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Zig Bee Based Human Sensing Robot using Embedded Systems

Dr.R.Naveen[1], S.A.Sivakumar[2], K.Gowthami[3], M.Sabarishbabu[4], M.Sathishkumar[5], R.Vignesh[6], B.Vivek Vishnu[7]

[1]*Associate Professor, Electronics and Communication Engineering Info Institute of Engineering, Tamilnadu*
[2,3]*Assistant Professor, Electronics and Communication Engineering Info Institute of Engineering, Tamilnadu*
[4,5,6,7]*UG Scholar, Electronics and Communication Engineering, Info Institute of Engineering, Tamilnadu*

Abstract — *The robot are capable of doing work which it seems impossible for the human and it is more helpful if one can control it wirelessly. Robots are fastest; it can do the work faster than the humans. The robots reduce the human power. Now a day the robots are becoming more versatile and it has many features like which we can control it by the smart phones. The search and the rescues purpose. Where in case of earthquakes and it can be used in finding the hidden terrorists. The various sensing sensors are used for this purpose. The robots can find out easily which it is impossible for humans to find in naked eye.*

Keywords- *Robotics, PIR sensor, Wireless image transmission, Motor drives*

I. INTRODUCTION

The robots are automatic machine which are guided by the computer programs to do different takes, the robots can do the work simpler and quicker. The robots can also be used in search and rescues processes in the areas of natural disaster like earthquake, tsunami and hurricane. This method is to find humans where the search dogs will also have certain limitation. The wireless technologies are used to send information from about the environment. The wireless camera is used for the transmission process.

This paper is organized as follows: section I. existing methods, section II proposed methods, section III materials and methods, followed by result in section IV and conclusion in section V.

II. EXISTING HUMAN SENSING ROBOT SYSTEMS

This part illustrates the present method of robots used in rescue.

1.1 Mobile Robotic System for Search Mission

The Arduino microcontroller is used in this project. The robot uses the sensors to sense the environmental and it makes the suitable actions based on the predefined instructions. The ultrasonic sensor is used for detecting hazards in the environment. The LDR sensor which it senses the lighting conditions, and an LCD unit is used for display. The RF transmitter is connected with the Arduino which transmits the data that are received by RF receiver. The RF receiver is placed on the robot. The transmitter is connected to the keyboard from which the commands are given to robot wirelessly. The motor driver IC plays as an interface between the motor and the microcontroller, the suitable commands are given to move, turn left, turn right and to stop. The camera is used for finding obstacle and surveillance and spying purpose.

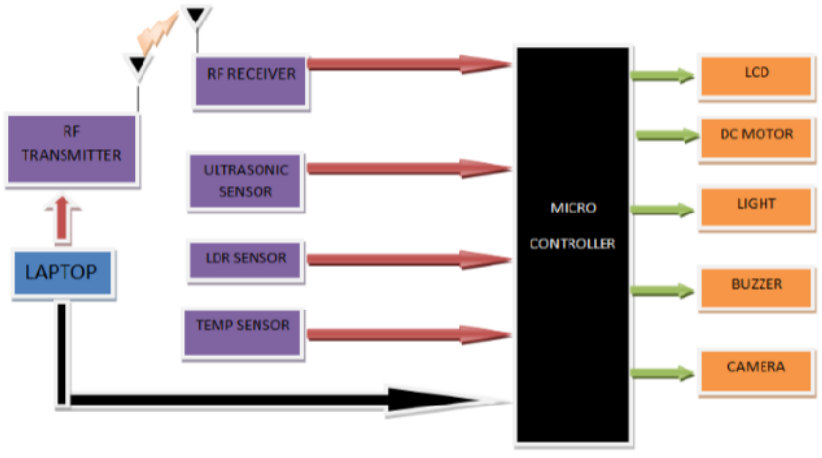

Fig 1 Mobile Robotic System for Search Mission

1.2Borewell recuse of children using Robot.

This project is to rescues the children who has accidently fallen into borewell using robot. The controlling system is done using a PIC microcontroller. The data is received by using a ZIGBEE receiver and it is sent to microcontroller input, which it judges to move in the relevant direction, which it is connected to PC motor. The current live images are captured from camera and it is TV through AV system. The embedded C language is used to program microcontroller. The borehole robot consists of a 3 wheel with a rubber grip, the motors which they are connected also have an spring suspension also. Which it makes the wheels to fix along the walls of hole and help in moving down without any sliding it also consists of arm to pick up baby from hole.

