



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Rescue Robot for Human Detection

Mrs. B S Sudha¹, MahimaShaini², Likitha M³, Omkar Chavan⁴, Prashant Kumar

¹Associate Professor, ^{2,3,4,5}UG Student

^{1,2,3,4,5}Department of Electronics and Communication Engineering,

^{1,2,3,4,5}Dr. Ambedkar Institute of Technology, Bangalore, India

ABSTRACT

Natural calamities like Earthquakes, Tsunami and man-made disasters bomb explosion, building Collapse often occurs and they cannot be stopped. Humans are getting increased knowledge in the concept of intelligent rescue operations in such calamities so as to save precious life and material, however calamities cannot be stopped. Therefore, many a time's humans are buried among the detritus and it becomes impossible to detect them. Only a timely rescue can only save people those have been buried and wounded This project proposes a mobile robotic vehicle that moves in the disaster-prone area for detecting alive humans in such devastating environments and helps to identify the live people and rescue operations. In this project Passive Infra-Red (PIR) sensor has been used.

Keyword :Internet of things, Robotics, Embeded Systems, Android application, Database Management System.

1. INTRODUCTION

Humanitarian search and rescue operations can be found in most large-scale emergency operations. Tele-operated robotic search and rescue systems consist of tethered mobile robots that can navigate deep into rubbles to search for victims and to transfer critical on-site data for rescuers to evaluate at a safe spot outside of the disaster affected area has gained the interest of many emergency response institutions. This project demonstrates the use of distributed wireless sensor network to track search and rescue robot in an open field. Robots designed for search and rescue had been discussed in scientific literature since the early 1980's however, no actual systems had been developed or fielded until 2001. With the advancement in sensor miniaturizations and exponential increment in the speed and capability of microcontrollers, rescue robots small enough to thread through rubbles are rolling out of experimental laboratories into the catastrophic areas. For the wireless robot tracking system in this research, the primary objective is to continuously track the location of each robot by evaluating a collective set of feedbacks from multiple sources.

Disasters can disrupt economic and social balance of the society. Natural disasters occur frequently now a days. Many human beings are victims of such occurrences. Because of high rise buildings and other manmade structures urban and industrial areas can be considered to be more susceptible to disasters. These disasters can be categorized into natural and human induced disasters. Natural disasters include floods, storms, cyclones, bushfires and earthquakes whereas besides natural disasters, the urban environment is prone to human induced disasters such as transportation accidents, industrial accidents and major fires. During such calamities, especially disasters, in order to prevent loss of life and property various essential services (like fire brigades, medical and paramedical personnel, police) are deployed. Some lose their lives because of

not being treated at time. According to the field of Urban Search and Rescue (USAR), the probability of saving a victim is high within the first 48 hours of the rescue operation, after that, the probability becomes nearly zero.

Generally, Rescue People cannot enter into some parts / places of the war field or in the earth quake affected areas. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. To avoid such losses, a robotic system can perform well for providing alert (detection) of human being.

2.OBJECTIVE

Whenever disaster occurs a rescue operation has to be performed. This task is performed mostly by human and trained dogs, often in very dangerous and risky situation so, to avoid this a robotic system is built which will enter the disaster prone area and will collect the data and send it to the control room. So the main objective are human detection using disaster prone area using PIR sensor.Soldier identification using RFID.Wireless communication using GSM and Android.

3 .LITERATURE SURVEY

In Paper [1],RoboFI: Autonomous Path Follower Robot for Human Body Detection and Geolocalization for Search and Rescue Missions using Computer Vision and IoT. This paper gives an idea about the use of PIR sensor, which can be used for the detection of human beings and helps for the movement of the robot in the rescue operation. Even this paper deals with the application of GSM module which helps to get the proper notifications of disaster prone area and helps to take necessary measures.

In Paper [2],An Embedded Autonomous Search and Rescue Mobile Robotic System for Alive Human Detection. The paper has helped us fixing the IP web camera for the live demonstration of the operation. It also gives us a idea of using thermal sensor to check the temperature of the volunteers in rescue operation and identify whether the volunteer is alive or dead.

