Phone Call Controlled Obstacle Detection Robot

Kasetty Ram Babu[1], Pruthvi D[2], Mandle Veneesha[3], Pramodini[4], Sushma H D[5]

[1], Asst. Prof, Department of ECE, Nagarjuna College of Engineering and Technology, Bengaluru
[2,3,4,5] Student, Department of ECE, Nagarjuna College of Engineering and Technology,
[2,3,4,5]Bengaluru, Karnataka, India

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Abstract - At present almost everything used is operated by remotes. The biggest limitation of remote control is its limited frequency level and limited control. To overcome this limitation we can make use a satellite and connect the device to a satellite then operate it from any part of the world. This can be easily done by using one of the most spread networks of the world, the mobile network. This project, 'Phone call controlled obstacle detection robot' will suggest a method for robot control using the DTMF tone generated when a user presses mobile phone keypad buttons when connected with a remote mobile robot.

In this paper, a robotic vehicle with the help of DTMF technology that allows sending data commands via a call is presented. One can operate the robot by calling on the mobile phone connected to the robotic vehicle. The use of a microcontroller interfaced to the ultrasonic obstacle detector, night vision camera, and motor driver. The paper can overcome the limitation of RF-operated robotic vehicles. The 8051 Microcontroller depends upon the code which is generated by the DTMF decoder to move the robot right or left and forward or backward by rotating both DC motors. The ultrasonic obstacle detector detects any obstacle that comes in the way of the robot. The robot gets stopped once it detects any obstacle and then waits for the user's commands. We have used the night vision wireless camera which can transmit videos of the surroundings to the receiver unit connected to the Laptop/PC. With the help of a night vision wireless camera, the user can view the area captured by this wireless camera which will be fixed on this robot. One can view the area captured by this wireless camera not only during the daytime but also during the night. The area captured by this wireless camera can be viewed on the PC. Thus with the help of DTMF technology, the robot allows the users to control the robot's movement via mobile phone and stop its movement if an obstacle is detected.

Key Words: 8051 Microcontroller, DTMF Technology, Obstacle Detection, Ultrasonic sensor, DC Motor.

1. INTRODUCTION

The demand for robots is increasing to do repetitive work and keep away from jobs that risk existence, inclusive of bomb diffusion, business operations, household duties, etc. This has look at is based at the mobile telephone control machine of independent robots. The appearance and functioning of robots may also range, all robots percentage the capabilities of a mechanical, movable structure under a few shapes of management. The management of the robot involves three phases: belief, processing, and motion. Usually, the sensors are set up on the robot, the processing is performed with the aid of the microcontroller, and the task has performed with the use of cars or with a few different actuators. The paper allows operating a robot irrespective of the space of the person working it. This machine permits no longer the simplest to govern the robot's movements but also to stop the robot as quickly because the robot encounters an impediment. The consumer of this device shouldn't worry about the gap to operate the robotic to make the robot circulate.

At present almost everything used is operated by remotes. The biggest limitation of remote control is its limited frequency level. To overcome this limitation one can use a satellite and connect the device to a satellite then operate it from any part of the world. This can be easily done by using one of the most spread networks of the world the mobile network. This paper will suggest a method for control of the robot using the DTMF tone generated when the user pushes mobile phone keypad buttons when connected with a distant robot.

This system allows to control of the robot's movements and to stop the robot when the robot encounters an obstacle. The user of this system doesn't have to worry about the distance to operate the robot. The system does this with the use of DTMF technology which allow the sending of data commands via a call. The user who wants to operate the robot will just have to call on the mobile phone connected to this system. This system consists of an 8051 microcontroller which is interfaced with the ultrasonic obstacle detector, wireless camera and the system also uses a battery.

The ultrasonic obstacle detector help to detect any obstacle that is in front of the robot. The robot stops once it detects any obstacle and then waits for the user's commands. To operate, the user has to make a call to the phone that is connected to this robot. The receiver phone will have to receive the call-to-data commands necessary for the robot's movements. The data commands will make the robot either go in forward, backward, left, or right direction. The system makes use of a night vision-enabled spy camera with the help of which the user can view the area captured by this spy camera which will be mounted on this robot. The user can view the area captured by this wireless camera not only during the daytime but also during the night.

