Mobile Controlled Robot using DTMF

Miss. Pooja Pramod Bendale
Department of Electronics & Telecommunication
Sinhgad Institute of Technology & Science, Narhe, Savitribai Phule Pune University, Pune, India

***Abstract*-In this paper, we can control the Robot using Dual Tone Multi Frequency (DTMF) technology. Basically , the paper is about a mobile controlled robot which will use the DTMF technology for the interaction with the circuit mounted phone. The robot is controlled by a mobile phone that makes a call to another mobile phone attached to the robot. During this call the robot will performits functions according to the key pressed on the mobile phone tht is used to make a call. This is actually done with the help of DTMF. The robot percieves the tone with the help of tone stacked on the circuit. This tone is then processed by the micro controller with the help of DTMF decoder. Microcontroller then sends this signal to the motor's driver IC to operate the motors. Once this is done the motors then starts moving and the robot is operated.**

***Index Terms*- DTMF decoder, motor driver, mobile, micro controller.**

I. INTRODUCTION

Conventionally, wireless control robots use RF circuits, which have the drawbacks of limited working range, limited frequency range and limited control. Use of a mobile phone for robotic control can overcome all of these limitations. It provides the robust control, provides the range as long as the service provider's coverage area. This project involves the control of robot which innolves three different phases – Reception, Processing and Action. These three are the important steps of the cell operated robot. The reception is done by the DTMF decoder, the second phase processing is done by the on-board microcontroller and the action is performed using the DC motors. DTMF mobile robot is the robot that can be controlled with the mobile phone. In this project, the robot is controlled by the mobile phone that makes a call on the mobile phone that is stacked on the robotic circuit. During the call if any key on the mobile phone is pressed, a tone corresponding to the tone is heard at the reciever side mobile phone. This tone is called Dual Tone Multi Frequency. The robot becomes consious about this DTMF tone with the help of the phone stacked on the robot. The recieved tone is processed by the microcontroller with the help of DTMF decoder IC MT8870. This decoder IC then decodes the DTMF tone into its equivalent binary digit.Later, this binary signal is then to the microcontroller. This microcontroller is already pre-programmed using the software to take decision for any given input and provide the output to the motor driver IC. When the output reaches the motor driver IC ,the motors start its motion.

II.BLOCKDIAGRAM

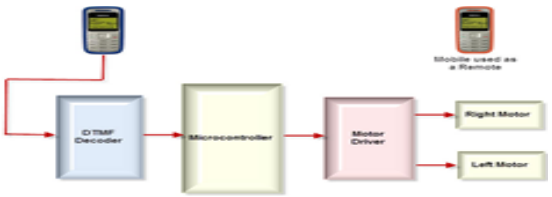

Figure 1. *Block Diagram*

The above figure shows the block diagram of the dtmf based mobile controlled robot.

i) DTMF DECODER

This circuit detects the dial tone (DTMF Tone) from a telephone line and decodes the keypad pressed on the remote telephone. The dial tone we heard when we pick up the phone set is call Dual Tone Multi-Frequency (DTMF). The name was given because the tone that we heard over the phone is actually make up of two distinct frequency tone, hence the name dual tone. The DTMF tone is a form of one way communication between the dialer and the telephone exchange. A complete communication consist of the tone generator and the tone decoder.

The DTMF telephone keypad is laid out in a 4×4 matrix of push buttons in which each row represents the *low* frequency component and each column represents the *high* frequency component of the DTMF signal. Pressing a key sends a combination of the row and column frequencies. For example, the key *1* produces a superimposition of tones of 697 and 1209 hertz (Hz). Initial push button designs employed levers, so that each button activated two

contacts. The tones are decoded by the switching center to determine the keys pressed by the user.

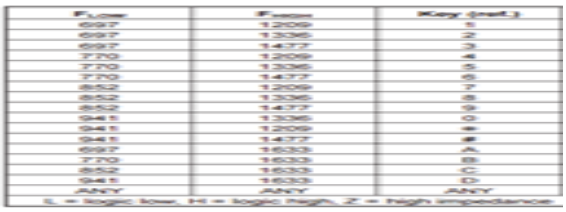

Figure 2. *DTMF frequency table*

ii) MICROCONTROLLER ATMEGA16

ATmega16 is an 8-bit high performance microcontroller from the Atmel's Mega AVR family. Atmega16 is a 40 pin microcontroller based on enhanced RISC (Reduced Instruction Set Computing) architecture with 131 powerful instructions. It has a 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively. Most of the instructions execute in one machine cycle. It can work on a maximum frequency of 16MHz.

Features of ATMEGA16 are-

- High-performance, Low-power Atmel AVR 8-bit Microcontroller
- Advanced RISC Architecture
- High Endurance Non-volatile Memory segments
- Power Consumption @ 1 MHz, 3V, and 25°C for ATmega16

By executing powerful instructions in a single clock cycle, the ATmega16 achieves

throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

iii) MOTOR DRIVER IC l293D

The l293D is a quadrupled hgh current half H-drivers. The L293D is designed to provide bidirectional drive currents of up to

600mA at voltages from 4.5 V to 36 V. They 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. All inputs are TTL compatible. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2 EN and

drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

III) ADVANTAGES

- DTMF's technology is simple, low cost as well as its already popular status in the telephone industry of today.
- In the networks there are large number of nodes that are very simple and act merely as relay stations.
- In healthcare (hospital and home environments), a robot that is capable of sending acoustic commands to turn on/off devices such as light switch or closing door while letting the user know that the process is taking place will be very helpful in allowing the user to feel more comfortable around robots.

IV) DISADVANTAGE

- As signal strength decreases the performance of the system also degrades.

V) APPLICATIONS

- Cell phone controlled robot can be used in the borders for displaying hidden Land mines.
- It can be adequately implemented in national defense through military-industrial partnership.
- It can be vastly applied in Resorts, borders of noted buildings.
- Installation of combat robots in required places.

REFERENCES

[1] S. Y. Harmon & D. W. Gage, "Current Technical Research Issues of Autonomous Robots Employed

[2] In Combat", 17th Annual Electronics and Aerospace Conference.

[3] Asaro,P. How just could a robot war be?, Frontiers in Artificial Intelligence and Applications, 75, 50-64.

[4] Robert L.Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 8th Edition,2006

[5] www.nex-robotics.com/.../motor-

[6] controllers/l293d-motor-driver-ic.html"Remote robot control system based on DTMF of mobile phone" published in 6th IEEE International Conference.