

SURVEILLANCE SYSTEM FOR NATIONAL BORDERS

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Abstract: In this paper, we aim to develop an embedded alive human recognition robot in the war fields by using passive infrared sensor (PIR) sensor and Global System for Mobile communication (GSM) as technology. Now a days in War field's common people as well as soldiers get injured by bullets and chemicals which cause death. Most of them get unconscious and can't help themselves and due to which they die. In warfare, it is not possible to check each and every person. Whether the victim is alive or not. So PIR Sensor helps in identifying the alive person with the help of infrared rays emitted from a human body in a particular range. If a person is alive then signal detected by the Microcontroller and Microcontroller directs the signal to GSM, then the GSM sends the message to saving them. Robot can be controlled in personal computer interface with the help of attached wireless camera. Using this embedded system rescue team can save more number of people in less time

IndexTerms - Microcontroller, GSM, PIR Robot, Surveillance system.

I. INTRODUCTION

Military forces are authorized to support the State and its citizens by using weapons. The military's prime duty is to defend the citizens and protect country against war. People undergo many difficulties in such military area and most of them loose their life because they don't get proper treatment on time. In such a situation the rescue system must decide quickly and attempt to place victims at their individual risk in safe places. In order to allow medicine and a team of people to enter the disaster area and save people, the rescue system needs to collect information about the position and status of victims, physical solidity as rapidly as possible. The rescue operation is usually performed by people together with trained dogs. Trained dogs require assistance of human and they cannot reach crucial areas. Military Rescue workers detection takes time and is very difficult in vast affected areas. The proposed robotic system can overcome the limitations of method existed above, it goes through the highly affected military areas and helps to identify the victims. The main advantage of using robots is that they never get drained out or worn out and they're operationally beneficial in the military zone.

In this paper distinctive passive infrared sensor is used to detect alive humans. The PIR sensor receives the rays back and manipulates the alive human body as it emits thermal radiation. When people are located, it provides a signal to the authorities with visual alerts so that aid can spread the individual very quickly. This PIR device is built into a movable robot, which can work at national borders.

II. RELATED WORK

Dogs were used in earlier days because they were highly delicate to any trivial measure or human existence. But it remained tough to rely entirely on them, subsequently they can predict the occurrence of a live victim and a dead victim, and they were too incapable to explain the particular human situation. One main drawback was that dogs could not work individually; they need the support of a human being.

In various fields, such as the military, industry, medicine, etc., robots are now creating a good progress with proven effectiveness.

Recent growths in the world of robotics have made robots cooler to use, smarter and, most prominently, more affordable. With these benefits of robotics, it is not surprising that they found jobs in every ground. That's right, robots are actually used for manufacturing production to medical areas. The benefits of robots have improved their flexibility by being able to perform numerous tasks and applications. They are more accurate and consistent than people. As the robot helps to save human lives, especially soldiers. The kind of progress in robotics is beneficial the society and the Nation, which is a highly motivational factor in this proposed project.

A review on Human Rescue Robots [1] has illuminated the design of a robot to direct with various sensors in the rubble. This technique uses two approaches to identify living human beings, one is the IR emission from alive human beings and the other use the sound or cry for human.

Automatic and Manual Controlled Alive Human Detection Robot [2] has operated on the policy of an economical robot that uses the AVR, MCU, PIR sensor. This machine senses the heat of the human body using a PIR sensor and an alarm / pointer is used to specify the signal once it senses the living body and this message is directed via SMS using GSM technology to allow rescue.

Quality exertion in the pitch of robotics has been done. There has been constant improvisation on this concept ever since. Rescue robots have been established, several of which are CRASAR (Centre for Robot Assisted Search and Rescue) by South Florida University. This robot was first used in real situations in the disaster of the World Trade Centre on 11 September 2001. Diverse sensors were used, such as a millimeter wave radar for distance dimension, a CCD color camera for vision and a forward-thinking infrared camera for human temperature recognition.

Human detection and identification by thermal source [3] presented the idea of permitting robots to detect and recognize people in local environments. This effort was done with the benefit of thermal and visual material sources, which were combined to discover and rescue humans.

Motion analysis and Remote control system [4] has proposed important mobility rewards over wheeled and tracked designs. It was prepared with predefined hiking gaits, cameras, live audio and videos of the tragedy site, as well as facts about object locations in relative to the robot's location on the laptop interface. Dedicated robots have been established for such surroundings as snake-like robot KOHGA. This robot was made by joining several crawler vehicles in sequence, resulting in a long and thin structure that allows it to enter narrow space.

