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RESCUE ROBOT

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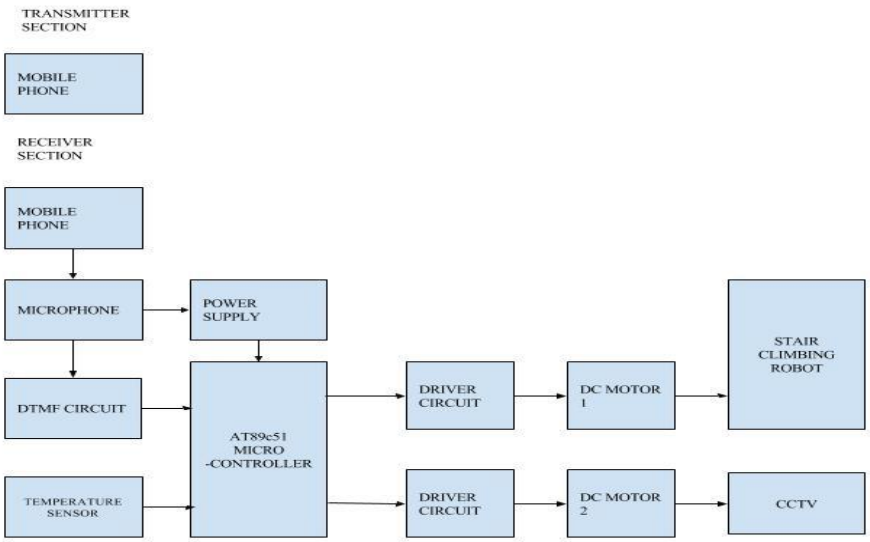
ABSTRACT

Safety is one of the very important aspects in each and everything. Safety and rescue go hand in hand with each other. Each and every building or industry must have a rescue system for use in case of emergency. In this paper we propose a track wheel type robot that can climb over any terrain and clear any obstacles to perform the rescue operation. This project uses double front flippers in the form of track wheel for climbing over rough terrain. Different sensors and cctv cameras are used to track the position of the robot and also to control its working. The robot's position is controlled by pressing the desired key in the phone which is connected to the DTMF circuit. The robot controlled by 8051 microcontroller coded using Embedded C. this robot can be used in places where safety is very important . Also this robot can be used for military purposes and in buildings damaged due to natural calamities. this robot can be used for surveying inside the building to find and rescue people struck inside the building . This robot can also be used for surveillance in public places.

I. INTRODUCTION

With Increasing developments in science and technology, Human findings are getting replaced by automated findings by robots. This is due to their accuracy and reliability. Now a days, robots are being employed in all fields such as medicine, safety, rescue etc. The proposed robot can be used be used as surveillance robots in industries and also as rescue robots in buildings damaged by natural calamities. The rescue operations taken in such places can be time consuming and can also be dangerous to the rescue personnels . So as to ensure that this does not take place, this work is undertaken. fig. 1 shows the basic block diagram of the robot.

II. BLOCK DIAGRAM



III. HARDWARE PART

A. Transmitter Section

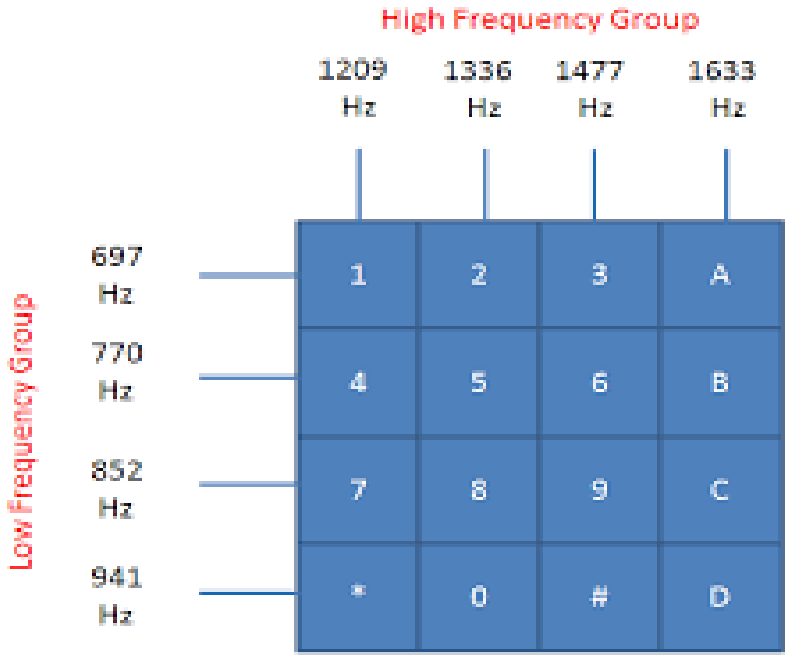
The transmitter section consists of a basic mobile phone that is connected to the receiver (robot). Here the mobile phone acts as the remote that controls the robot. The control is made possible due to the DTMF circuit that is present in the mobile phone .

