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Advanced Rescue System for Industrial Monitoring Using ZIGBEE GSM and FPGA

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Abstract

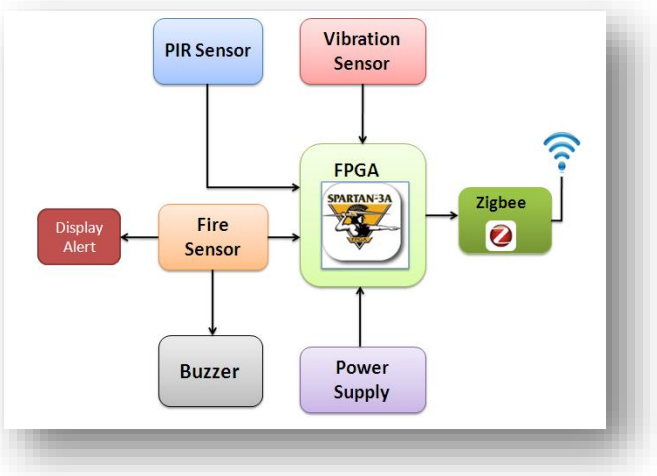
The increase of greed in people has paved way to civil-wars and natural disasters. A swift action has to be taken in the relief work of the aftermath of earthquake affected areas, such that any delay in the rescue could lead the death toll to rise. The same can be applied to war fields too. The project focuses on human beings who are alive and struggling for their lives either in the war field or due to natural disasters like earthquakes, to be recognized and rescued in a much faster pace. The robot senses humans alive and sends a notification to the mobile to capture the images of the same. The captured image is then sent to the server to view and act accordingly.

Keywords: PIR Sensor,GSM, FPGA, RS232, VHDL, Zigbee

Introduction

The administrator at the server end has options to move the robot in any required direction for more accurate detection of human beings alive security is becoming increasingly important to owners. Today security systems fulfill a wide variety of roles, from monitoring of your personal property to signaling or alerting police in case of a break-in. There are different types of security systems available to choose from, all of them with different operational concepts fire Alarm Security System is an active fire protection system that detects fire or the effects of fire, and as a result provides one or more of the following: notifies the occupants, notifies persons in the surrounding area, summons the fire service, and controls all the fire alarm components in a building. IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red(IR) spectrum Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.. exhaust gases are described .

Block Diagram of the Proposed Method



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PIR Sensor

Instead of infrared or laser transmitters and receivers, PIR (Passive Infrared Radial) sensors are used in this circuit. The sensor is basically a pyroelectric device. When the device is exposed to infrared radiation, it generates an electric charge. The device is made of crystalline material. According to the change in the amount of infrared striking the element, there will be a change in the voltages generated, which is measured by an on-board amplifier.

The infrared light explained here refers to the light radiating from all objects in its field of view. The reason for not having a transmitter and receiver is that the device does not emit one, but only accepts the energy emitted from objects above absolute zero in the form of radiations. Thus the temperature will be different for a human working past a sensor, and that of a wall right in front of it. Thus the word "passive" is used in PIR to explain that it does not emit a radiation and receive it, but instead accepts the incoming infrared radiation passively.

Pressure Sensor

A piezoelectric sensor as shown in figure 3.9 is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical charge. Here a simple pressure sensor is used to protect door or window. It generates a loud beep when somebody tries to break the door or window. The alarm stops automatically after three minutes. The circuit uses a piezo element as the pressure sensor. Piezo buzzer exploits the piezoelectric property of the piezo electric crystals. The piezoelectric effect may be direct piezoelectric effect in which the electric charge develops as a result of the mechanical stressor reverse or indirect piezoelectric effect (Converse piezoelectric effect) in which a mechanical force such as pressure develops due to the application of an electric field.

Figure 1. Piezo electric sensor

A typical example of direct piezoelectric effect is the generation of measurable amount of piezoelectricity when the Lead Zirconate Titanate crystals are deformed by mechanical or heat stress. The Lead Zirconate Titanate crystals also shows indirect piezoelectric effect by showing pressure when an electric potential is applied.

Operation

Operation of pressure sensor is very simple. Here we have two plates that is one is input plate and the other is output plate, whenever pressure is applied as shown in figure 3.10 then these two plates come into contact we get voltage as a output then this output is send to the FPGA in turn it shows the weight of the vehicles is shown in the display as per our project. Accordingly toll tax is calculated. It is made up of a piezoelectric crystal. Depending on how a piezoelectric material is cut, three main modes of operation can be distinguished into transverse, longitudinal, and shear.Vibration sensors can also be used to harvest otherwise wasted energy from mechanical vibrations. This is accomplished by using piezoelectric materials to convert mechanical strain into usable electrical energy.

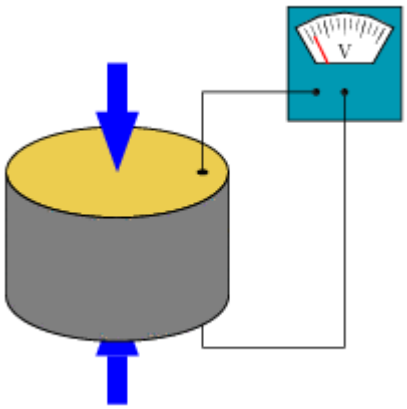

Figure 2.Pressure sensor operation

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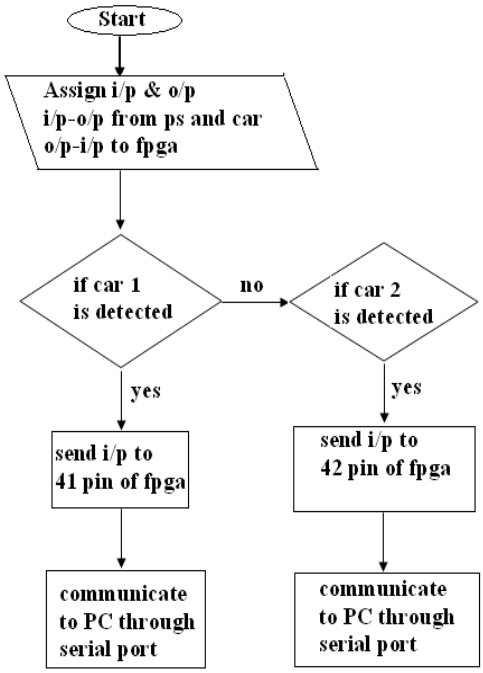
Flow Chart For Pressure Sensor Module

