Computer Engineering and Intelligent Systems
ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online)
Vol.6, No.3, 2015
www.iiste.org

Implementation of Improved Method on Embedded Surveillance System with Reduced Power Usage

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Abstract
In this project design and implement a home embedded surveillance system with ultra-low alert power. Traditional surveillance systems suffer from an unnecessary waste of power and the shortcomings of memory conditions in the absence of invasion. In this design we pressure sensors as the alert group in windows and doors where an intruder must pass through. These low-power alert sensors wake up the MCU (Micro Controller Unit) which has power management for the ultrasonic sensors and PIR sensors indoors. This state transition method saves a large number of sensors required for the alert power. We also use the Majority Voting Mechanism (MVM) to manage the sensor groups to enhance the probability of multiple sensors sensing. After the MCU sends the sensor signals to the embedded system, the program starts the Web camera. Our sensing experiment shows that we reduce the system's power consumption
Keywords: Embedded Surveillance System, PIR Sensor, Ultrasonic Sensor, Low-PowerState

I. INTRODUCTION

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 exist paper the alerting sensors with low-power consumption are placed near those home windows and doors where an intruder must pass through. When an intruder enters the sensing area, the sensors wake up the sleeping MCU (Micro Controller Unit) which starts the power supply for the indoor sensors and for the sensor signal transmission to the embedded system. For the indoor sensors we use the MVM to improve the sensing reliability.

The embedded surveillance system determines the sensor results and then decides whether to start the Web camera to both capture images and upload these captured images to the Webpage through the Internet. We use the MCU's sleep mode to reduce the alert power consumption for our home embedded surveillance system when there is no intruder so as to improve the traditional surveillance system without wasting the power.

II. OBJECTIVE

The main objective of my paper is to reduce power and cost and number of sensors in home surveillance systems. Traditional surveillance systems suffer from an unnecessary waste of power. The short coming of memory conditions in the absence of invasion. The MCU sends the sensor signals to the embedded systems, the program start the web camera. Experiments shows that we reduce the system power consumption

III. EXISTING METHOD

The home embedded surveillance system which has two groups of sensors, indoor and outdoor. The outdoor sensor group contains a number of PIR and pressure sensors placed near windows and doors of a home. When the outdoor sensors sense an intruder, the MCU is woken up and turns on the power for the indoor PIR and ultrasonic sensors for the Majority Voting Mechanism.

When this is completed, the decision signal passes to the embedded board GPIO (General purpose input and output). The software module of the embedded board turns on the Web camera to capture images, and the embedded system uploads them by means of the Web server through the Internet. The user can view the images captured by the home surveillance system through the Internet.

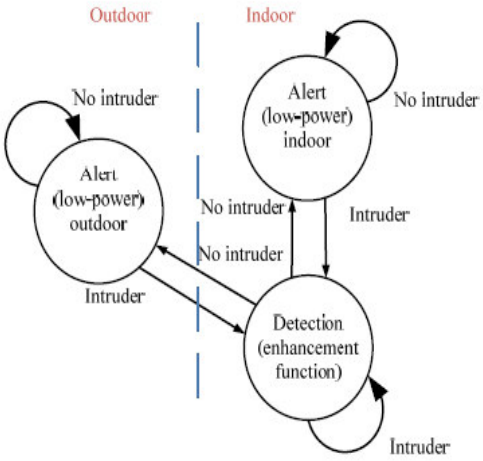


Fig 1. The state transition for the home embedded surveillance system to save power

Majority voting mechanism:
This scheme works on the principle that involves majority of the sensors output for activating the web camera. If few sensors detect intruders- detection, the web camera will not be activated. This scheme involves more number of sensors and hence involves more power consumption.

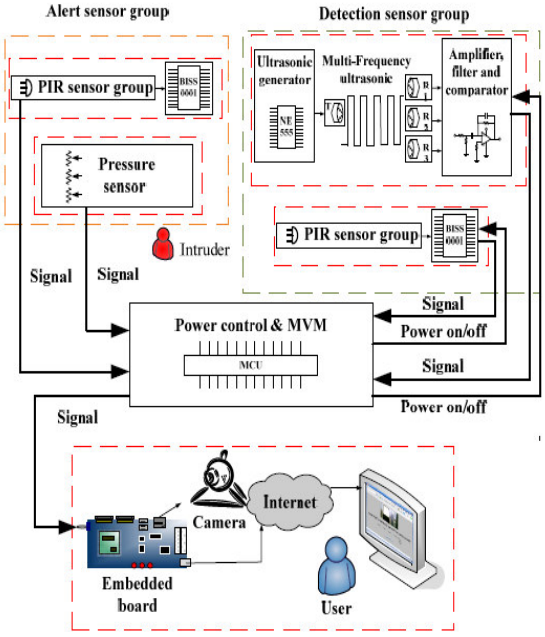


Fig. 2. The home embedded surveillance system with ultra-low alert power.