B. Reciever Section

The receiver section is actually the robot. The robot also contains a DTMF circuit. There are also other important circuits present in the robot. There is a temperature sensor that is present . The whole setup is connected to a microcontroller.

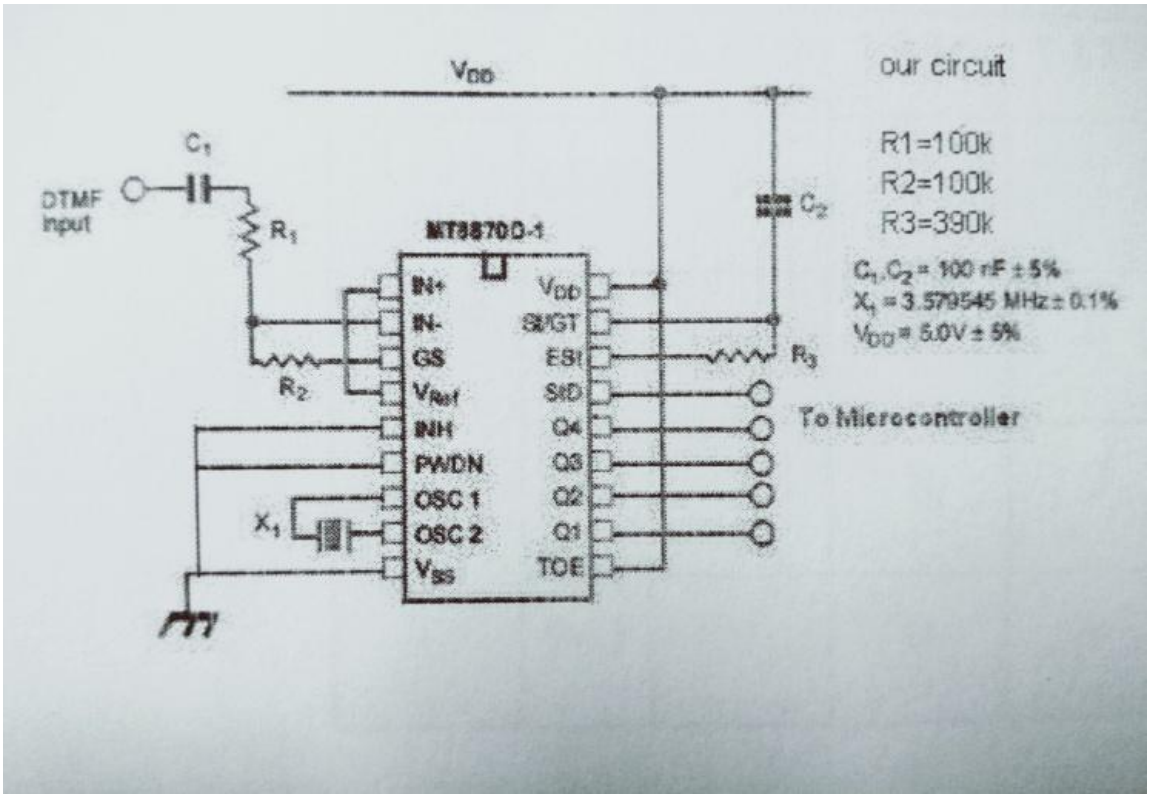
IV. DTMF CIRCUIT

Dual-tone multi-frequency signaling (DTMF) which is an in-band telecommunication signaling system is used. It uses the voice-frequency band over telephone lines between phone equipment and other devices and switching centers. The telephone keypad is arranged in the form of a 4×4 matrix of push buttons in which the low frequency component is represented by rows and the high frequency component is represented by columns. When a key is pressed the circuit sends a combination of the row and column frequencies. . The tones are decoded by the switching center to determine the keys pressed by the user. In the present times IC's are used for DTMF circuits. Motorola MT8870 is the most widely used DTMF IC in the receiver circuits.



This IC contains 18-pins. This DTMF IC also has many other applications. This IC has to be tested separately when a proper output is not obtained. If the IC recognizes a tone pair greater than 40ms (time duration) and accepts tone pair that are greater than 40 ms it means that the IC is working normally. This can be achieved by adding a steering diode and an extra resistor. Balanced line mode is used for configuring the circuit. The circuit is uses a balanced differential amplifier to reject common mode signals. Voltage clamping is achieved

by adding Zener diodes (ZD1 and ZD2) by splitting the input resistor. Whenever a key is pressed on the keypad, the tone pair is received by making the delayed tearing output high (std high). This causes the LED connected to pin 15 to glow.