Remote Operated and Controlled Hexapod (ROACH) [5] has presented a venture with a sensor for human recognition in the USAR robots. It considered various types of human sensors such as pyro electric sensor, USB camera, and microphone and IR camera. The pyro electric sensor has been used to identify heat in the human body. The USB camera was used to discover movement. For long period and high-amplitude sound detection a microphone has been used. The IR camera was used to distinguish humans by their heat image. The core idea was to identify an image change by trying pixel values. Some images for the part were acquired and removed from each other to regulate whether a movement has been detected. The method used was quite efficient in the recognition of the victims. However, the robot was not completely self-governing and depended on the operator.

Using GPS service the idea of locating the current position came into existence. A low-cost automotive positioning system with GPS and GSM SMS services [6] that affords human placing via smart phone as a short message (SMS) and PC interface.

A new method for detecting humans in devastated environments using a simulated autonomous robot [7]. The first level is a PIR sensor used as the key sensor to identify the reality of people in a scene. The PIR sensor uses the radiation of the body heat to discover a alive human. The second level is a sensor of body shape. This level uses cost-effective web camera with modest image processing using neural network knowledge to confirm the presence of a human form.

An approach for controlling the robot wirelessly [8]. In this the control unit contains of a manual control with a remote control of the robot movement and a PC linked to the robot unit by Bluetooth to get the GPS receiver output.

Several methods are used in this [9] to control the robot for human detection. In this Joystick and RF technology are used to control and connect with the control point of the semi-autonomous robot.

III. PROPOSED WORK

The soldiers in a warfare field may need immediate medication, during wartime. When the soldiers, fall to the ground due to the attacks made by the enemies or shooting out continuously, the injured soldiers had to be rescued only by the other soldiers or by the armed forces manually by searching each and every victim, during wartime and provides them with immediate medication and necessary treatment. This project is implemented by using PIR sensor, GSM and Wireless camera for video streaming purpose.

The functionality of our project is that the PIR sensor linked to the embedded board of our microcontroller is sensed each time an individual moves. When a breathing is person sensed by the microcontroller of the PIR sensor directs a message to the team. To detect the exact location or position of a soldier during extreme condition and to transmit the video coverage to the support team through wireless camera's. The robot can also be used during the Earthquakes, to detect the alive human. User friendly GUI at the receiver end providing control of the robot and its actions.

3.1 HARDWARE REQUIREMENTS

1. Embedded Microcontroller
2. GSM Modem
3. PIR Sensor
4. GPS Module
5. Motor drive
6. Wireless Camera
7. PC Interfacing
8. DC Motor
9. Zigbee Transmitter and Receivers / RF Transceivers
10. Alarm.