All the areas captured by this spy camera can be viewed on the PC. Therefore with the help of DTMF technology, the system allows the users to control the robot's movement through a mobile phone and stop its movement if an obstacle is encountered.

MAJOR PROBLEMS IN RF OPERATED ROBOTIC VEHICLE

At present, almost everything used is operated by remotes. The biggest limitation of remote controlled robot is its:

- Limited frequency level.

- Limited control.

The major issues in society:

- Damage and loss to human life in the military.

- Difficulty in search and rescue during natural calamities like earthquakes.

- It is difficult for a common human being to reach some extreme places in extreme conditions.

OBJECTIVES

The main objective of the proposed paper is as follows:

- Overcome this limitation of RF-operated robotic vehicles.

- Use of DTMF technology to connect the devices and operate them from any part of the world.

- Developing this robot is for the surveillance of human activities in the war field or border regions to reduce infiltrations from the enemy side.

- Overcome the issues faced in society.

The robot consists of a night vision wireless camera which can transmit videos of the war field to prevent any damage and loss to human life. The robot helps in the defense sector to reduce the loss of human life and will also prevent illegal activities.

2. LITERATURE SURVEY

Aliyu, J. G. Kolo, O. O. Mikail, J. Agajo, B. Umar and O. I. Aguagba, "An ultrasonic sensor distances elicited automatic braking automobile collision avoidance system". This paper offers the thought to design and develop a robotic vehicle using DTMF technology for operation from distant places connected with a wireless camera for observance purposes. The receiver decodes before passing the data to a microcontroller to drive DC motors via motor driver IC for necessary work[1].

M. S. Uddin, M. Gianni, and A. Lab, "Long vary robot teleoperation system supported net of things", Nowadays, one can no longer imagine that net will be thought-about simply a network of computers. one can even have to state that it's changing into even a lot of a network of things [2].

MacMillan, Neil, et al. "Range-based navigation system for a mobile robot", The aim is to support operators throughout things within which the remote control devices lose the reference to the on-board receivers[3].

R. Chinmayi et al., "Obstacle Detection and avoidance Robot", planned the event of associate obstacle turning away artificial intelligence. the target of the project is to develop an associate obstacle avoiding robot employing a microcontroller associated with an ultrasonic sensing element to observe the object ahead of it. This model is provided with an associate ultrasonic sensor and therefore the distance calculations are done within the microcontroller. This prototype is additionally equipped with a wireless camera for live video transmission which might be received by varied terminals like smartphones, tablets, PC, etc[4].

R. Sharma, K. Kumar, and S. Vig, "DTMF based mostly device System", a trial has been created to handle automation supported dual-tone multi-frequency device system for industrial and unit applications. during this work, we tend to style a tele remote system. The system is enforced on existing telephone lines to allow a leading-edge advantage over typical Infrared remote systems[5].

W. Farooq, N. Butt, S. Shukat, N. A. Baig and S. M. Ahmed, "Wirelessly Controlled Mines Detection Robot", during this paper, we tend to target in of humans and therefore the automaton; the robot is provided with special vary sensors that facilitate in avoiding the obstacles within the field by specifically detecting the position of obstacles. A wireless camera is added to the robot, that captures and broadcasts the current location of the automaton. small controller commands the automaton.[6].

Yun Chan Cho and Jae Wook Jeon, "Remote robot control system based on DTMF of mobile phone", The robot may be controlled using dual Tone Multi-Frequency (DTMF) technology. This DTMF offers an advantage over the RF; it will increase the range of operating and additionally offers sensible leads to a case of motion and direction of the robot using mobile through microcontroller. this sort of wireless communication offers the remote handling operation of the robot using DTMF[7].

