

SEARCH AND RESCUE SYSTEM BY USING CAMERA RESCUE ROBOT

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Abstract: Using the zigbee as the interface for processor, it led to the improvements of automotives. In this project, it is implemented to control a robot with Rx command. Zigbee commands were taken to the Rx part of the robot, with which the features were extracted. Finally, the commands were been converted the form in which the robot can recognize and move accordingly. Our proposed system aim at a robotic vehicle is operated by zigbee commands. The system operates with the use of a transmitter of frequency which transmits digital commands to ATMEGA to achieve this functionality. The transmitter consists of the 433 MHZ frequency oscillator device. These commands are detected by the robotic vehicle in order to move it in left, right, backward and front directions. The zigbee receiver mounted to recognize the transmitted commands and decode them. The controller then drives the vehicle motors to move it accordingly. This is done with the use of a driver IC used to control the motor wheel movements. IR sensor is used for obstacle detection in navigation path of robot and gas sensor is used to sencegas leakage inside the building. Wireless Camera is also integrated to observe and analyze conditions that will help human to detect in reliable manner with highest probability.

Keywords: Zigbee , ATMEGA , Wireless camera , IR Sensor , Gas Sensor

1.Introduction

Our project can be defined as a rescue robot that has been structured for the purpose of helping rescue workers. General situations that employ rescue robots are mining accidents, urban disasters, hostage situations, and explosions. Intelligent robots equipped with updated sensors are attracting much more attentions from researchers and rescuers. When in our life, Natural disaster like flood, earthquake and cyclone occuring regularly because people are disrupting the natural balance by cutting downs trees, destroying hills areas, unplanned urbanization, etc,. During an environment catastrophes, many people lose their life and lands. A living thing tries for a rescue operation, the life of the rescuer will be mostly in risk. In such cases, technology will be of most importance one. Hence, we present our project, Search and Rescue Robot to help such rescue operators by using camera rescue robot. Our Rescue robot will serve as a trapped disaster.

After any tragedy, 48 hours is difficult to rescue defectors. Fire service, police and rescue team, are being deployed to minimize the loss of human lifes and animals. In Some cases the rescue team can't able to reach many parts of problem affected area due to the inability to search for the live person inthe detritus. In many times, they themselves became the victim of the situation. To decrease losses of lives and for getting correct information of the disaster situation, a rescue robot system can be used and can be changed according to the needs of the situations. Quality work has been done in the field of robotics to develop rescue robot. In last ten years, different types of rescue robot are made for different type's works and situations. During 2001 disasters rescue robots were first really introduced. They were sent into the wreckage to look for survivors and bodies. But in 2010, the numbers of incidents that are using rescue robots and using them quickly are increased, with 2012 being a major year with robots at the Emilia-Romagna Region and the aid of the Eu-funded project NIFTI. Robots are used in more than 35 disasters internationally.

There are many different types of rescue robot are used in the field. Some of them uses sensors like ultrasonic sensor, PIR sensor and IR sensor for detecting human in cruel condition and others use different types of camera like thermal and IR camera , short or wide angle lens camera are used to find survivors. Some of the robot contain extra sensors for detecting temperature, fire, bomb and gas. However, we are try to develop a robot which can detect live human being by using temperature sensor, IR sensor, Passive infrared (PIR) sensor, wireless Camera. zigbee and IOT based controller gives easy control for user. Besides that, IR sensor is used to identify obstacles and gas sensor is used for dangers and more gas detection in the affected places. In this paper, we present the existing system in Section II. Section III proposed system. Section IV describes the system block diagram. Finally, conclusion and results are described in Section V.

2.Existing System

The existing system only gives solution to manage the robotic vehicle with typed command or switch buttons present in the android application. This system need to be connected with UART protocol only. So, the smart and efficient way of controlling the vehicle is not possible in the existing system.

In previous system, the frequency range to control the robot is too low and in can't easily pass to the obstacles. And the information given by the sensor is no too accuracy and efficiency. TCP/IP Protocol having 6 channels and 2.4 GHz transmitter is not enough to fully surveillance the disaster.

