device and power supply. The block diagram of proposed method is shown in Fig.



Fig.2.ARM 7

LPC2138 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. A 128-bit wide memory interface and unique accelerator architecture enable The 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. For this project ARM 7 series LPC2138 is used. Which is costlier than 8051 but it is advanced and has advantages over 8051.

A) Power Supply

The Entire Project needs power. However, from the study of this project it comes to know that we supposed to design power supplies 12 V dc for Stepper motor, 5V dc for peripherals, Bluetooth module, 3.5 V dc for ARM processor

B) MAX 232

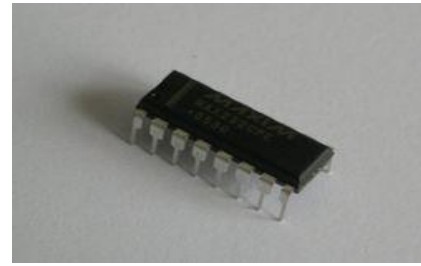


Fig.3.MAX 232 IC

It is used as communication IC between PC and ARM for programming. It works on 5V dc supply. Serial RS-232 (V.24) communication works with voltages (between -15V ... -3V are used to transmit a binary '1' and +3V ... +15V to transmit a binary '0') which are not compatible with today's computer logic voltages. On the other hand, classic TTL computer logic operates between 0V ... +5V (roughly 0V ... +0.8V referred to as low for binary '0', +2V ... +5V for high binary '1'). Modern low-power logic operates in the range of 0V ... +3.3V or even lower.

C) Stepper Motor:-



Fig.4. Stepper Motor

For driving motor IC L293D used which works on 5V dc supply and motor is interfaced with it which works on 12 V DC. Driver is used to drive this motor were it is interfaced with ARM processor and works according to signal. Motors used are Stepper motors and works on 250 mA current supply.

D) LCD DISPLAY:

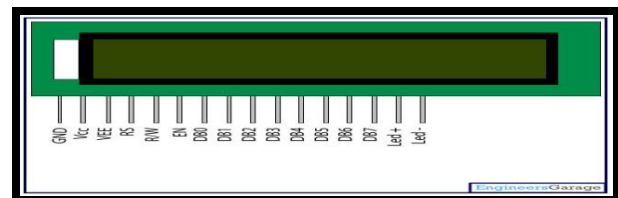


Fig.5. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module. In this paper, 16x2 LCD display is used which is very basic module and is very commonly used in various devices and circuits. LCDs are economical easily programmable and have no limitation of displaying. A 16x2 LCD means it can display 16 characters per line and there

are 2 such lines. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

E) Bluetooth Model:-

Bluetooth is a packet-based multi-layer wireless protocol with Master-slave model. In Bluetooth, one Master may communicate up to 7 slaves in a “piconet”. In this, RF Layer operates in unlicensed ISM band of 2.4GHz. In this paper, Bluetooth HC-05 is used which has a Chipset CSR BC417143. The Bluetooth version is V2.0+EDR. It has Flash 8Mbit and operates at voltage 3.3V. The size of Bluetooth module is 26.9mm*13mm*2.2mm.

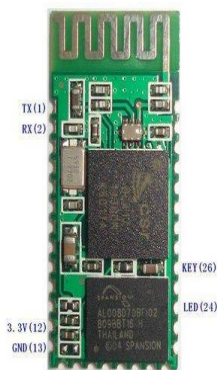


Fig.6. Bluetooth Model

The transceiver module is easy to use and is completely encapsulated. It allows your target device to both send and receive. The TTL data via Bluetooth technology without connecting a serial cable to your computer. The wireless Bluetooth RS232TIL transceiver module is suitable for mouse, keyboard, joystick, computer peripherals GPS receiver instrument and industrial control.

III. SOFTWARE REQUIREMENT

Android is the most popular operating system used in mobile. In this paper, we have developed an android application to control the movement of robotic system Blue Control is a basic universal Remote Control for Blue-Tooth enabled serial devices such as Blue Tooth modules connected to ARM.

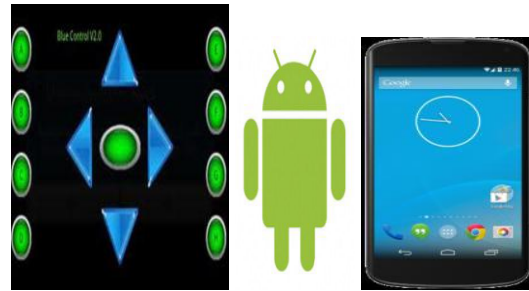


Fig.7.Blue control application, Android symbol and Android phone.

IV. EXPERIMENTAL RESULTS:-

In this way, we have implemented a robotic bomb disposal system wireless controlled by an android device. We have controlled the various movements of robot as well as bomb disposal system by sending different commands from android device through Bluetooth model. The results can be seen in Fig.

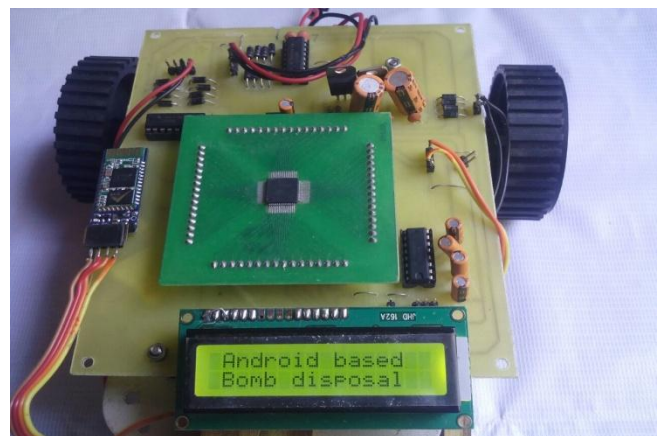


Fig.8.Initialize the robotic system



Fig.9.cutting action of cutter

V. CONCLUSION:-

The system is going to handle hazardous material with greater mobility. In today's life at many industrial sectors workers work with very dangerous and harmful machines, parts and chemicals. That's why people lose their lives or may get injured. In this situation workers safety is more essential. So our project gives them a safety for handling those hazardous materials in industries and military application.

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REFERENCES

- [1] Shamy bin mansoor [1] Department Of Computer Engineering, Sir Syed University of Engineering and Technology, Karachi, IEEE conference on "Wireless bomb disposal robot" volume: 11
 - [2] Andrew b. Cushing [2], Jackrin Suthkorn from Department of Mechanical Engineering, Johns Hopkins University, Baltimore, Maryland, IEEE conference on "Automatic Self replicating robotic system" volume: 6
 - [3] Tsay, T.L.J [3] Dept. of Mech. Eng., Nat. Cheng Kung University., Tainan, Taiwan Hsu, M.S. ; Lin, R.X. IEEE conference on "Development of a mobile robot for visually guided handling of material" volume: 3
 - [4] Harada, K. Intell. Syst. Res. Inst., Nat. Inst. of Adv. Ind. Sci. & Technol. (AIST), Tsukuba, Japan Tsuji, T. Nagata, K., Yamanobe, N., Onda, H. ; Yoshimi, T. ; Kawai, Y. IEEE conference on "Object placement planner for robotic pick and place tasks" volume: 4
 - [5] Zeng, G., Hemani, K. Robotics and Automation, 1997 Proceedings. 1997 IEEE International Conference on "An adaptive control strategy for robotic cutting", volume: 1
 - [6] Robotics by James L. Fuller Published by: Prentice Hall Publication.
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