OBSTACLE DETECTINGSPY ROBOT

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Abstract—**In present time almost everything used basically is operated by remotes. The biggest limitation of remote controlling is its limited frequency level. This paper suggests a method for robotic control using the DTMF tone generated when the user gives commands using mobile phone keypad buttons connected with a remote mobile robot. This spy robot holds three technologies together, they are- Obstacle Sensing & Detection, Day-Night Vision and DTMF. Robot motion is done by DTMF Technology. The system uses two mobile phones, one to control the robot that sends DTMF commands via call to another mobile phone mounted on the robot vehicle.**

Keywords—**Obstacle Detection, Long Range, DTMF, Day-Night Vision.**

I. INTRODUCTION

This system "**OBSTACLE DETECTING SPY ROBOT**" allows not only to control the robot's movements but also to stop the robot as soon as the robot encounters an obstacle. The user of this system doesn't have to worry about the distance in order to operate the robot. The system does this with the help of **DTMF** (Dual-Tone Multi frequency) **technology** which allows sending data commands via a call. The user wishing to operate the robot will just have to call on the mobile phone connected to this system. This system consists of 8051 family microcontroller which is interfaced to the **Ultrasonic Obstacle Detector**, a **Night-Vision Camera** and the system also uses battery for further operations.

The **ultrasonic obstacle detector sensor** helps to detect any obstacle that comes in the way of the robot. The robot automatically stops once it detects any obstacle and then waits for the user commands.

In order to operate the system, the user has to make a call to the phone connected to this robot. The receiver phone will have to receive the call in order to data commands necessary for the robot movements.

The data commands will make the robot to either go in forward, backward, left or right direction. The system makes use of **night vision** enabled spy camera with the help of which the user can view the area captured by the spy camera which will be mounted on this robot. The user can view the area captured by this wireless camera not only during day time but also during night.

All the area captured by the spy camera can be viewed in the PC/ANDROID. Thus with the help of DTMF technology, the system now allows the users to control the robots movement via mobile phone and stop its movement if an obstacle is encountered.

II. LITERATURE REVIEW

This concept of long range spy robot with obstacle detection is a very original system which operatesir respective of distance. This is because we are using DTMF technology which allows the user to operate the robot via call. Here we have used a microcontroller ATmega328 which is the brain of the whole system, all the sensors and other hardware is interfaced with this microcontroller (Motor drivers, obstacle detector, spy camera).In order to operate the robot, we have to call on a mobilephone which is connected to the robot, therefore, we are using two mobile phones, but instead of a mobile phone that is connected to robots we can use GSM chips also. After thecall is received (manually or automatically), the operator has to send a command through the keypad of the mobile phone. This system also has a day-night vision camera, so users can view the captured area irrespective of day/night.

Captured streaming can be viewed on a laptop. This whole system is operated via DTMF.

