Alive Human Detection Robot For War And Rescue Operation

Kunal Swami[1], Prof.D.G.Agrawal[2]

PG Student [ECE], Dept. of Electronics and Telecommunication Engg. SSGB College of Engineering & Technology, Bhusawal, Maharashtra, India[1]

Professor, Dept. of Electronics and Telecommunication Engg. SSGB College of Engineering & Technology, Bhusawal, Maharashtra, India[2]

ABSTRACT

The principal purpose of this embedded application is to design a remote controlled robot that can hit upon stay humans and transmit the vicinity information wirelessly. It conflict fields and places in which war or disaster has occurred. Detection is also required in risky sectors like boilers, reactors wherein most effective legal man or women can input. The stay body sensor in this venture is a special sort of sensor called PIR sensor. Any alive frame with a temperature above absolute temperature emits radiations which can be invisible to the regular eye. It senses those rays to come across the live human and will inform to the controller.

Keyword: *ATMEGA328 Microcontroller, ZigBee transceiver, Camera module, PIR sensor, GPS module, DC motors*

1. INTRODUCTION

The live body sensor is a special type of sensor. It senses the passive infrared rays, which are always emitting from the live bodies that is human bodies. In this project we are using ZigBee for the efficient wireless communication. The GPS receiver receives the Longitudinal and latitudinal value when the system detects the movement of the human. This data is sent to the remote PC using ZigBee transceiver. The whole system is placed in a robotic car. The car is moved remotely using the C# software running in PC through the ZigBee. 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. All of these tasks are performed mostly by human and trained dogs, often in very dangerous and risky situations. The rescuer may become a victim who needs to be rescued. This is why since some years mobile robots have been proposed to help them and to perform tasks that neither dogs nor existing tools can do. We will focus only on robots which will work in a disaster environment of manmade.

2. LITERATURE REVIEW

The implementation of Microwave life detection system to locate human subjects under earthquake rubble or behind barrier was based on microwave beam of low frequency i.e. 450 MHz so that the communication between human subjects and earthquake rubble or construction barrier was less.[1] In implemented system to detect victims with image taken by an IR (Infrared camera) in an intelligent way , the detection of an object in an image is so complicated so they used neural network method for recognition of the body of human in taken image.[2] [5].

The proposed a network system and an algorithm for a rescue robot to obtain its position under collapsed area used omnidirectional sensor which has certain area of coverage for reporting the observing quantity and temporary tag .

Because of this, the system was construct temporary communication.[3] The designed robot to operate in outdoor environments such as disaster area was used wireless communication and due to limitation of wireless connection and the complexity of rescue operation , the full operation of robot cannot be constantly supervised by human operator therefore they used autonomous robot.[4].

The proposed an autonomous robotic vehicle that moves in the earthquake prone area and helps in identifying the alive people and rescue operation was based on embedded PIC Microcontroller and ZigBee transmitter and receiver. In this system the battery backup for camera was weak so they have use a solar panel. [6] The proposed an autonomous robotic vehicle that moves in earthquake affected area used AVR microcontroller which is reprogrammable. But remote controlling was designed for limited distance. For this system, the battery backup was not sufficient. So they used GSM technology by adopting image processor which was more effectively. [7]

3. SYSTEM MODELS AND ASSUMPTIONS

3.1. Proposed system:

The proposed robotic system can be design to detect alive human body in an affected area which is useful for rescue operation. This system is based on ATMEGA328 single board microcontroller. This system uses PIR sensor to detect alive human reliably. The block diagram of alive human detection robot is given in Fig.1and Fig.2.