In this project by developing this robotic vehicle, we've got overcome the drawbacks of RF communication that have a restricted vary whereas this automotive may be controlled from anyplace simply using this DTMF technology. in this project with the utilization of mobile for robotic management one is able to overcome these limitations. It provides the benefits of sturdy control, working range as massive because of the coverage space of the service supplier, no interference with different controllers, and up to 12 controls. though the appearance and capabilities of robots vary immensely, all robots share the options of a mechanical, movable structure below some style of control.
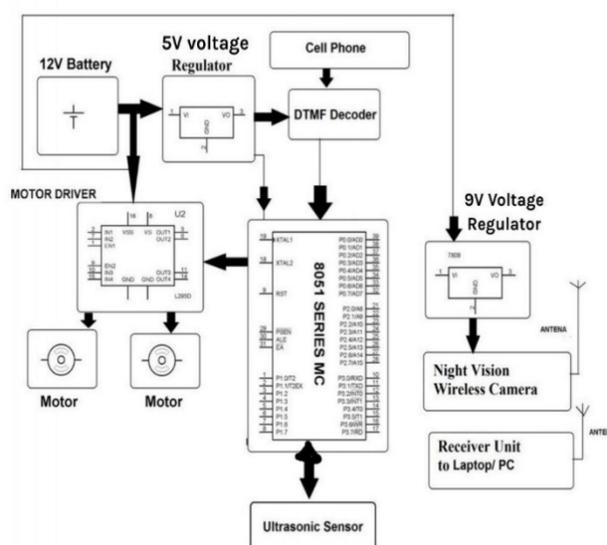
3. BLOCK DIAGRAM

Fig -1: Block Diagram of Phone call controlled obstacle detection robot

This project permits not solely to manage the robot's movements however conjointly to prevent the robot as soon as the robot encounters an obstacle. The user of this system doesn't have to worry about the distance during this project allows not solely to manage the robot's movements however conjointly to prevent the robot as soon as the robot encounters

an obstacle. The user of this method doesn't got to worry concerning the distance so as to work the robot. The system does this with the assistance of DTMF technology that permits sending data commands via a call. The user desire to operate the robot can simply have to call on the mobile phone connected to this system. this system consists of an 8051 microcontroller that is interfaced to the ultrasonic obstacle detector, spy camera and the and therefore the and conjointly the system also uses a 12 V battery.

The ultrasonic obstacle detector helps to detect any obstacle that comes within the way of the robot. The robot automatically stops once it detects any obstacle and then waits for the user's commands. so as to work the system, the user has got to build a call to the phone connected to this golem. The receiver phone can got to receive the call in order to information commands necessary for the robot movements. the info commands can create the robot either go in forward, backward, left, or right direction. The system makes use of a night vision-enabled spy camera with the assistance of that the user will read the area captured by this spy camera which can be mounted on this robot. The user will read the area captured by this wireless camera not only during the daytime however conjointly throughout the night.

All the areas captured by this spy camera is viewed on the computer. therefore with the assistance of DTMF technology, the system currently permits the users to manage the robot's movement via mobile phone and stop its movement if an obstacle is encountered.

8051 MICROCONTROLLER

It is the 8051 microcontroller. All remaining hardware peripherals area unit connected to the microcontroller for receiving, processing, and sending information.

MOBILE PHONE

Mobile is employed to send commands to robots from anyplace in the world. this is often done by connecting any GSM mobile to induce a broad range to regulate the robot. A mobile which will build and receive telephone calls over a link whereas touring a large geographical region. It does so by connecting to a cellular network provided by a mobile operator, permitting access to the general public telephone network.

DTMF DECODER

The mobile will be connected to the DTMF decoder for accessing the commands sent by the remote mobile in audio format (DTMF) and therefore the decoder decodes the audio format to the binary equivalent in four-bit that is then sent to the microcontroller for more process.

MOTOR DRIVERS

Motor drivers are connected to drive robot motors having high power necessities. based on the DTMF commands, the microcontroller sends a signal to the motor driver to drive the motors for the robot's movements. The L293D could be a quad, high-current, half-H driver designed to supply bidirectional drive currents of up to 600 mA at voltages from four.5V to 36V. It makes it easier to drive the DC motors. The L293D consists of 4 drivers.

DC MOTORS

DC in gear motors of twelve volts connected to the robot for providing mobility to the robot. The DC motor gets a signal from the motor driver which is connected to the microcontroller.

WIRELESS CAMERA

Night vision wireless camera works on ip protocol that provides live streaming video data to the remote receiver. The receiver could be a mobile phone or computer. If the camera gets internet access then live video may be seen from any place within the world.

ULTRASONIC SENSOR

The HC-SR04 ultrasonic sensor uses an echo sounder to determine the distance to an object. therefore it will find obstacles and avoid obstacles. cellular phone decision controlled obstacle detection could be a system that will be controlled with a mobile.