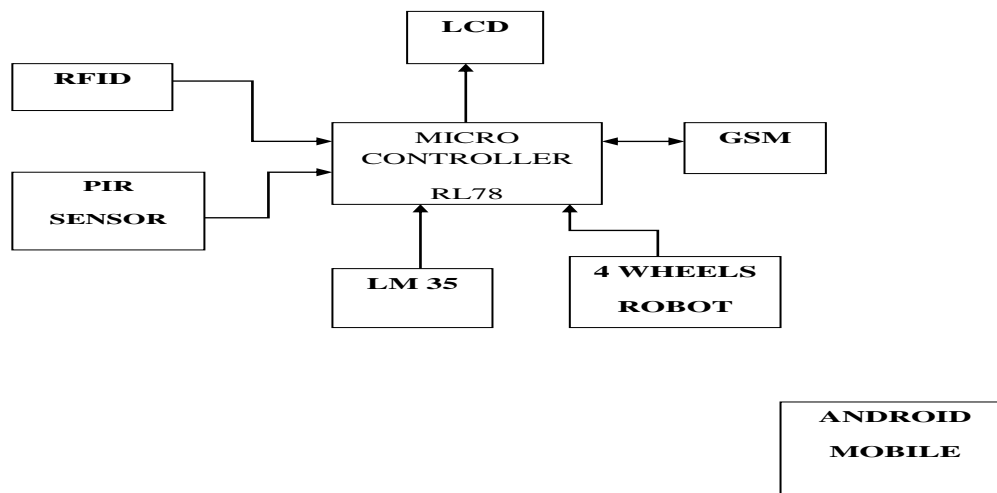
In Paper [3] ,Live Human Detection and Streaming using IoT. This paper deals with various sensors where we can see wi-fi modules, motion sensors, gas sensors etc., Even this has given us the idea of fixing the DC motors which helps for the fixing the wheels of the robot for its motion.

In Paper [4],DronAID A Smart Human Detection Drone for Rescue. This paper has used the drones in the operation to detect the live location of the rescue operation and also the drone sends the live footage of the disaster prone area. This helps us in monitoring the operation with live camera and various sensors..

In Paper [5], Paper [5], Alive Human Detection System for Rescue Operations in Hazardous Areas. . This paper gives us the idea of using the heartbeat sensor which helps in detecting whether the human being is alive or dead. It alsouses GPS system to detect the actual position of the volunteers working in the disaster prone area.

4. BLOCK DIAGRAM

In this project we are developing a robot which detects living human body. We are using PIR sensor for the detection of human body and we are using temperature sensor to measure human body temperature. Microcontroller controls the motion of the motor and moves towards the human body. Once it reaches near to the human body, it will check for temperature of the human body. Temperature sensor output is given to the ADC. ADC converts the analog input into digital bits which is taken into microcontroller after few seconds it sends an SMS to the predefined numbers. Here the soldiers are identifying by using the RFID reader which are already given them as a unique number. When soldier entered to the particular RFID reader it will reads the TAG and name of the soldier, with the help of Temperature sensor we will come to know whether the soldier alive or not. GSM module is used to send SMS to the required GSM mobile. This module is programmed using AT commands through UART. These all parameters or messages will send to Android mobile which will give Voice output.



6. METHODOLOGY

The model aims to provide the solution for problems faced by rescue operators who risk their own lives for saving the lives of victims. The methodology or implementation of this rescue robot starts with analyzing the block diagram followed out by hard testing as per the project requirement. Further the test code is prepared for all the peripherals. The necessary logic is developed is using various open source software. Then the final testing of project is done as per the required conditions.