In existing system they were using DTMF based GSM robot they are consuming large amount of energy , the controlling unit and the roboting unit must be in, line of sight, for different mobile application controlling unit the whole program should be reprogram in DTMF unit the main containers cable due to that cast of the system should be increase.

DRAWBACKS OF THE EXISTING ROBOTS

1. The software and equipment's used in the robots are more costlier
2. Robot cost maintained is too high
3. In case of breakdown is very high
4. The robot used before cant store data
5. The robot are not intelligent and sensitive, they can never improve the results in real time
6. Always there is no cross checking or recheck in the field
7. They are using cables to operate so we can't use in large distance
8. The Accuracy and performance are very less
9. They never receive regular usage of energy
10. On existing robot , the rescuer control the robot on that disaster spot, it will be dangers to that rescuer also.

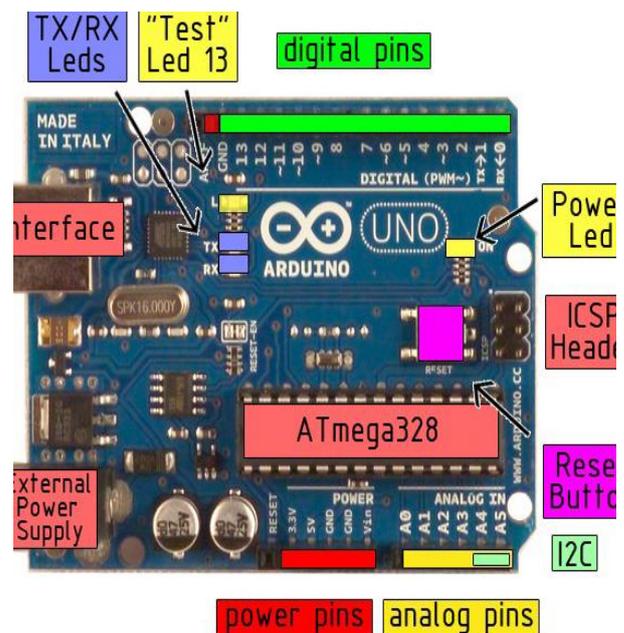
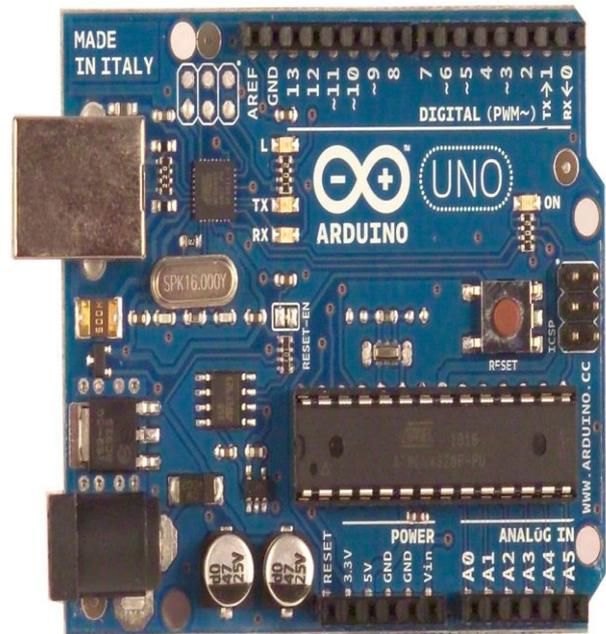
3.Proposed System

Our proposed system aim at a robotic vehicle operated by zigbee commands. The system operates with the use of an transmitter of frequency which transmits digital commands to ATMEGA to achieve this functionality.

The robot has two parts one is control unit and another one is the robot itself. The microcontroller is programmed using C programming language and

ARDUINO IDE. It has many features which likes, easy to program and compile any type arduino based program.