VOLTAGE REGULATOR

The function of the voltage regulator is to supply a stable dc voltage for powering different electronic circuits. The voltage regulator should be capable of providing a considerable output current. they need to give a relentless voltage despite changes in load current, temperature, and AC line voltage. The transformer may be designed victimization op-amps, whereas it provides the quick and simplest way for functioning. IC voltage regulators are versatile and comparatively inexpensive and are offered with features such a programmable output current/voltage boosting internal short-circuited current limiting.

4. FLOW CHART

The steps followed the run the robot are as follows:

STEP-1. Start.

STEP-2. Begin the system by switch on the power supply module.

STEP-3. The continuous observance of command inputs from the mobile through the DTMF decoder.

STEP-4. When the command is received, the DTMF decoder starts the motion of the robot based on the command received by the mobile phone.

Press key 2 for Forwarding motion

Press key 4 for Leftward motion

Press key 6 for Rightward motion

Press key 8 for Backward motion

Press key 5 for stopping

STEP-5. Throughout the robot motion if any obstacle gets detected then the robot will be stopped instantly.

STEP-6. The camera will continuous streaming regardless of the commands received or the motion of the robot.
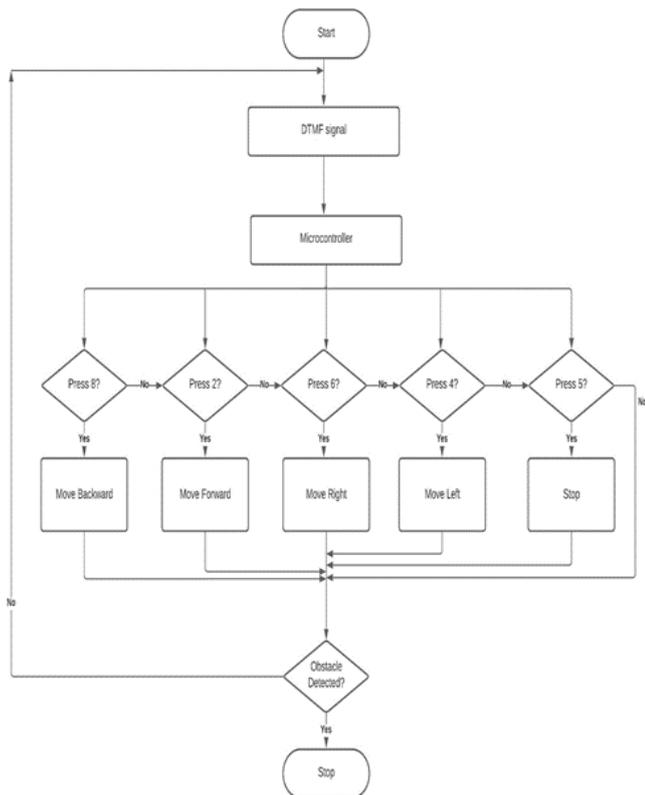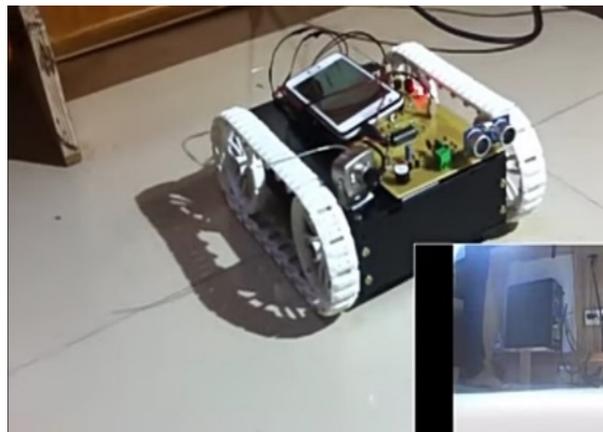
STEP-7. End.

Fig -2: Flow Chart

Fig -4: Movement of robotic vehicle

This project permits not solely to regulate the robot's movements however conjointly to prevent the robot as soon as the robot encounters an obstacle. The user of this system doesn't need to worry concerning the distance so as to control the robot. The system does this with the assistance of DTMF technology that permits sending data commands via a call. The user wishing to control the robot can simply need to call on the mobile phone connected to this system. this technique consists of an 8051 microcontroller that is interfaced to the ultrasonic obstacle detector, spy camera and the and therefore the and also the system also uses a 12 V battery.

