DTMF Based Mobile Operated Surveillance Vehicle

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ABSTRACT: The objective of designing this robot is simply to facilitate the humans in the future for security purposes. In the present scenario, there are many recent developments of robotics and communication on a large scale. The robot is in the form of a vehicle mounted with a web cam, which acquires and sends pictures PC. The movement of vehicle is controlled by microcontroller. Our idea is to make a robot to tackle the hostage situation &the worst conditions which cannot be handled by human being. Hence Humans are moved out from direct exposure to potentially dangerous situations. Robotic system can perform many security and surveillance functions more effectively than humans. The Keil micro software vision is used for writing Assembly level program code to the robot and for transferring the hex files to microcontroller.

I. Introduction

A Robot is a virtual artificial agent. In practice, it is usually an electro-mechanical machine which is guided by computer, mobile or electronic programming, and can able to do the tasks on its own. Conventionally, wireless controlled robots use RFcircuits, which have drawbacks of limited working range due to low frequency range. The usage of mobile phones instead of RF remotes can overcome this limitation .Here is a Mobile operated spy robot circuit which can be controlled by using mobile phone.

The robot can capture audio and video information from the various environment and can be send to a remote station through DTMF signal. The Mobile operated spy camera robot has been designed in such a way that it can fulfil all the needs of armed forces and also for personal security. It has countless application and can be used in hazardous environments. For instance, at one place it can be used by bomb disposal squad, while at another instance it can be used for handling mines.

While another application can be to provided up to date information in hostage situation. The robot is made for purpose by military operation spy robot for navigator in forest. The mobile operated robot is a very small application of DTMF technology. Since the DTMF Technology is used to control the robot, the range of robot communication is not limited and it just depends on the network of mobile and in the present scenario, the mobile network is everywhere.

Wireless Communication is the most evolving fields of application in present scenario, where different technologies can be used so as to have automated systems with flexibility, reliability and accuracy. Conventionally, wireless- controlled 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 these limitations. So this system will be a powerful and flexible tool that will offer this service at any time, and from anywhere with the constraints of the technologies being applied. Possible target appliances include (but are not limited to) climate control systems, security systems, and home appliances and anything with an electrical interface.

The robotic vehicle is controlled by wireless communication system using DTMF technology. Microcontroller AT89c51 is used to control all operations. As the call is made to the robot the robot will ask a password from the user and proceed when only correct password is entered. According to the button pressed on the transmitting cell phone, the robot will move. But if any obstacle is sensed by the robot, it will change its direction or it will stop. This could be upgraded as an intelligent system in the future which includes gas sensor, smoke sensor and metal sensor for the security purposes in homes. The main aim of using these sensors is to monitor smoke, gas leakage in houses as well as industries.

II. DTMF Technology

DTMF (Dual Tone Multi Frequency) better known as touch-tone is a system of signal tones used in telecommunication. Applications include voice mail, help desks, telephone banking, etc.

There are twelve DTMF signals, each of which is made up of two tones from thefollowing selection: 697Hz, 770 Hz, 852 Hz, 941 Hz, 1209 Hz, 1336 Hz, and 1477 Hz. The tones are divide into two groups (low and high), and each DTMF signal uses one from each group. This prevents many harmonics from being misinterpreted as a part of signal. This DTMF technology is achieved by using mobile phones hence it overcome the limitations of conventional RF based robots whose operating range is very low i.e., limited to few hundred metres only.
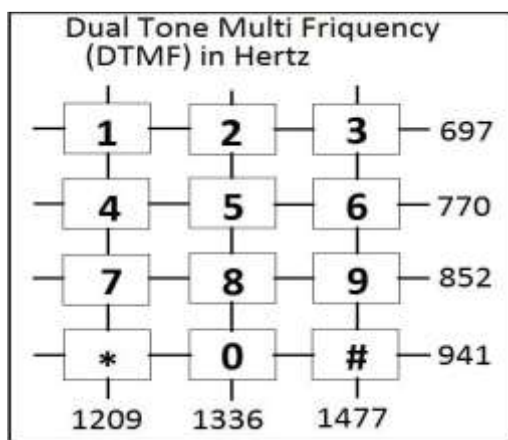