The transmitter consists of the 433 MHZ frequency oscillator device. These commands are detected by the robotic vehicle in order to move it in left, right, backward and front directions. The RF receiver mounted to recognize the transmitted commands and decode them. The controller then drives the vehicle motors to move it accordingly



IV. BLOCK DIAGRAM OF PROPOSED SYSTEM

4.1 Requirement:

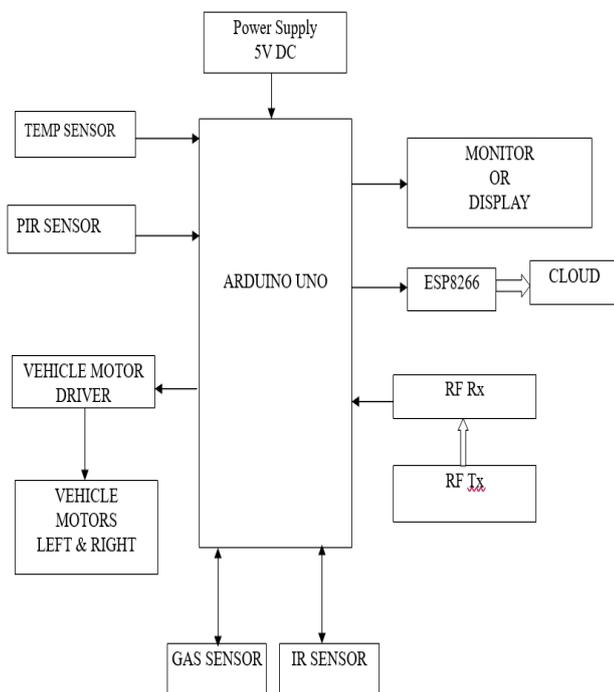
Software Requirement:

Language : C Programming language
 IDE : ARDUINO IDE

Hardware Requirement:

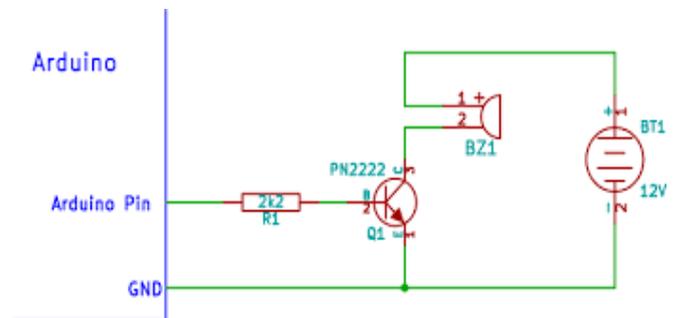
- ARDUINO
- ESP8266
- Motor drives
- HC-05.
- Motors
- Zigbee Tx Rx
- TEMPERATURE SENSOR
- GAS SENSOR
- PIR SENSOR
- IR SENSOR
- LCD
- POWER SUPPLY

4.2 BLOCK DIAGRAM OF RESCUE ROBOT



The rescue robot is consists two parts, controller and a semi-automatic robot. The controller consists of joystick which is used to control and drive the robot wheel to left, right, backward and front directions. The servo motor which is attached on the robot is control by potentiometer. The microcontroller process data from the joystick and

potentiometer, sends the data through Tx. After that, controller received signal from robot about humans through zigbee transceiver which switch ON a buzzer connecting with it. LPG or CO level are detected by using Gas sensor that is indicated by LED



ARDUINO BUZZER CIRCUIT

From the block diagram of rescue robot. The semi-autonomous robot has PIR, temperature sensors, IR and gas sensors to detect human presence, temperature on that place, aspects on the surrounding and excessive LPG or Carbon Monoxide (CO) in the air of the disaster building respectively. The robot collect the information and sends the sensor value to the controller for future processing. The robot is a tank wheel control robo-tank which can control using joystick command from controller. Zigbee transceivers module is used to receive control data to microcontroller to run the robot. Including that, IR sensor is used to detect obstacle and it can automatically navigate if needed. A servo motor is used in the robot to drive the camera of the robo-tank which is controlled by the analog switch of the microcontroller. Microcontroller receives control data through zigbee transceiver and drive the servo motor respectively. An wireless camera is also used for observing from a computer screen and finding survivors on the affected area.