3.2 SOFTWARE REQUIREMENTS

1. Python IDE
2. Flash Magic

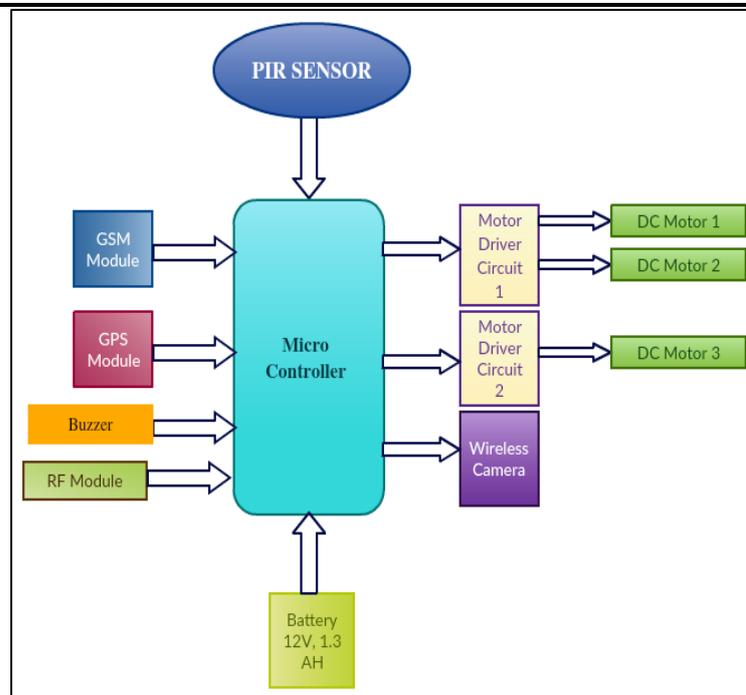


Fig. 1: Block diagram

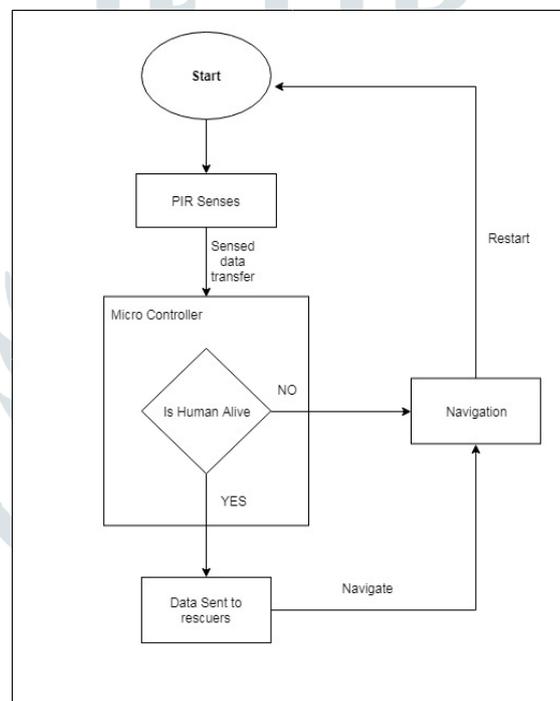


Fig. 2: Flow diagram

The working nature of this project is that the PIR sensor which is attached to the microcontroller embedded board, will detect the alive victim. As the Robot moves at the national borders, PIR sensor detects the person who is alive with the help of infrared rays emits from a human body. The range of PIR sensor is 10 m. After the detection of alive person the signal is sent to Microcontroller and then Microcontroller directs to GSM. GSM is programmed with rescue team mobile number for which the messages are sent. For the detection of exact location GPS is attached. Hence the SMS sent by the robot includes exact location of the victim. Rescue team has the functionality of operating the robot in a PC interface, with the help of attached wireless camera in the robot. The rescue team can view the live video streaming in the PC. Based on the live video the robot can be controlled in various directions by rescue team.

IV. COMPONENTS USED

4.1 PIR SENSOR

PIR is a passive infrared sensor that processes infrared energy. The Passive Infra-Red (PIR) sensor senses movement within around 10 m of the sensor below typical circumstances. This is an average value, meanwhile the real range of recognition is among 5 m and 12 m. The PIR sensor receives and operates thermal energy as live human body originates. It works in 5V DC. The PIR (Passive Infra-Red) sensor is a pyro electric device that notices movement by determining changes in the levels of infrared (heat) discharged by humans. This motion can be perceived by examining the adjacent IR designs for a unexpected change. The PIR sensor yields a high indicator on its output pin when wave is spotted. A microcontroller can deliver this logical signal or drive a transistor to change a higher current load.



Fig 3.a PIR SENSOR

4.2 MICROCONTROLLER

Arduino is the system's microcontroller. Signals from PIR devices are directed to the microcontroller then the signal is digitized and guided to the Zigbee through this microcontroller. The controller has features such as an combined ADC, which is needed to obtain the signals from the various devices.



Fig 3.b Arduino Microcontroller

4.3 ZIGBEE TRANSRECEIVER

It is a very low power communication technology. It is used to transmit and obtain data among robot and the control unit. Zigbee is a wireless communication protocol.



Fig 3.c Zigbee Transceiver

4.4 MOTOR AND MOTOR DRIVE

The device signifies the robot that can move transversely areas prone to earthquakes. The motor drive is the microcontroller-robot line circuit. The project is consuming a DC engine. DC motors have divergence and rotational path depends on present direction. However, a DC motor cannot be straight interfaced with the microcontroller, as it needs far advanced voltage and current. For this, the motor drive is used. It is created using a transistor npn-BC547. It acts as a boundary device to amount the engine with the essential power.

4.5 GSM

GSM (Global Mobile Communications System) is a cellular or mobile net, which means that mobile receivers are associated to it in the instant locality by penetrating for cells. GSM networks function in 4 diverse frequency ranges. Most GSM nets achieve bands among 900 MHz and 1800 MHz It also proposals a low-cost alternate to voice calls to the network conveyor, the Short Message Service (SMS, also known as "text messaging "), which is offered in real time on others.

4.6 WEBCAM

The camera component involves of a web camera that is placed on the robot plus the video signal is conveyed in the control area to the receiver. The camera segment transfers the video coverage and therefore aids the saving team to track with ease. For actual time requests, camera of high range is to be used to get decent clearness and good exposure of area. The camera benefits the robot to halt even in pit, even in difficult areas and forecast essential information. This helps to advance the robot's lifetime in the catastrophe part. Owing to which we can perceive the robot & we can see a live vision.

V. CONCLUSION

The goal is to deliver a human detection robot in a catastrophe atmosphere. Some rescue robots are equipped with different sensors but it is too expensive. The sensor used in this research paper is easy to use and economical.

In this research paper a new technique is proposed for the exposure of survivors in smashed surroundings using a simulated autonomous robot. For this process, the machine uses two segments and the two segments are interconnected. The first unit is the robot sector that moves in and around the war field and looks for the alive humans. The second section is the Control section, which is for rescue team and to control the robot direction and movements. Up gradation in accuracy can be done by adding more number of DC Motors.

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