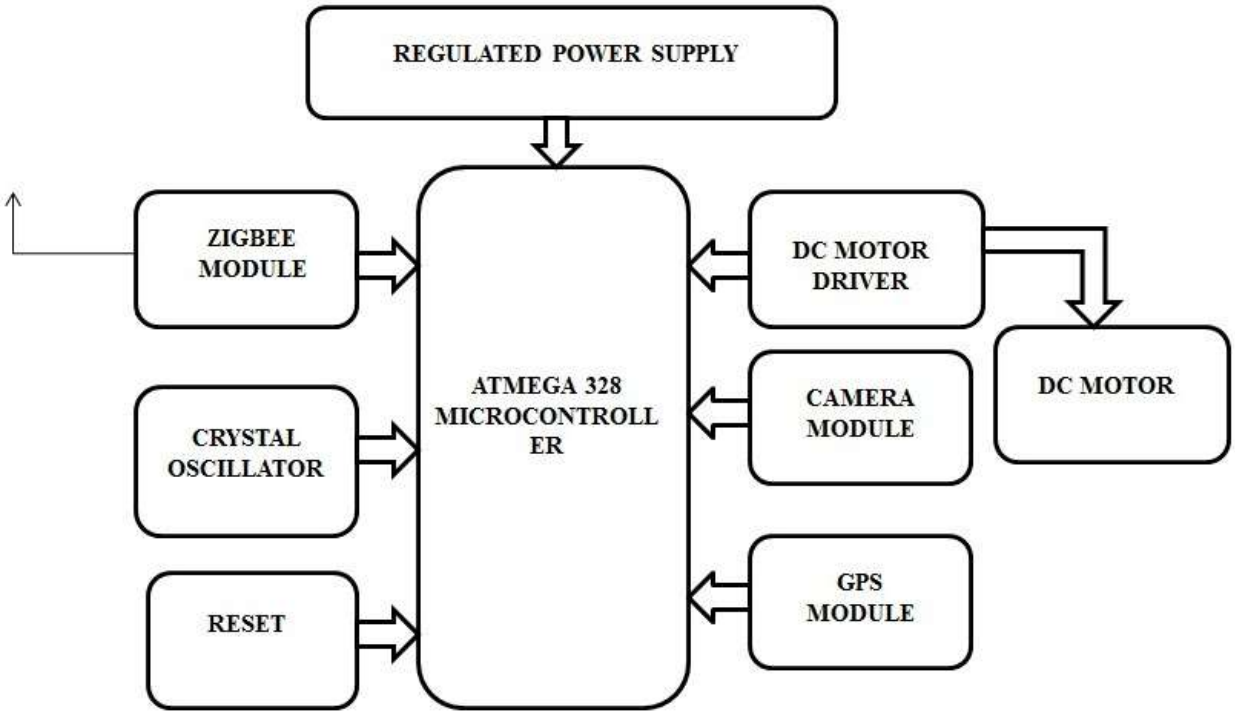

Fig-1: Block diagram of the transmitter section

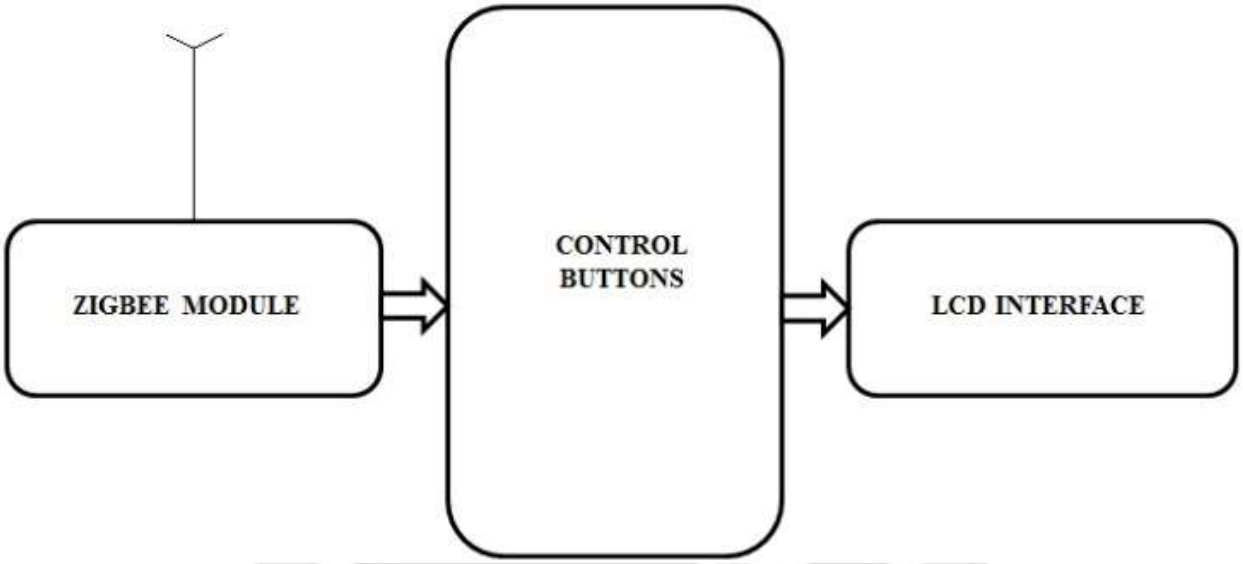

Fig 2: Block diagram of receiver section

3.2. Proposed workflow:

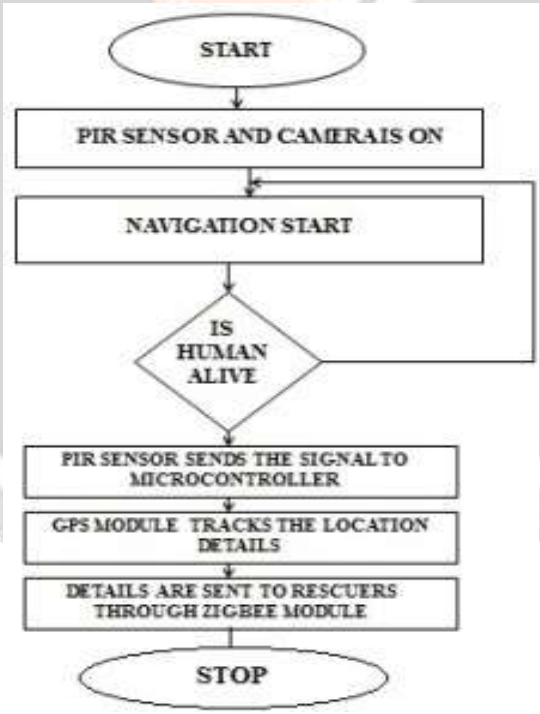

Fig 3: Flow chart

3.3. Working of the proposed model:

The power supply is used here is bridge rectifier with 3v and 5v. 3.3v is used for GPS module. All other IC's uses 5v. Microcontroller used is ATMEGA 328. The reset circuit used here is power on reset. The ZigBee transceiver module receives the control information from the remote wirelessly. The controller drives the motor of the robotic car. Motor is connected to the microcontroller through relay drivers. Relay drivers is wired using transistor BC107 and dc motor is interfaced using LN293 driver IC. The voltage regulator supplies constant voltage to the level shifter

from the power supply by maintaining constant DC voltages and avoiding unwanted spikes in current. The system monitors the passive infrared rays through the PIR sensor continuously. If rays are detected a high value is sent to the ATMEGA 328 controller. The controller reads the latitude and longitude information from the GPS receiver connected to the RXD pin. This information is stored in the external memory which is a NVRAM. Memory is connected to the controller using an octal latch. Controller sends this information through the ZigBee to the remote. LCD displays the information about human detection.

