IMPLEMENTATION OF INDUSTRIAL SECURITY SYSTEM USING ULTRASONIC AND PIR SENSOR

DHATLA SUDHAKAR [1] **A.MOHAN [2]** **SANDEEP PATIL [3]**

sudhakardhatla804@gmail.com [1] ashwala@yahoo.com[2] s_patils1@rediffmail.com[3]

[1] PG Scholar, Dept of ECE, Gurunanak institutions technical campus school of engineering & technology, Ibrahimpatnam, Ranga Reddy Dist, Telangana, India.

[2] Guide, Professor, Dept of ECE, Gurunanak institutions technical campus school of engineering & technology, Ibrahimpatnam, Ranga Reddy Dist, Telangana, India.

[3]Guide, Associate Professor, Dept of ECE, Gurunanak institutions technical campus school of engineering & technology, Ibrahimpatnam, Ranga Reddy Dist, Telangana, India.

Abstract— In this paper we have to design and implement surveillance system by use of smart sensors like ultrasonic sensors and pyroelectric infrared sensors (PIR) to detect an intruder in a home, ATM, Industries, Bank Locker room or a storehouse. The PIR sensors are placed on the ceiling, and the ultrasonic sensor module consists of a transmitter and a receiver which are placed vertically on the wall. We are going to use the camera to capture video of the people those are coming under the surveillance area. And we are sending these video to authorized and related personnel. This system will also help to reduce the power consumption.

Key words*: LPC2148, Ultrasonic Sensor, PIR Sensor.*

Introduction

The major issues as Security and safety is one of the most talked of topics in almost every facet like surveillance, industrial applications, offices, and in general, in smart environments. The traditional surveillance systems take a long time to detect whether there is any intruder. If there is no intruder, the sensing device which continuous to work and consumes much power. To meet the increased requirements of the IEA we have to reduce the standby power of each electrical apparatus to less than 1 Watt. A recently published survey shows that various attempts have been made to reduce such power loss by to making the adapters more efficient. Another way to improve power efficiency is accurate control of the apparatus by both software and microcontroller. In this paper the alerting sensors with low-power consumption are placed near those home windows and doors where an intruder must pass through. In this paper we extend our previous design not only by using both multiple PIR sensors and ultrasonic sensors as a sensor group, but also by using the MVM. Ultrasonic receivers and transmitters are located at opposite ends [8-9]. However, to reduce the interference from other frequencies in ultrasonic signals, we use a coding signal to enhance the ability to distinguish the random interference. To enhance system reliability in the experiment, we focus on how to improve the shortcomings of the ultrasonic sensor. Some research explores the influence of attenuation in air and crosstalk of ultrasonic signals by using a coding signal, while some provides improvement of the ultrasonic signal by using different coding signal types. Other research uses the application of a coding signal to increase resolution and contrast of images. Also paper proposes a PIR sensor based low cost security system for home applications in which Passive Infrared (PIR) sensor has been implemented to sense the motion of human through the detection of infrared radiated from that human body. PIR device does not emit an infrared beam but passively accepts incoming infrared radiation. To secure embedded surveillance system against theft, crime, fire, etc. a powerful security system is required not only to detect but also

pre-empt hazards. Conventional security systems use cameras and process large amounts of data to extract features with high cost and hence require significant infrastructures.

Design of Proposed Hardware

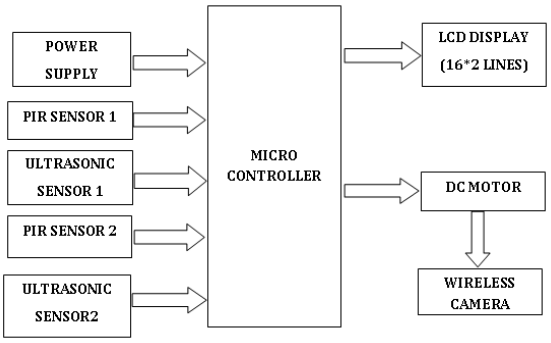

Fig. 1.Block diagram

As shown in Fig. 1 our system which contains several groups of ultrasonic and PIR sensor. The transmitter circuit generates a multi-frequency square waveform, and the receiver circuit amplifies the received signals and filters out any noise. When a transmitter transmits an ultrasonic coding signal, the ultrasonic receiver determines whether there is an intruder or person passing through the sensing area. If there is no intruder, the MCU (Micro Controller Unit) will keep our camera off but as soon as intruder is detected and camera can capture the image. Our design reduces the environmental interference with the ultrasonic signal. All sensing signals are input to the embedded surveillance system by the GPIO (General purpose input and output.

The PIR sensor groups obtain the sensing signals from human temperature. If the voting results of ultrasonic and PIR sensor groups pass the criteria, the embedded surveillance system starts the camera to capture images. When it capture the image this image is send to the PC for monitoring.