5. RESULTS

Fig -3: Cell Phone call controlled robot

In this project, the robot is controlled by a mobile phone that produces a decision to the mobile phone connected to the robot as shown in fig.3. within the course of a call, if any button is pressed, a unique tone reminiscent of the button ironed is detected at the opposite end of the call. This tone is termed the 'Dual Tone Multiple-Frequency' (DTMF) tone. The robot perceives this DTMF tone with the assistance of the phone stacked on the robot(fig.4). the utilization of a mobile phone for robotic control will overcome these limitations. It provides the advantage of strong control, a working range as giant because the coverage space of the service provider, no interference with alternative controllers, and up to 12 controls.

Fig -5: Ultrasonic obstacle detection

The ultrasonic obstacle detector(fig.5) helps to observe any obstacle that comes within the manner of the robot. The robot automatically stops once it detects any obstacle then waits for the user commands. so as to control the system, the user needs to call a decision to the phone connected to this robot. The receiver phone will need to receive the call so as to data commands necessary for the robot movements. the data commands can build the robot to either go in forward, backward, left or right direction.
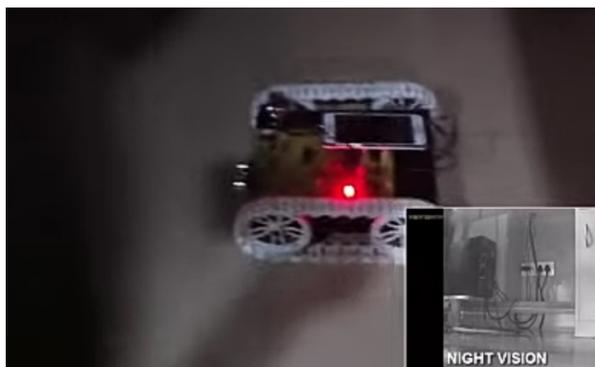
Fig -6: Night vision spy camera image obtained during night or dark places

The system makes use of a night-sight-enabled spy camera (fig.6)with the assistance that the user will see the region captured by this spy camera which will be mounted on this robotic vehicle. The user will scan the region captured by this wireless camera not alone throughout the daytime conjointly together throughout the night. All the region captured by this spy camera is viewed within the PC. so with the assistance of DTMF technology, the system will now permit the users to regulate the robot's movement via mobile and stop its movement if an obstacle is encountered.

Fig -7: Results Obtained

During tests, the proposed model worked as expected. This spy robot is tested to the most effective of our ability. One might observe accurately what's happening, the system doesn't cause any damage. DTMF controlled robot is run by some commands that are sent via mobile. the utilization of the DTMF operates of mobile phones. Here the utilization of the mobile to indicate the operating of the project. One is that the user mobile that we'll is used to make a 'Remote Phone' and therefore the other that's connected with Robot's circuit using aux wire. For this mobile one should call 'Receiver Phone'. First, one should build a call by employing a remote phone to the receiver phone so attend the decision manually or automatic answer mode. currently here is however this DTMF controlled robot is controlled by cell phone: once '2' is pressed by remote phone, the robot starts to moving forward and moving continues forward till succeeding command comes, once '8' is ironed by remote phone, the robot change his state and begin moving in backward direction till another command comes once '6' is pressed robot turned to pressed once '4' is

pressed robot turned to left and for stopping robot '5' is pressed.

This can be operated by sitting anyplace without any frequency limitation. The project will discover the obstacle and avoid a collision. rather than using multiple cameras, one will use a movable spy robot. By developing this robotic vehicle with its multitasking feature, the drawbacks are overcome of that seen in RF communication-based robots that had a restricted range whereby this vehicle is controlled from anyplace by the usage of DTMF technology. Considering all the things this could be used for police investigation and military applications with the assistance of installing the camera.

6. CONCLUSION

By building this robotic vehicle, one can overcome the shortcomings of low RF communication as we have been able to control this vehicle from anywhere in the world using this DTMF technology. The great advantage of the robot car is that it can reach anywhere such as small mines and pipelines, for these reasons it was widely used in military and research processes. It is a mobile robot, so it is now used for research, mining, and military purposes because of its wide range of control and wide range of operations.

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