3.3.1. Transmitter section:

The transmitter section consists of a power supply unit, ATMEGA 328 microcontroller, GPS receiver, ZigBee module, motor drivers. Signals form PIR sensors are given to the microcontroller and this microcontroller will digitize the signal and send it to the ZigBee. The controller has peripheral features like inbuilt ADC, required to get the signals from the various sensors. 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. They detect change in the heat and this can be used to detect movement of people. Infra-red sensors that are sensitive in the range of 10 feet could be used to detect human. It has digital output and can be directly given to the digital pins and no ADC is needed. It operates at 5v DC. 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. ZigBee is a very versatile communication technology. Motor denotes the robot which can move over disaster prone areas. Motor drive is the interfacing circuit between controller 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 controller directly because it requires much higher voltage and current. Motor driver are used for this. It is built using NPN transistor (BC547). It acts as an interfacing device to supply power to the motor. Camera module is use as a web camera and it is placed on the robot. By using this camera the video signal is transmitted to the receiver at control room. This camera module will transmit the video coverage of the paths and this path to be taken by the rescue team. For this purpose high range camera module is to be used to get good clarity and good coverage of area. A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers.

3.3.2. Receiver section:

In the receiver section the ZigBee transceiver receives the data from the transmitter section. The receiver section consists of LCD display i.e. used to display the longitudinal and latitudinal positions received from the GPS. This section also controls the motion of the robot. A separate ac supply is given to the receiver section. The operating range of the ZigBee is 500 m in the radius of the given frequency our robot can work.

3.4. Proposed system algorithm:

Step 1:- Start

Step 2:- PIR sensor and camera is on.

Step 3:- Robot will start navigation.

Step 4:- PIR sensor will detect whether the human is alive or not.

Step 5:- If human is alive PIR sensor will send the signal to microcontroller and if not it will start navigation further.

Step 6:- GPS receiver tracks the location details of alive human.

Step 7:- All the details are sent to the receiver section through ZigBee transceiver.

4. RESULTS

We have designed such a robot, which will able to find alive humans on the field by sensing their presence through their body heat radiation.

4.1. Snapshots:

A. Transmitter section of robot

Fig 4: Robot section

Fig 5: GPS module

Fig 6: ZigBee module

B. receiver section of robot

Fig 7: Receiver section of robot.

5. CONCLUSION

The purpose of the proposed system is to provide a cost effective system for rescue of human beings in war fields and disaster prone areas. The proposed system uses a low cost sensor which is easily available. It is impossible for an individual to visit the war fields or disaster prone area. So, in such situations, the proposed system can be useful.

6. ACKNOWLEDGEMENT

I would like to express the deepest appreciation to my guide Prof.D.G.Agrawal and HOD Dr.G.A.Kulkarni for their help to complete this paper also like to thank for their great support , also thanks to SSGB College of Engineering to provide lab and instrument to me for my work . At last but not least , I am thankful my parents who support and encourage me for this works.

7. REFERENCES

[1] Kun-Muchen , Yong Huang , Jianping Zhang, Narman A. " Microwave Life-Detection System for searching Human subjects under Earthquake Rubble or behind Barrier", IEEE Transaction, Biomedical Engineering ,volume 27 ,pp 105-114 , January 2000.

[2] Saeed Moradi , "Victim detection with Infrared Camera in a Rescue Robot" IEEE International Conference on Artificial Intelligence System, 2002.

[3] Miyama S., Imai M. , Anzai Y. " Rescue Robot under disaster situation position acquisition with omnidirectional sensor" IEEE International Conference , volume 3 , pp 3132-3137, October 2003.

[4] Marques, c.Cristovao , J.Lima,P." RAPOSA- Semi-Autonomous Robot for Rescue Operation" ,IEEE Intelligent Robots and Systems , pp 3988-3993 , October 2006.

[5] Rufaida Shamroukh ,FahedAwad " Detection of Surviving human in destructed environments using a simulated autonomous Robot" IEEE , March 2009.

[6] Ying –Wen Bai, Li-Sih Shen, Zong –Han Li" Design and implementation of an embedded home surveillance system by use of multiple ultrasonic sensors",Consumer Electronics IEEE Transactions, pp 119-124,29 March 2010.

[7] Mr. S.P.Vijayaragavan , Hardeep pal Sharma, "Live Human detecting Robot for Earthquake Rescue operation" International Journal of Buisness Intelligents, volume 2 June 2013.