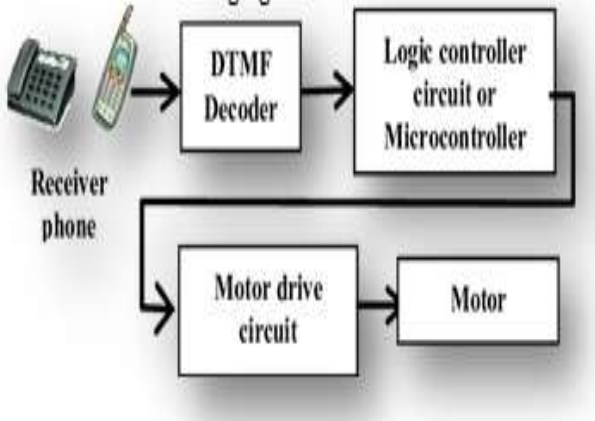### A. DTMF workingalgorithm –

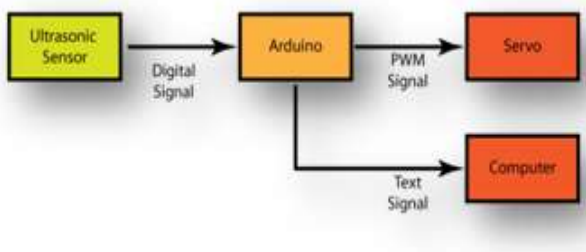Fig 1. DTMF working

B. Ultrasonic sensor working algorithm –

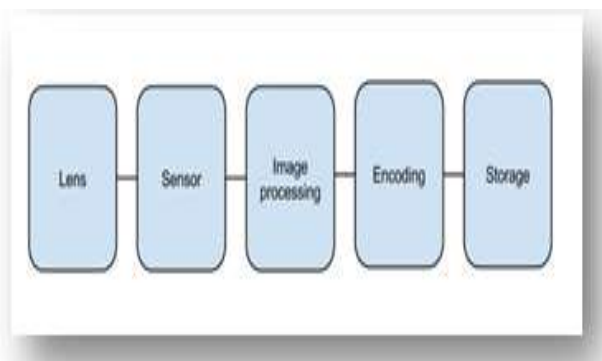Fig 2. Ultrasonic Sensor working

C. Digital Camera working algorithm –

Fig 3. Digital Camera working

III. BLOCK DIAGRAMS AND COMPONENTS USED
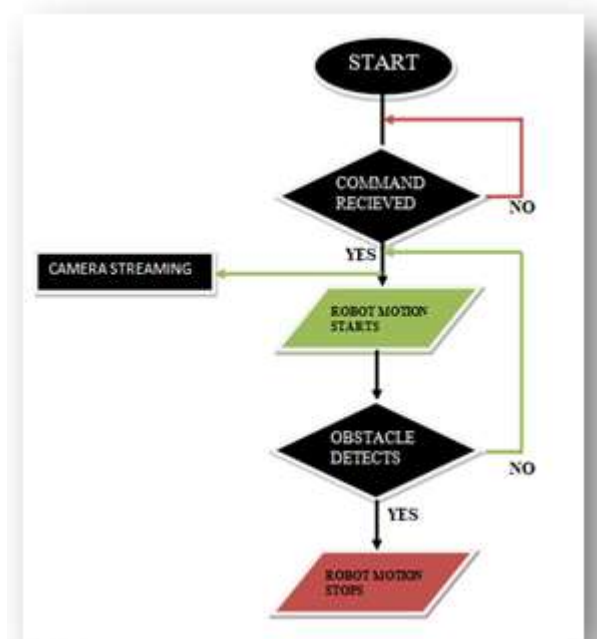

Fig 4. Block diagram of the robot

- MICROCONTROLLER: It belongs to the AVR family(ATMEGA328). All remaining hardware peripherals areconnected to the microcontroller for receiving, processingand sending data.
- MOBILE PHONE: Mobile is used to send commands torobots from anywhere in the world. This is done by connecting any GSM mobile phone to get a broad range tocontrol the robot.
- DTMF DECODER: Mobile phone will be connected to theDTMF decoder for accessing the commands sent by theremote mobile phone in audio format (DTMF) and decoderdecodes the audio format to binary equivalent in 4 bit whichis then send to the microcontroller for further process.
- MOTOR DRIVER: Motor drivers are connected to driverobot motors having high power requirements. Based on theDTMF commands, the microcontroller sends a signal to themotor driver to drive the motors for the robot's movements.
- MOTORS: DC geared motors of 12 volt attached to the robotfor providing mobility to the robot. It gets a signal from themotor driver which is connected to the microcontroller.
- CAMERA: Night vision wireless camera works on IP protocol which provides live streaming video data to theremote receiver. Receiver is Mobile phone or PC. If thecamera gets internet access then live video can be seen fromanywhere in the world.

- OBSTACLE DETECTOR: The HC-SR04 ultrasonic sensoruses sonar to determine distance to an object. So it can detectobstacles and avoid obstacles.

IV. METHOD OF OPERATION & RESULTS

- 1st step: Start the system with switching on the power supply module.
- 2nd step: The continuous monitoring of command inputs from the mobile phone through DTMF decoder.
- 3rd step: If the command is received, the DTMF decoder then starts motion of the robot based on the command received.
- Press key 2 for Forward motion Press key 4 for Leftward motion Press key 6 for Rightward motion Press key 8 for Backward motion Press key 5 for stopping the system.
- 4th step: During the robot motion if an obstacle gets detected then the robot will be stopped immediately.
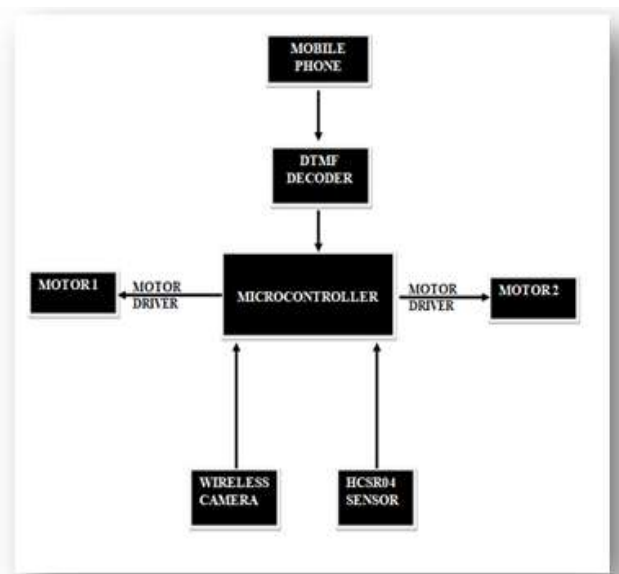- Camera does continuous streaming irrespective of the commands received or the motion of the robot.