Here the renaesas microcontroller controls all the activities of sensors. The PIR sensor detects the motion of human in the operation. The RFID reader and tag is used to identify the volunteers. The GSM module is used for wireless communication. The LM-35 temperature sensor detects the temperature, based on the detected temperature we can say whether the human being detected is alive or dead. A LCD screen is used to display the data being collected by the various sensor. The DC motors here are used for moving the robot in four different directions (forward, backward, right and left). With the help of android application we can control the movement of robot and the database can be maintained. This database can be used in rescue operation.

7. SYSTEM IMPLEMENTATION

The system implementation consists of hardware and software implementation of the project. The hardware components used in this project are renesas microcontroller, GSM module, RFID reader and tag, PIR sensor, LM-35 temperature sensor, L293 driver and 4 DC motors. Here the LM-35 temperature sensor, PIR and the RFID reader acts as input. All these three sensors will read data and send it to the renesas microcontroller. So based on the data collected by these sensors the microcontroller will check for some conditions and if the condition satisfies, it will trigger the GSM module and L293-driver. Now the L293 driver will drive the motor which will result in movement of robot. Here the LCD display acts as an output device which will display the status of the system continuously. The user will receive a SMS whenever the robot makes a movement and if it detects the human in the rescue operation.

The robot we use here is a mobile phone controlled, which can be moved in all four directions with the help of an android application. Also we can maintain a database in a mobile application. The software applications used for this project includes Cube suite++, Renesas Flash Programmer and Eclipse. The code for hardware is implemented and tested using cube suite++ software and it is dumped into the hardware with the help of renesa flash programmer. The code for android is developed and tested using eclipse software.

8. ADVANTAGES

1. Fidelity of the system is high so effective tracking of human being can be done.
2. Can also be used to monitor provide health status of the human.
3. Low cost
4. High reliable.

9. DISADVANTAGES

1. PIR Sensors detect only in front field of 180 degrees, it must be Fresnel PIR which work at 360 degrees.
2. Changes in environment, like temperature, pressure, humidity, affect ultrasonic response, so it shows a need for better one when robot is working in real field.

10. APPLICATIONS

1. In disaster zones, whether it natural or man-made disaster.
2. In military applications to detect the presence of militants.
3. In Rescue operations where human reach is not possible.
4. In Medical applications to detect motion.
5. In Warfield affected areas, to detect the presence of bomb.

11. CONCLUSION

The goal of this work was to provide a rescue robot for human detection in a disaster environment. Though, the existing Urban Search and Rescue Robots are equipped with various sensors, but the problem with them is the cost and complexity of circuit. The sensor used in the development of this project is easily available and cost effective

In this project, a new method for detecting surviving humans in destructed environments using simulated autonomous robot has been proposed. the Robot section, which moves into the debris and searches for the alive humans. Adding more number of DC motors to the Robot can further enhance this, so that the torque can be still improved. A timer can be built-in and this complete system can be made automated.

12. FUTURE SCOPE

In future, automatic pick and drop of blocks and human with robot arm can be implemented which can further reduce the time consumption. For project demo concern, we have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

REFERENCES

- [1] RoboFI: Autonomous Path Follower Robot for Human Body Detection and Geolocalization for Search and Rescue Missions using Computer Vision and IoT by Ahmed Imteaj, M A IsfarJubair Chowdhury, Mohammad Farshid, Abdur R Shahid in 2020.
- [2] An Embedded Autonomous Search and Rescue Mobile Robotic System for Alive Human Detection by Izzeldin I. Mohamed, Lim Lei Kun and Nazar Elfadil2 in 2020.
- [3] Live Human Detection and Streaming using IoT by Dr. Varsha Bendre, Priyanka Ugale, Mayuri Maske, Amruta Patil in 2020.
- [4] DronAID A Smart Human Detection Drone for Rescue by Rameesha Tariq, Maham Rahim, Nimra Aslam, NarmeenBawany, UmmayFaseeha in 2019.
- [5] Alive Human Detection System for Rescue Operations in Hazardous Areas by Jinu Sebastian, Lidiya KA, Martha George, Asst.Prof. SijaGopinathan in 2017.