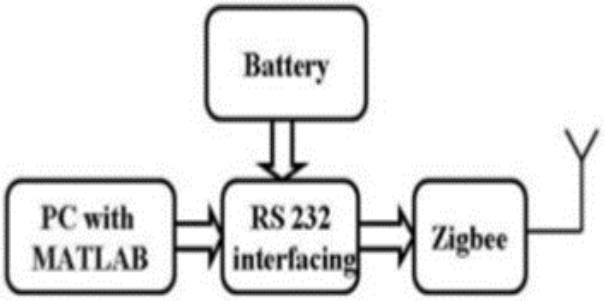

Fig 2 Block of the transmitter

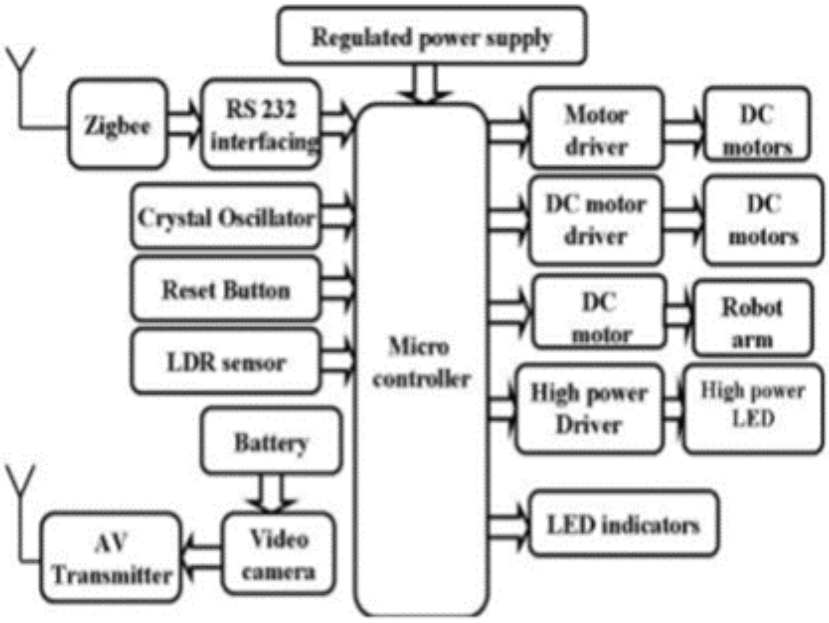

Fig 3 Block diagram of receiver

1.3 Autonomous rough terrain rescue mobile robot

This project consists of two sections as the receiver and mobile section. This requires the pc or tv to display the location and a Zigbee module to receive the GPS, that it determines the latitude and longitude direction with the robot. The RF receiver is used to receive the captured video. The data logging is done using Microsoft visual studio 2010.The first configuring of COM port is completed, and the next step will retrieving the longitude and latitude values. And the real time mapping is done by google maps by the help of ASP. The mobile section consists of a GPS, PIR sensor and a wireless camera module. TheARM7 gives signal if human is detected and the latitude and longitude is known using ZigBee.

