

A REVIEW ON SECURITY ROBOT TO RESCUE HUMANS IN DISASTER

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Abstract

When a natural disaster like an earthquake hits a populated area or an accident like gas leakage takes place in a building, rescue teams have to get a quick overview of the situation in order to identify possible locations of victims, which need to be rescued, and dangerous locations, which need to be secured. The paper is written to design a “Robot to rescue a human being from a disaster condition” which is capable of moving inside the cave or mine according to the user commands given from MOBILE PHONE using WI-FI.

Keywords: PIC microcontroller, GPS, GSM, RFID, Temperature Sensor, Heart Beat SENSOR, MEMS sensor

1. Introduction.

Over the last few years, advanced robots embedded with lots of sensors and functions are centre of attraction and attention of researchers all around the world. This paper describes the application and functionality of a Robot that can be used in case of disaster management to rescue human life. The robot is designed in such a way that it can be used by any organisation for various purpose. This robot works as, searching for living human beings and collects data from the atmosphere. The team of rescue members can wirelessly receive the data in real time and perform their job accordingly. By the help of this robot rescue team can get information that the area is safe or not before entering to that particular location.

The controlling device for the robotic controlling in the project is a Microcontroller. The data sent from Android mobile phone over Wi-Fi will be received by Wi-Fi module connected to Microcontroller. Microcontroller reads the data and decides the direction and operates the dc motors connected to it accordingly. The live images from the camera in the robot system can be sent to TV through AV transmitter system. The Microcontrollers used in the project are programmed using Embedded C language.

This paper contributes an efficient and fairly fall detection system. System once installed has less maintenance cost and is easy to use.

2. LITERATURE SURVEY

The paper by Raghad Dardar [1] discuss a low cost and low power consumption robot used for guiding rescue teams when disasters happens using wireless sensor network. The papers published by Albert W. Y. Ko and Henry Y. K. Lau [2] and [3] discuss various things about rescue mechanisms including camera mounted probes, search dogs, and audio devices. The paper [4] by Trupti B. Bhondve proposes a monitoring system using sensors unit and camera module to record, analyze conditions of human body and transmit data. The paper [5] by Tsuyoshi Suzuki, Ryuji Sugizaki describes an autonomous deployment and restoration of a Wireless Sensor Network (WSN) using mobile robots. Paper [6] by Kamol Chuengsatiansup explained about a team of search robots for rescue missions. Each robot contain various sensors including digital compass, laser range finder, a thermopile array, Carbon Dioxide sensor, tilt sensor and microphone. This module can also be operated in teleoperated and autonomous mode.

3. Implementation:

Disaster Security Robot AV Receiver

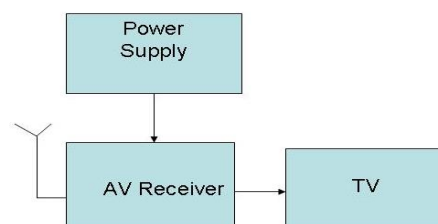


Figure 1: AV receiver

The Figure 1 shows the AV (i.e. audio and video) receiver of Robot.

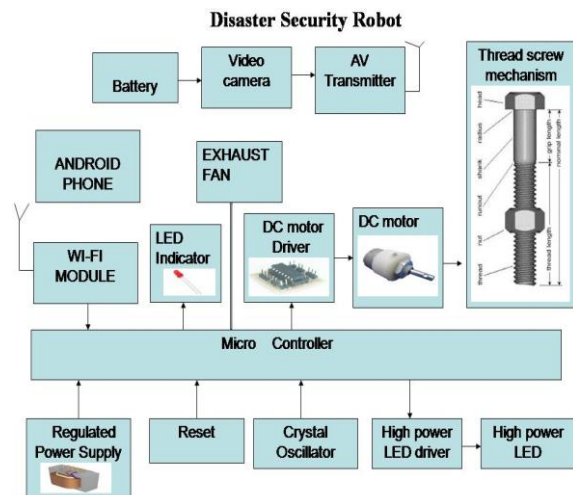


Figure 2: Block Diagram of Disaster Security Robot
 The Figure 2 shows the main block diagram of the proposed model where to microcontroller all components are connected and Robot is designed for disaster security.

The robot is equipped with Microcontroller, DC motors, video camera, AV transmitter, thread screw mechanism, exhaust fan, high power LED. It has a live video camera that is equipped with two way audio communication, Day and Night vision. Robot is having a Battery which can provide power to Robot.