Board Hardware Resources Features

PIR SENSOR

PIR is basically made of Pyroelectric sensors to develop an electric signal in response to a change in the incident thermal radiation. Every living body emits some low level radiations and the hotter the body, the more is emitted radiation. Commercial PIR sensors typically include two IR-sensitive elements with opposite polarization housed in a hermetically sealed metal with a window made of IR-transmissive material (typically coated silicon to protect the sensing element). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or an animal passes by, it first intercepts one half of the PIR sensor which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. In order to shape the FOV, i.e. Field Of View of the sensor, the detector is equipped with lenses in front of it. The lens used here is inexpensive and lightweight plastic materials with transmission characteristics suited for the desired wavelength range. To cover much larger area, detection lens is split up into multiple sections, each section of which is a Fresnel lens. Fresnel lens condenses light. Providing a larger range of IR to the sensor it can span over several tens of degree width. Thus total configuration improves immunity to changes in background temperature, noise or humidity and causes a shorter settling time of the output after a body moved in or out the FOV. Along with Pyroelectric sensor, a chip named Micro Power PIR Motion Detector IC has been used. This chip takes the output of the sensor and does some minor processing on it to emit a digital output pulse from the analog sensor.

Fig: PIR Sensor

ULTRASONIC SENSOR

Ultrasonic sensor is non-contact distance measurement module, which is also compatible with electronic brick. It's designed for easy modular project usage with industrial performance. A short ultrasonic pulse is transmitted at the time 0, reflected by an object. The senor receives this signal and converts it to an electric signal. The next pulse can be transmitted when the echo is faded away. This time period is called cycle period. The recommend cycle period should be no less than 50ms. If a 10μs width trigger pulse is sent to the signal pin, the Ultrasonic module will output eight 40 kHz ultrasonic signal and detect the echo back. The measured distance is proportional to the echo pulse width and can be calculated by the formula above. If no obstacle is detected, the output pin will give a 38ms high level signal.

Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping.

Features

- Minimum range 10 centimeters
- Maximum range 400 centimeters (4 Meters)
- Accuracy of +-1 cm
- Resolution 1 cm
- 5V DC Supply voltage
- Compact sized SMD design
- Modulated at 40 kHz
- Serial data of 9600 bps TTL level output for easy interface with any microcontroller

CONCLUSION

This paper describes the assessment of a new mobility aid for a powered wheelchair designed in our laboratory. It is based on a traded control method which provides the user with two autonomous features in addition to traditional manual driving: automatic passing through narrow passages and wall following. Its activation is performed by a deictic interface that makes it possible to use these features ergonomically with the same control device as the one used to manually steer the wheelchair, the joystick. We highlight the cognitive prerequisites for its use such as attentional load and executive abilities. It appears that this assistance brings about a decrease in physical load for an equal level of comfort as manual driving, but requires an additional cognitive effort for the user, especially in terms of executive abilities. The potential users are people who are likely to endure strong difficulties to drive a wheelchair with a joystick. This assessment also helps to determine among them the persons for whom the system is usable: people who do not present severe cognitive impairments.

REFERENCES

[1] Z. Zhi - hui, L. Hui, L. Yin, C. Jia - jia, "Design of the intelligent fire proof and theft - proof alann system for home", JOURNAL OF HENAN POLYTECHNIC UNIVERSITY, vol. 28,no. I, pp. 207- 210, Feb. 2009.

[2] Q. Qu, Z. Guohao, W. Baohua, "Design of Home Safeguard System Based on GSM Technique", Electronic Engineer, vol. 32, no. I I, pp. 76- 78, Nov. 2006.

[3] M. Shankar, 1. Burchett, Q. Hao, B. Guenther, "Human-tracking systems Using pyroelectric infrared detectors", Optical Engineering, vol. 10, no. 45, pp. 106401 (01-10), Oct. 2006.

[4] M. Moghavvemi and C.S. Lu, "Pyroelectric infrared sensor for intruder detection," in Proc. TENCON 2004 Conf., pp. 656-659.

[5] Renewable Energy UK. (2010, Aug.). Find out how to integrate PIR (passiveinfra red) sensors into renewable energy applications.Available: http://www.reuk.co.uklPIR-Sensors.htm

[6] Kelson R. T. Aires, Andre M. Santana, Adelardo A. D. Medeiros"

[7] P. Drews, R. de Bem, and A. de Melo, "Analyzing and exploring feature detectors in images," in Proc. 9th IEEE Int. Conf. Industrial Informatics(INDIN), Lisbon, Portugal, Jul. 26–29, 2011, pp. 305– 310 BIOGRAPH.

[8] L. McGarry, "The standby power challenge," IEEE Transactions on Asian Green Electronics, pp. 56-62, 2004.

[9] Bo-Teng Huang, Ko-Yen Lee and Yen-Shin Lai, "Design of a TwoStage AC/DC Converter with Standby Power Losses Less than 1 W," Proc. PCC, pp. 1630-1635, Apr. 2007.

[10] Jee-Hoon Jung, Jong-Moon Choi and Joong-Gi Kwon, "Novel techniques of the reduction of standby power consumption for multiple output converters," Proc. APEC, pp. 1575-1581, Feb. 2008.

[11] S. Y. R. Hui, H. S. H. Chung, and D. Y. Qiu, "Effective standby power reduction using non-dissipative single-sensor method," Proc. PESC, pp. 15-19, Jun. 2008.

[12] Yu-Kang Lo, Shang-Chin Yen, and Chung-Yi Lin, "A High-Efficiency AC-to-DC Adaptor with a Low Standby Power Consumption," IEEE Transactions on Industrial Electronics, pp. 963-965, Feb. 2008.