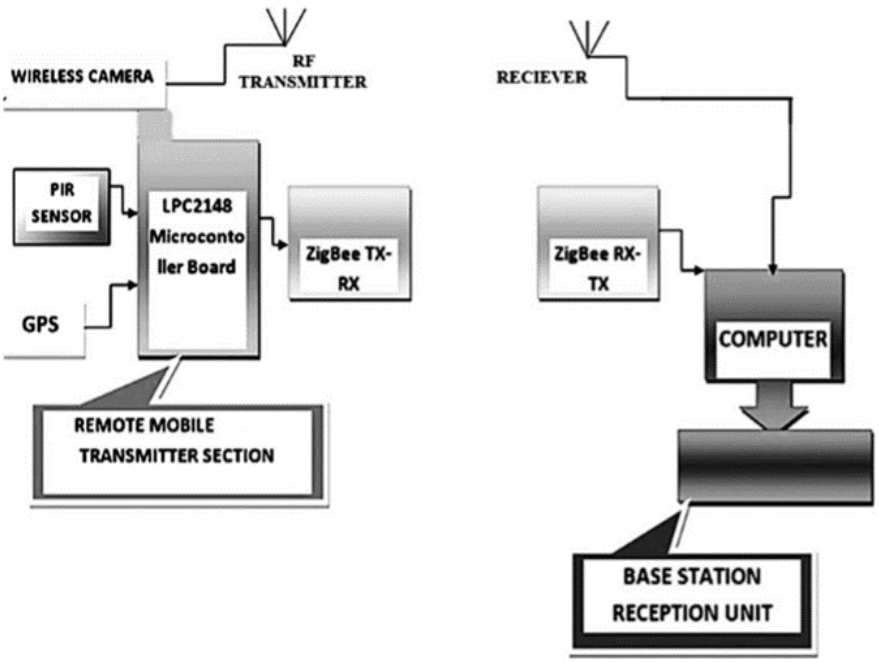

Fig 4 Autonomous rough terrain rescue mobile robot

III. PROPOSED METHOD WORKING METHODOLOGY

This project work deals with the rescue of the humans by robots using sensors. The ZigBee transceiver is used as both transmitter and receiver for sending and receiving information. The wireless camera is used to capture the live images and the suitable commands is given using the Zigbee. The PIR sensor senses if any human is under the destruction parts of the building and an LCD display is given to the rescue team and alarm sound is heard if any human is found, which it will be fastest and the easy way to rescue. The motor diver is used to stimulate the motions of the robots. The motor is used to convert the electric current into mechanical energy.

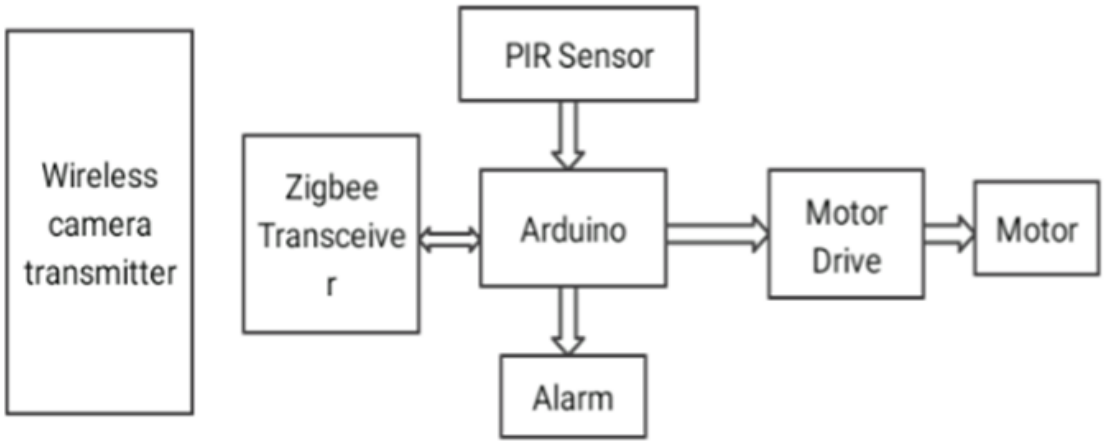

Fig 5 Block diagram of the proposed system

IV. MATERIALS & METHODS

3.1 Arduino microcontroller

An Arduino microcontroller is been originated from ATMEGA 328. It 14 input/output digital pins which are been used for various causes. There is an inbuilt USB connection which is connected to USB cable to upload any program associated. The Arduino is different from others as it does not use PTD1 USB to serial drives chip. It can be powered with any external supply also. And the external supply is of 6 to 20 volts. The main disadvantage of this UNO is if we give more than 12 v, the overheat is produced which iy may damage the board.

Fig 6 Arduino microcontroller

3.2 LCD Display

LCD is usually a flat display panel, it uses the light modulating properties of the liquid crystal. The light is not directly emitted from the liquid crystal. The LCDs are available as to display arbitrary images and fixed images but the information will be low of content and also can be hidden. They have wide range of applications such as they are used in televisions, aircraft etc. They are very commonly been used for customers-oriented devices such as DVD player, clocks, wrist watches, and so on. They are available in different size and displays. One of the main characteristic of an LCD display is that they do not make use of phosphors.

Fig 7 LCD display

3.3 Electric motor

Electric motors are used to simulate something in robot like its wheels, legs, tracks and fingers. There are several types of motor controllers like brushed DC, DC gear motors and many linear actuators are used. A simplest type of the motors is dc brush motors. The device which it changes the current/voltage of the motor is known as the controller of the motor. The servo motors are most commonly used in robots. The torque and speed of servo motors are better than the stepper motors. A brush is used to conduct current between the stationary and the moving parts. It is impossible for a DC motor to rotate backwards.