Fig 2.1 DTMF Keypad

III. Block Diagram

The Block diagram consists of the Rover vehicle and the user computer to view the pictures captured by the robot through the communication channel. Here the GSM network acts as the communication channel. After finishing the vehicle it is then placed in the environment to be monitored.
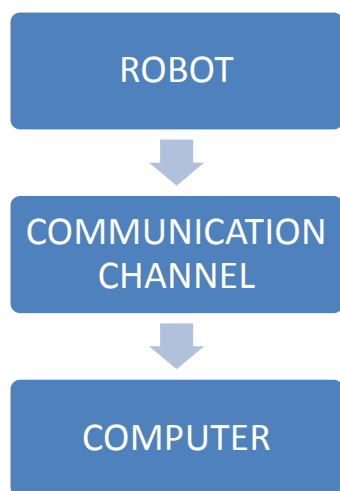

Fig 3.1 Block diagram

IV. Construction

The construction of the robot is of three steps. They are IC circuit assembly, rover body and camera mounting on the designed vehicle.

In IC circuit assembly, it is nothing but the PCB board which controls the movement of the vehicle according to the instruction given by the user. Here we are using three main IC's. They are,

1. DTMF Decoder

The IC MT8870 is known as the DTMF Decoder which gets the input frequency generated from the user mobile phone as DTMF tone, converts them into the binary digits and sends it to the microcontroller as inputs.

2. Microcontroller

The Microcontroller is the heart of the vehicle which controls the motion of the vehicle according to the user instructions. Here we are using AT89c51 microcontroller and the program coding was written in ASM program and fed into the microcontroller IC using KEIL compiler.

3. Motor Driver

Since the output supply from the microcontroller is not sufficient to run the motors hence a motor driver IC is used. The IC L293D is known as the motor driver IC which inherits H-Bridge concept and is able to run the two motors simultaneously at different directions.

V. Rover Body

The rover body is the mechanical design of the vehicle which consists of motors, robotic wheels steel and fibre glass sheets ,etc., The design of the vehicle is made as robust to withstand disturbances and vibrations carrying power supply, camera, IC circuit board,etc., on the vehicle.

VI. Camera Installation

The Internet Protocol (IP) camera is used in our project for the surveillance purposes. This camera is properly configured in the user system so that able to view the pictures captured by the camera during the movement of the vehicle. The wireless antenna present in the camera is employed to transmit the data to the user system.

VII. Simulation

The simulation for this project is done using the PROTEUS software. Here the program for the microcontroller is written using ASM program and is fed into the microcontroller.

The input for the microcontroller is fed as switches since DTMF IC is not available in this software.
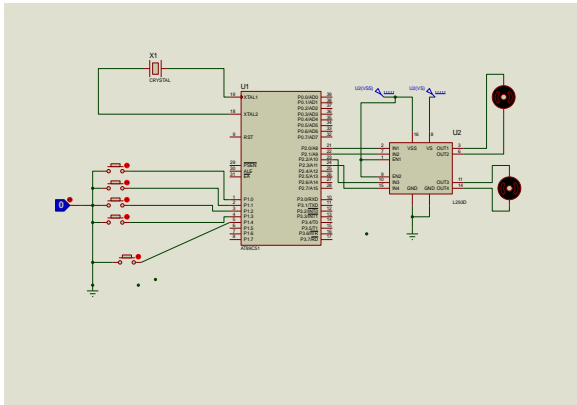
Fig 7.1 Simulation Result

The connections for the microcontroller and motor driver circuit are given as per the circuit diagram and the simulation results were successfully obtained for this circuit.

VIII. Output

The final outcome of this project after completion of all these process would be like as of shown in the figure. The vehicle is of three wheel mechanism so that it is stable to carry over all the components. The camera is fixed on the top of the vehicle independently and it is capable of moving along various directions according to the user control.

Fig 8.1 Outcome of the Paper

When the user dials to the mobile phone connected to the vehicle it gets automatically answered and gets connected to the user. Now according to the command given by the user the vehicle moves in the corresponding direction and the camera captures the pictures and sends it the user computer simultaneously so that the user can view the conditions and situations around the places where the surveillance vehicle is kept.

IX.Application

The DTMF based mobile operated surveillance vehicle has a wide range of applications at the places of military and armed forces, individual security, mining areas, and for rescue purposes. The applications are not limited for only to this and have countless number of applications. This vehicle may also upgraded by adding various sensors such as temperature sensor, pressure sensor, vibration sensor, gas sensor, etc., and is used in the places of earthquake, mines, etc.,

X. Conclusion

In the designing of our projects, we have kept in mind the user. The controlling of robot is easy as the various buttons are available on the web page specifying the various actions. The programming used gives very good control on the movements of the robot. The Controlled Wireless communication can be achieved using Wi-Fi network or internet. The future implications of the project are very great. The robot is very robust.

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