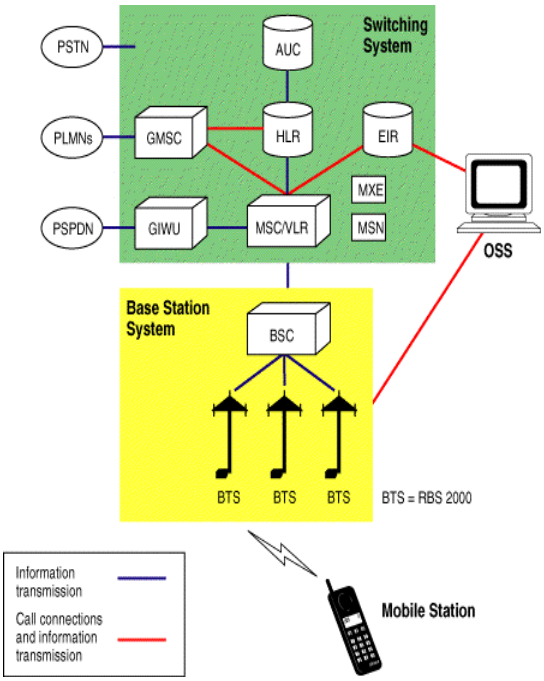


The GSM Network

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators to buy equipment from different suppliers. The GSM network is divided into three major systems: the switching system (SS), the base station system (BSS), and the operation and support system (OSS). The GSM network elements are shown in *figure*

GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.



3. GSM Network Elements

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.As mentioned in earlier sections of this SMS tutorial, computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards.

Facts and Applications of Gsm/Gprs Modem

The GSM/GPRS Modem comes with a serial interface through which the modem can be controlled using AT command interface. An antenna and a power adapter are provided. The basic segregation of working of the modem is as under

- Voice calls
- SMS
- GSM Data calls
- GPRS

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Voice calls:

Voice calls are not an application area to be targeted. In future if interfaces like a microphone and speaker are provided for some applications then this can considered.

SMS:

SMS is an area where the modem can be used to provide features like Pre-stored SMS transmission, These SMS can be transmitted on certain trigger events in an automation system SMS can also be used in areas where small text information has to be sent. The transmitter can be an automation system or machines like vending machines, collection machines or applications like positioning systems where the navigator keeps on sending SMS at particular time intervals. SMS can be a solution where GSM data call or GPRS services are not available

Zigbee Module

The XBee/XBee-PRO RF Modules are designed to operate within the ZigBee protocol and support the unique needs of low-cost, low-power wireless sensor networks. The modules require minimal power and provide reliable delivery of data between remote devices. The modules operate within the ISM 2.4 GHz frequency band and are compatible. The XBee modules were designed to mount into a receptacle (socket) and therefore do not require any soldering when mounting it to a board. The XBee-PRO Development Kits contain RS- 232 and USB interface boards which use two 20-pin receptacles to receive modules. The XBee OEM RF Modules interface to a host device through a logic-level asynchronous serial port. Through its serial port, the module can communicate with any logic and voltage compatible UART; or through a level translator to any serial device.

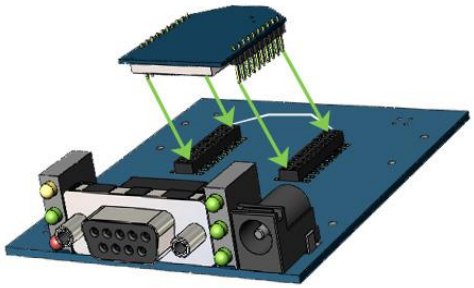

Fig 4.. Zigbee Module Mounting to an RS232 Interface Board

Conclusion

In this paper the proposed system is implementing by integrating FPGA, PIR sensor and zigbee rescue system for human alive. The application includes An affordable Technology with high end advantage Can help tracking alive human beings View the status of the person alive The place can be monitored remotely by moving the robot. The simulation is done using Xilinx. It is a more safety system that uses systematic approach for monitoring and control and uses easy way of sensing PIR and intimating the authorized person and RTO department through wireless technologies.

References

[1] *I.F.Akyildiz,W.su,y. Sankara subramanian and E. caryirc, 'wireless sensor networks. A survey,"computer networks,Elesevier science,38(4), pp.343-422 2002*

[2] *M.Momani, S-Challa and R.A in Mouz," can we trust nodes in wireless sensor.*

[3] *Zuo-Xun Wang Design of cable temperature wireless monitoring system*

[4] *ZM.W.Son, J. B. Choi ,H .I. Hwang, and K.S. Yoo , J. Kor. Sensors Soc., vol. 18,p.263,2009..*

[5] *C.-Y. lin, Y.-Y. Fang, C.-W. Lin, J. J. Tunney, and K.-C. Ho, Sensors and Actuators B, vol.146, p. 28, 2010.*