Fig 5. Flow chart of the robot

Table -1 Operational Results

Key Pressed by the user	Operation performed
2	**FORWARD**
4	**LEFT**
6	**RIGHT**
8	**BACKWARD**
5	**STOPS**

Table 1 shows that how the robotic system performs when given with the numeral commands by the user.

V. CONCLUSION & FUTURE SCOPE

The main motive of this kind of concept is surveillance of war fields or mining fields where in most of the areas human intervention is not allowed or dangerous. Spy robots are basically used for spying on the enemies and with the help of these we can prepare for counterattack to save military people's lives. This spy robot is also used to observe the mining areas. As this robot is user friendly, it can easily move, capture images and wirelessly transmit them as well as it can avoid obstacles, which alerts people about dangerous situations. This helps organizations to view things at a remote location. With available facilities and infrastructure we can be successful in designing cost effective systems to meet required applications. Wireless technology that we have used helps to handle robots efficiently without manual operation. As we are using DTMF technology, this robot can cover long range.

Another advantage of this system is night vision camera that helps to monitor areas at night also. While developing this robotic vehicle with its multi-tasking feature, many drawbacks have been overcome, one of those is RF communication and Bluetooth based communication which has limited range, where in this system can be controlled irrespective of range and distance via call due DTMF technology

The robot may also include a bomb disposal kit in order to diffuse the bomb in a war fileld .

- By including a PIR sensor, it can also detect human motion near a robot or area under consideration.
- We can also include voice recognition technology in future which can be used for giving commands to the robot.
- Also this system can be further enhanced by incorporating various types of sensors like pressure sensor, temperature sensor, etc

VI. REFERENCE

[1] 'Robotics and Intelligent Systems', Virtual reference book by ROBERT F. STENGAL, Princeton University
[2] Digital Computer Electronics', Albert Paul Malvino.
[3] '8051 microcontroller and embedded system', Muhammad Ali Mazidi.
[4] 'Smart Spy robot charged and controlled by wireless systems', M. Balakrishnan; S. Gowthaman; S.P. Jaya Kumaran; G. RathanaSabhapathy; Publishers IEEE, International Conference on Innovations in Information,Embedded and Communication Systems (ICIIECS).
[5] T. S. Rappaport, Wireless Communications: Principles and Practice, Upper Saddle River, NJ: Prentice Hall, 1996.
[6] Dhiraj Singh Patel. Mobile operated spy robot. International Journal of Emerging Technology and Advanced Engineering (IJETAE); 2013.
[7] AaruniJha, Apoorva Singh, RavinderTurna, et al. War field spying robot with night vision camera. Journal of

Network Communications and Emerging Technologies (JNCET). 2015;

[8]   AbdusSamad, JadhavDevidas Dasharath, Dhaigude Madhukar Kumar. An intelligent combat robot. International Journal of Advanced Research in Computer and Communication Engineering. 2014;

[9]   Mr. Lokesh Mehta, Mr. Pawan Sharma. Spy night vision robot with moving wireless video camera. International Journal of Research Engineering Technology and Management (IJRETM); 2014

[10] Lin, Bekey, Abney, Patrick, George, Keith (2009). "Robots in War: Issues of Risk and Ethics". Archived from the original on 2015-11-23.

[11] Bowcott, Owen. "UK opposes international ban on developing 'killer robots'". the Guardian. Archived from the original on 2015-07-29. Retrieved 2015-07-28.

[12] Awab Fakih, JovitaSerrao, Cell Phone Operated Robotic Car. International Journal of Scientific & Engineering Research, ISSN 2229-5518.

[13] Yun Chan Cho and Jae Wook Jeon Remote Robot

[14] Long range spy robot with obstacle and metal detection IJERT by V. NagalakshmiVaishnavi, SnehalShinde, PrernaBhalerao, Dr. GargiPhadke.

[15] BENNETT BRUMSON ROBOTICS IN SECURITY AND MILITARY APPLICATIONS.