V. TEMPERATURE SENSOR

The temperature is detected by using temperature sensors . There are a variety of temperature transducers such as thermocouple, thermistor, and RTD . The thermocouple consists of two dissimilar metals connected to produce the differential output voltage that can be calibrated in terms of temperature. This transducer has the positive temperature coefficient of resistance. The base to emitter voltage of transistor is amplified precisely and then calibrated in terms of temperature. Thus the temperature is measured.

VI. DC MOTOR

A DC motor is a type of electrical machine that converts electrical energy (DC) to mechanical energy. DC motor uses the magnetic forces for the conversion. The internal current flow is periodically changed by using some internal mechanism. The external magnetic field is used to produce the rotary motion. The Dc motor works on the principle that when a current carrying conductor is placed in an external magnetic field it will experience a force proportional to the current flowing through the conductor and the strength of the external magnetic field. There are two types of DC motors. They are brushed DC motors and brushless DC motors. In our project we are using a brushed DC motor which will operate in the ratings of 12V DC 0.6A which will drive the flywheels in order to make the robot move.

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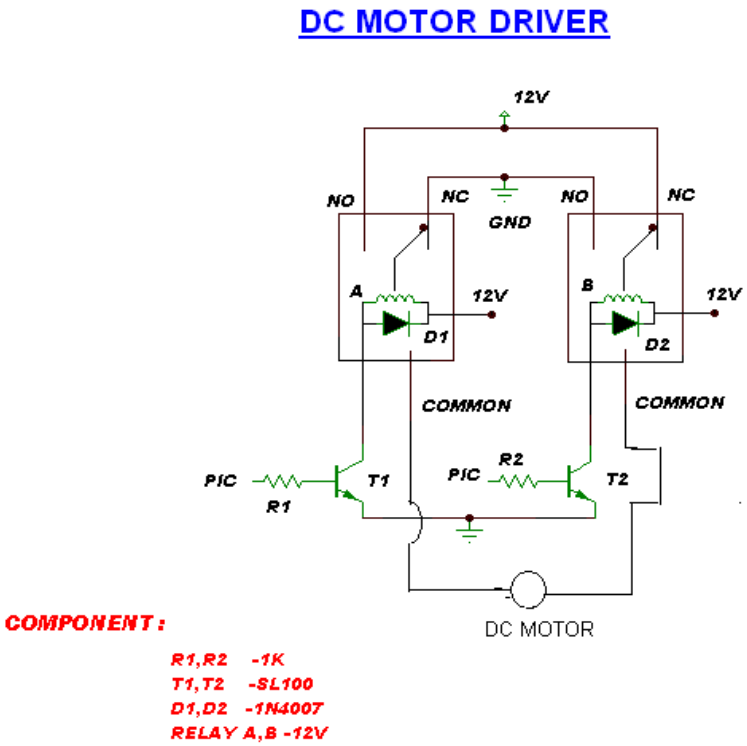
VII. MOTOR DRIVER

A motor driver is a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor. A motor driver might include a manual or automatic means for starting and stopping the motor, selecting forward or reverse rotation, selecting and regulating the speed, regulating or limiting the torque, and protecting against overloads and faults.



Motor driver is a device that is used to control the performance of the DC motor. It may have a separate control unit regulating the speed, torque and giving protection against overloads and faults. Motor driver IC is used to provide interface between microprocessor in robots and the motors in the robot. L293 series is the most commonly used motor driver ICs. Two DC motors can be controlled simultaneously using these ICS. There are two H-bridges in L293D. H bridge is nothing but a circuit for controlling low current rated motors .These ICs are used only in autonomous robotics. Micro processors normally operate at low voltages and requires a small amount of current to operate while the motors require relatively higher voltages and currents for operation. Such low value of current cannot be supplied to the motor from the microprocessor. So the motor driver is needed. This L293D IC receives signals from the microprocessor and transmits the relative signal to the motors. The L293D has two voltage pins, one of which is used to draw current for the working of the L293D and the other is used to apply voltage to the motors. The L293D switches its output signal according to the input received from the microprocessor. It is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. Also there are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor.

