Live Human Detecting Robot for Earthquake Rescue Operation

Rupnar Pallavi Sharad
ME (EC)
Savitribai Phule College of engineeering
Aurangabad, India
E-mail: pallavi_rupnar@rediffmail.com

Prof. Thorat P.R.
ME (EC)
Savitribai Phule College of engineeering
Aurangabad, India
E-mail: thorat.popat.r@gmail.com

Abstract— the advent of new high-speed technology and the growing computer capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drives and advanced control algorithms.

Natural destructions that we can not stop.But humans are becoming increasingly aware in the concept of intelligent rescue operations in such calamities so that precious life and material can be saved though calamities cannot be stopped. Still there are lots of disasters that occur all of a sudden and Earthquake is one such thing. Earthquakes produce a devastating effect and they see no difference between human and material. Hence a lot of times humans are buried among the debris and it became impossible to detect them.

Keywords- *DC motor, PIR sensor, ZIGBEE*

_____*****_____

I.   INTRODUCTION

A Passive Infrared sensor is used in the project which emits infrared rays to detect humans. As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. Once the people are located it immediately gives audio alert visual alerts to the authorities so that help can reach the live person very fast. This PIR sensor is placed on a moving all direction robot that can move in the earthquake prone areas. The robot is driven on a geared dc motor for increased torque and low speed and stepper motor for increased turning accuracy hence the precise control of position is monitored. The robot consists of a three wheel geared drive with DC motors attached to perform forward and reverse movement. Detection by rescue workers is time consuming; therefore here we are using the robot for earthquake recue operation.

II.   BLOCK DIAGRAM

ROBOT MODULE

CONTROLE MODULE
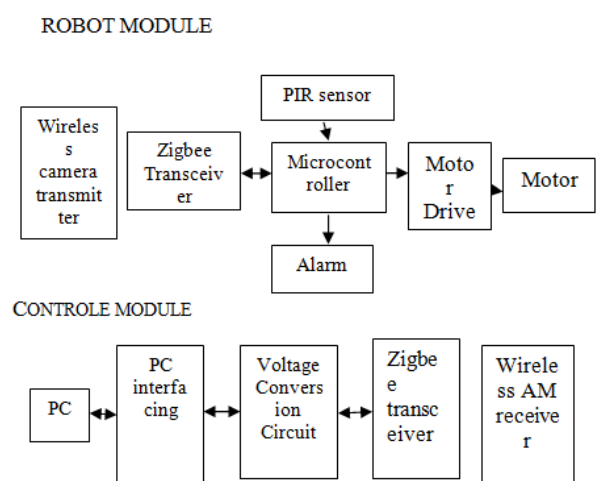
III.   WORKING OF THE SYSTEM

PIR Sensor:
The Passive Infra Red (PIR) sensor will, under typical conditions, detect a human being moving around

_____

within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.

As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. PIR sensors are passive infra-red sensors. It operates at 5V DC. The PIR (Passive Infra-Red) Sensor is a pyro electric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

Microcontroller:

PIC16F877A is the microcontroller used in this system. Signals from PIR sensors are given to the microcontroller and this microcontroller will digitize the signal and send it to the zigbee. The controller has features like inbuilt ADC, required to get the signals from the various sensors. Beside this the microcontroller that is used in this project has some additional advantages.

ZIGBEE Transceiver

It is used to send and receive data between robot and the control unit. Zigbee is a digital wireless communication protocol. It is a very low power communication technology.

Motor and motor drive:

Motor denotes the robot which can move over earthquake prone areas. Motor drive is the interfacing circuit between microcontroller and robot. The project uses DC motor. DC motors have polarity and direction of rotation depends on direction of current. But a DC motor cannot be interfaced to the microcontroller directly because it requires much higher voltage and current. Motor drive is used for this. It is built using an npn transistor –BC547. It acts as an interfacing device to supply required power to the motor.

Voltage conversion circuit:

The operating voltage of zigbee transceiver and PC are different hence we need a voltage conversion circuit

IV. ADVANTAGES

1. The system uses Zigbee and this makes the system both accurate and reliable.
2. This System is an effective and a safe system to ensure that there are no humans left behind in a rescue operation.
3. The System is safe even for the user because of the use of robotics and no manual work

V. DISADVANTAGES

1. The initial cost may be high if very high range sensors are being used in commercial usage.
2. Battery backup for camera is weak which can be overcome by using a solar panel.

VI. VISUAL BASIC

Visual basic has been used to create an on screen application to control the robot; Visual Basic uses graphical, forms -based approach to application and development. The typical way to write a program in Visual Basic is to create a form, drag and drop controls onto the form, set properties for the form and its controls, adds application – specific code to handle events. It sounds simple, but we can write very powerful applications in this manner.

VII. CONCLUSION AND FUTURE SXCOPE

Hence many lives can be saved by using this autonomous vehicle during an earthquake disaster in a short duration which becomes time consuming and unaffected if done manually. This vehicle can be improved by using high range sensors and high capacity motors. Some more sensors like mobile phone detector, metal detector etc. can be implemented to make this vehicle more effective.

REFERENCES

[1] Chou Wusheng. Wang Tianmiao, You Song, "Sensor-based autonomous Control for telerobotic system", Proceedings of the 4th World Congress On Intelligent Control and Automation, 2002, vol.3, pp. 2430 - 2434.
[2] Miyama, S.; Imai, M.; Anzai, Y.; "Rescue robot under disaster Situation: position acquisition with Omni-directional Intelligent Robots and Systems, 2003.(IROS 2003), 27-31 Oct. 2003, vol.3, pp. 3132 - 3137.
[3] Albert Ko and Henry Y. K. Lau, „Robot Assisted Emergency Search and Rescue System With a

805

_____

Wireless Sensor   Network", International Journal of Advanced Science and Technology Vol. 3, February, 2009.

[4] Burion, Steve (2004), Casper, J. (2002), Amerada, Yams, Igarashit, &Matsunos, (2004) and Cappello, C., etal (2005) "Human Detection for Robotic Urban Search and Rescue" Carnegie Mellon University, Institute of Production Robotique (IPR) LSRO2 – VRAI-Group, Microtechnique, February 2004.