PIC microcontroller:



Figure 3: PIC microcontroller

The PIC16F73 CMOS FLASH-based 8-bit microcontroller is upward compatible with PIC16C73B/74B/76/77, PIC16F873/874/876/877 devices. It features 200 ns instruction execution, self-programming, an ICD, 2 Comparators, 8 channels of 8-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port. PIC16F73 is a RISC microcontroller, that means that it has a reduced set of instructions, more precisely 35 instructions.

WIFI MODULE (ESP8266):

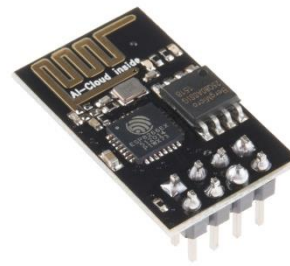


Figure 4: WIFI MODULE

Wi-Fi or WLAN as it is commonly known is fast becoming the preferred mode of connecting to the internet. Many people are not aware of the descriptions and explanations related to it. Wi-Fi gets its name from a certification called Wireless Fidelity given to networks operating under 802.11 standards. Wi-Fi allows computers, PDAs and other devices to connect to a broadband connection in a wireless mode. The 802.11 standard defines the wireless communication operating via electromagnetic waves. While reading the descriptions and explanations related to Wi-Fi, one should remember there are different modes for wireless networks like Infrastructure mode and Ad-Hoc mode that can be used for different criteria.

DC motor:



Figure 5: DC motor

A dc motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. The reverse process, producing electrical energy from mechanical energy, is accomplished by an alternator, generator or dynamo. The DC motor has two basic parts: the rotating part that is called the armature and the stationary part that includes coils of wire called the field coils.

DC motor driver L293D:

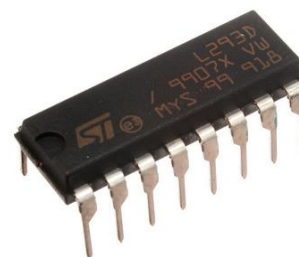


Figure 6: DC motor driver L293D

The L293D is quadruple high-current half-H drivers. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

Video camera:



Figure 7: Video camera

A **video camera** is a camera used for electronic motion picture acquisition (as opposed to a movie camera, which records images on film), initially developed for the television industry but now common in other applications as well.

Thread Screw mechanism:

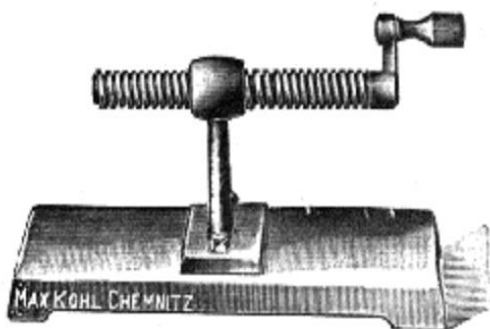


Figure 8: Thread Screw mechanism

The screw has a thread designed to withstand an enormous amount of pressure. This is due to the fact that it is generally holding up heavy objects for an extended amount of time. Once up, they normally self lock so that they won't fall if the operator lets go, and they hold up well to the wear of repeated use. A **screw** is a mechanism that converts rotational motion to linear motion, and a torque (rotational force) to a linear force. It is one of the six classical simple machines. The most common form consists of a cylindrical shaft with helical grooves or ridges called threads around the outside.

Exhaust fan:



Figure 9: Exhaust fan

The primary **purpose** for having an **exhaust fan** is to remove the moisture out of the room. These **fans** help to control and eliminate room odors. Additionally, they add to the safety of the home and its residents by reducing fumes from cleaning agents that could potentially cause health-related issues. In this project they used to eliminate moisture inside the robot cave.

High power LED:



Figure 10: High power LED

A **light-emitting diode (LED)** is a semiconductor light source. LEDs are used as indicator lamps in many devices. Like a normal diode, the LED consists of a chip of semiconducting material impregnated, or doped, with impurities to create a p-n junction. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carriers—electrons and holes—flow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon.

5. CONCLUSION

The existing model presents an Integrating feature of all the hardware components. The presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for “Disaster Security Robot” has been designed perfectly. Thus, the project has been successfully designed and tested.

6. ACKNOWLEDGEMENT

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