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VIII. MICROCONTROLLER

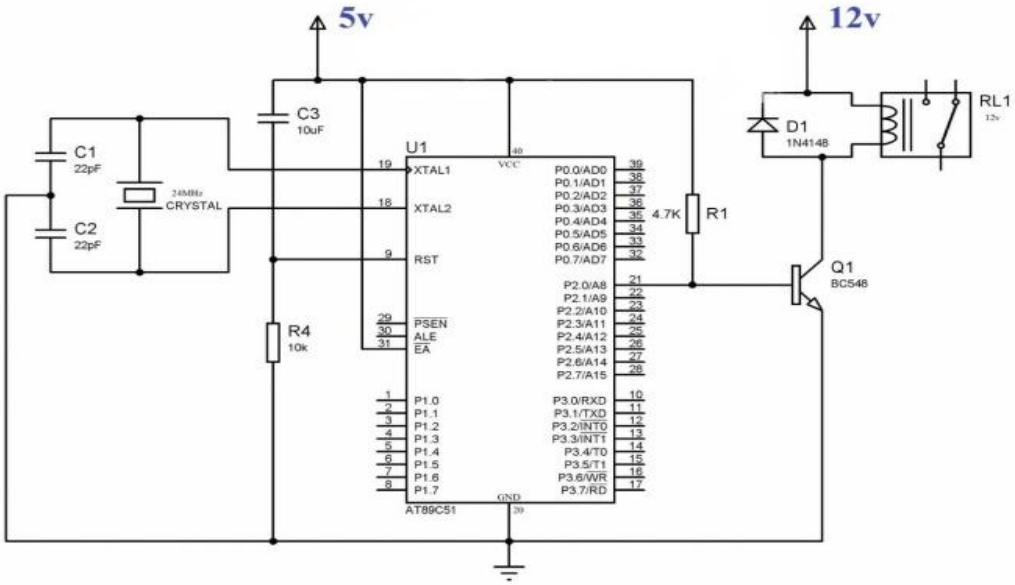
The microcontroller (or MCU for microcontroller unit) is a small computer on a single integrated circuit. It is also called as a system on a chip or SoC. A microcontroller has one or more CPUs (processor cores) along with memory and programmable input/output peripherals. A program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. The Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips. Microcontrollers are normally used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. The Microcontrollers make it economical to control more devices and processes by reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices.

IX. RELAY

In some electronic applications we need to switch or control high voltages or high currents for which we may use electromagnetic or solid state relays. For example, relays can be used to control home appliances using low power electronic circuits. A relay is a switch that is used to switch High Voltage or Current using Low power circuits. The relay isolates low power circuits from high power circuits. It is activated by energizing a electromagnet, coil wounded on a soft iron core. For detailed working of relay please visit this page. A relay should not be directly connected to a microcontroller, It needs a driving circuit due to the following reasons.

- A microcontroller will not able to supply current required for the proper working of a relay. The maximum current that A89C51 microcontroller can sink is 15mA while a relay needs about 50 – 100mA current.
- A relay is activated by energizing its coil. Microcontroller may stop working by the negative voltages produced in the relay due to its back emf.

Relay Interfacing Circuit :



X. CCTV

CCTV stands for Closed Circuit TV. CCTV uses one or more video cameras to transmit video images and sometimes audio images to a monitor, set of monitors or video recorder. Most of the wireless CCTV cameras use the 2.4 Gigahertz frequencies to transmit their video images to a monitor or DVR (digital deorecorder). Wireless cameras used at this frequency can easily transmit through most walls and obstacles; however each individual location will have its own operating limits. Usually, frequencies can be slightly changed to have more than one group of cameras in a specific space.

XI. SOFTWARE PART

The software part used is the keil C compiler and embedded C.

The Keil C51 C Compiler for the 8051 microcontroller is one of the most popular 8051 C compiler in the world. The C51 Compiler allows the user to write 8051 microcontroller applications in C that, can be compiled,and later can have the efficiency and speed as that of the assembly language.In C51 Compiler, the C source files are translated into relocatable object modules that contain symbolic information for debugging in an in-circuit emulator. The compiler generates a listing file in addition to the object file which may include symbol table and cross reference information.

Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

XII. WORKING

The movement of the robot is made with the DTMF circuit. The C coding is made in the microcontroller for each direction of robotic action. According to the C coding when the cell phone key is pressed the robot starts moving in a desired action. Usually 2,4,6,8 keys are used for the forward, backward, left, ,right movement respectively. .When the key is pressed ,the relay of the particular key gets on and the motors starts operating. The motors starts running and so the robot starts moving in a` particular direction as desired.If any obstacles disturbs the robotic motion , it directly clears the object by moving upon it with the help of flipping action.The flippers are usually of Conveyor belt.

XIII. CONCLUSION

Till now , the robot can climb steps only when the power of the motor is increased.The centre of gravity of existing robot is outside the robot. Hence, the robot tend to fall easily when climbing the stairs. This has been rectified in the proposed robot.The proposed robot can easily clear high and rough terrain as flippers are used. So, it becomes more easier to access the victims to get their vital signs and never fall from steps.

In this we have discussed issues relevant to the plausibility of the claim that this will happen. In future the following may also happen

- Robots will be as smart as humans and
- Robots will be capable of being persons.
- There will be a viable mechanism for the transfer of a human's mind from a human body to robot body and Transferring one's mind to a robot will allow one to continue one's existence as the robot.

With the help of this project, we assure that we will make the future of robot technology for secure purposes and reliable.

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