Fig 8 Electric motor

3.4 Zigbee transceiver

Zigbee is a wireless communication. The transceiver module enables a bidirectional communication, that both way communication between the RTI remote controls and the control process used by Zigbee. Zigbee suits for a high-level communication protocols it is designed for such purpose. The Zigbee provide very good security. Zigbee are of low cost and low power consumption wireless M2M networks. It is defined as a wireless personal area network (wipan) it also included the Bluetooth standards too.

Fig 9 Zigbee transceiver

3.5 Wireless camera transmitter

It transmits a video and audio signal wirelessly through the receiver by the radio band. The term wireless means the transmission of audio and video. It has no installation unit and no need of expensive video cable extensions. It is more flexible also. The digital wireless camera has the range between 250 to 450 feet in the outdoor and in the indoor the range is limited to 100 to 150 feet. The cubical walls and glass do not degrade the wireless signal strength. The range depends on the competing signals which uses the frequency as the frequency of camera.

fig 10 Wireless camera transmitter

3.6 Motor drive

A motor drive when associated with an electrical machine used to convert the direct current into electrical energy into mechanical energy. The motor drives have an internal mechanism which change the current flow direction. The speed of a DC motor drive can be controlled by either using a voltage supply or by changing the windings. This motor is used in many toys and appliances where the light weight motors are generated by the universal motors with a direct current flow when a technology rich in power tectonics came into exitance, DC motors are replaced by AC motors. The specification of a DC motor is that it has fixed magnets in the rotor part and one or more windings in the armature part.

fig 11 Motor drive

3.7 PIR sensor

PIR sensors permits us to sense motion, every time it is used to detect whether a human has moved in or out of the

sensors sensing range. They are compact, low-cost, low-power consumption, and easy to handle. They are usually called as PIR, "Passive Infrared", "Pyroelectric", or sensors. PIRs are basically made up of pyroelectric sensors which can detect levels of infrared radiation. It emits low level radiation, and the hotter something is, the more radiation is emitted is observed. The detection of this sensor is divided into two halves. The reason for that is that we are looking to detect motion (change) not average IR levels. The two halves being wired up so that they cancel each other out. If one half sees more or less IR radiation than the other, the corresponding output will swing low or high.

Fig 12 PIR sensor

V. HARDWARE RESULT

This project work deals with the rescue of the humans by robots using sensors. The ZigBee transceiver is used as both transmitter and receiver for sending and receiving information. The wireless camera is used to capture the live images and the suitable commands is given using the Zigbee. The PIR sensor senses if any human is under the destruction parts of the building and an LCD display is given to the rescue team and alarm sound is heard if any human is found, Which it will be fastest and the easy way to rescue. The motor diver is used to stimulate the motions of the robots. The motor is used to convert the electric current into mechanical energy.

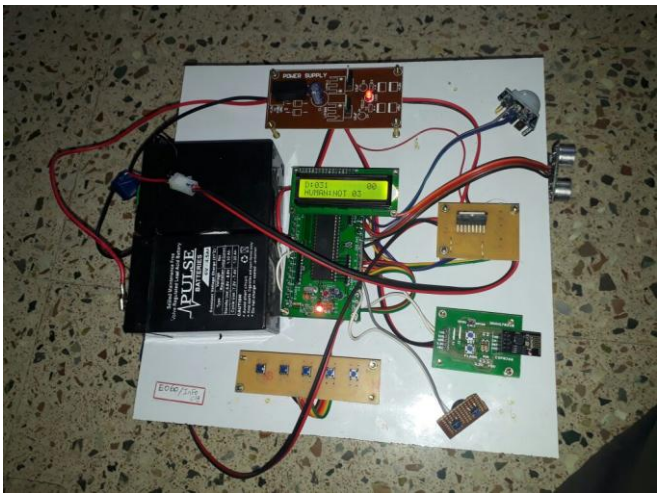

Fig 13 Hardware output

VI. CONCLUSIONS & FUTURE ENHANCEMENTS

The robot was controlled wirelessly using the Zigbee technology for the search and rescue purpose is successfully sketched and verified. The main part of robot is the microcontroller which combines with the transceiver and permits the robot to be accessed from the distance. The sensor unit like PIR sensor unit, makes the robot more suitable for rescue mission. The future enhancement of the of the system can be increased by adding some extra features like GPS tracking so that where the robot will be tracked at any point of the time. In the era of industrial revolution where people used to build a huge building but they do not care for the people who live their life there. After the natural calamities many people lost their life so taking account of all the situations robot is integrated with varies modules so that they can be used for redemption and security purpose.

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