4.3 ZIGBEE MODULE

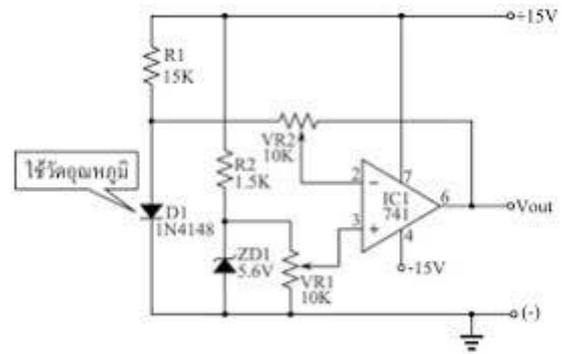
ZigBee devices can mediate data to distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128 bit symmetric encryption keys). ZigBee has a defined rate of 250kbit/s, best suited for intermittent data transmissions from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that require short-range low-rate wireless data transfer. ZIGBEE is a new wireless technology guided by the IEEE 802.15.4 Personal Area Networks standard. It is primarily designed for the wide ranging automation applications and to replace the existing non-standard technologies. It currently operates in

the 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at 40Kbps in the USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250Kbps. The ZIGBEE specification is a combination of Home RF Late and the 802.15.4 specification. The specification operates in the 2.4GHz (ISM) radio band - the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per network. The specification supports data transmission rates of up to 250 Kbps at a range of up to 30 meters. ZIGBEE's technology is slower than 802.11b (11 Mbps) and Bluetooth (1 Mbps) but it consumes significantly less power. 802.15.4 (ZIGBEE) is a new standard uniquely designed for low rate wireless personal area networks



4.4 TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55 to $+150^\circ\text{C}$ temperature range. As it draws only $60\mu\text{A}$ from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to $+150^\circ\text{C}$ temperature range, while the LM35C is rated for a -40° to $+110^\circ\text{C}$ range (-10° with improved accuracy). The LM35 series is available in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package.



TEMPERATURE SENSOR USING LM35

Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies.

4.5 GAS SENSOR [MQ2]:

In current technology scenario, monitoring of gases produced is very important. From home appliances such as air conditioners to electric chimneys and safety systems at industries monitoring of gases is very crucial. Gas sensors spontaneously react to the gas present, thus keeping the system updated about any alterations that occur in the concentration of molecules at gaseous state. The gas sensor module consists of a steel exoskeleton under which a sensing element is housed.

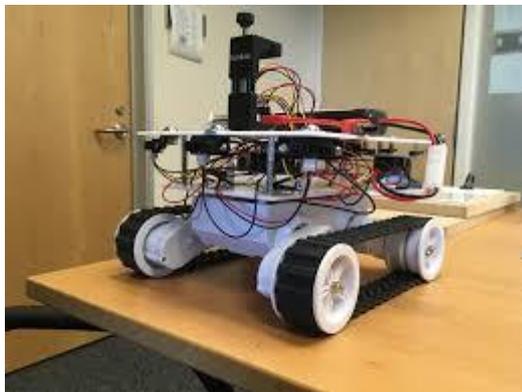
This sensing element is subjected to current through connecting leads. This current is known as heating current through it, the gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changes the resistance of the sensing element which alters the value of the current going out of it. The connecting leads of the sensor are thick so that sensor can be connected firmly to the circuit and sufficient amount of heat gets conducted to the inside part. They are casted from copper and have tin plating over them.



INTERFACING MQ2 WITH ARDUINO

V. CONCLUSION

The aim of this paper is to give a lower cost human detect rescue robot for improving country rescue mission in disaster situation. The developed robot is joystick control with IOT which will help user to drive the robot easily. ZigBee module is used for data transfer to make the system performance reliable inside the rescue area. Though there are lot of USAR rescue robot available with many features and different sensor but they are high cost, but the sensors used in this project are easily available and low cost. We are created a robot with two different type of human sensing in order to get higher efficiency in rescue mission. The first type is a PIR sensor which detect human in the spot by their radiated infrared wave and second type is a wireless camera to see the existence of human in disaster area. Because of the two type of human detection system the system is reliable for rescue operation.



RESULT:

The sensory parts are continuously monitor the disaster zone and giving the result simultaneously so it is easy for the rescue operation and most cost efficient and power consumption. By using sensors this are more reliable and accurately detect the humans and animals in the disaster area

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