IV. PROPOSED METHOD

In the proposed method among the total number sensors only 75% detected only system will be activated and start sensing then only the circuit only works.

Majority Voting Mechanism has been employed in the existing design to turn ON/OFF the camera. Priority based control of the webcam has been proposed in the design. Stepper motor has been used to rotate the camera to the direction of the intruder.

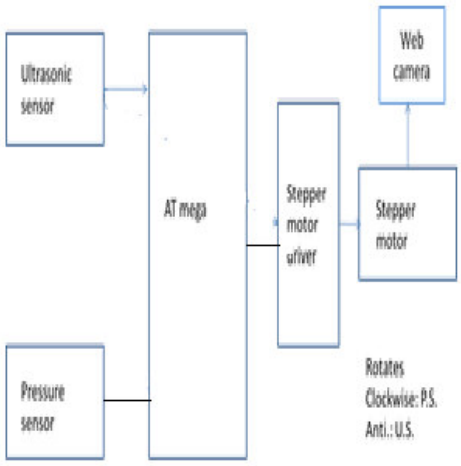


Fig 3. Block diagram of priority mechanism in proposed method

ULTRA SONIC SENSOR:

The ultrasonic sensor module which uses a typical oscillator chip to design a square waveform generator and to adjust the resistance and capacitance so as to generate a multi-frequency ultrasonic transmission. The ultrasonic transducer transforms the voltage waveform into an ultrasonic transmission and the transducer of the receiver transforms the ultrasonic transmission into the voltage waveform. The receiver may experience external interference at different frequencies, it is necessary to screen both the filter signals outside the receiving frequency and the signal input to the amplifier and the comparator; as other ultrasonic sensors are also susceptible to refractive interference, so we use several ultrasonic sensors at the receiving end

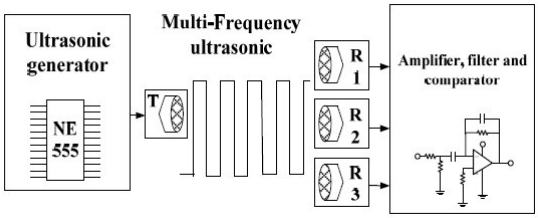


Fig 4. A system block diagram of the ultrasonic sensor module

PRESSURE SENSOR:

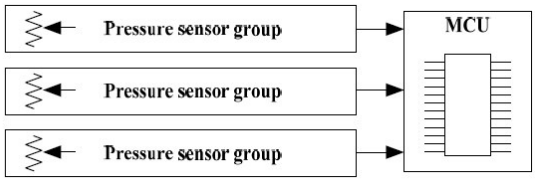
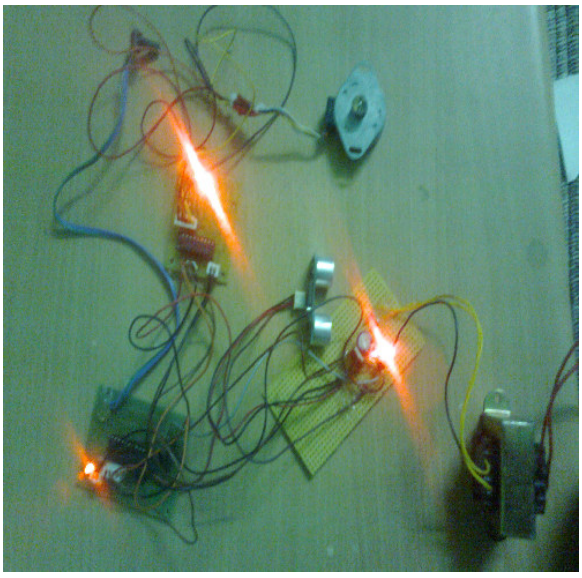


Fig 5 System block diagram of the pressure sensor module

The PIR sensor groups on the ceiling, and the sensing area is a cone-shaped projection area. Covering the Y.-W. Sensing area with multiple PIR sensor groups extends the sensing area, and by using MVM we enhance the overall sensing probability. But the PIR sensor cannot sense a low speed or heat-insulated object, because obviously these won't change the environment temperature. The pressure sensors are designed by linear potentiometers. The pressure sensors used are thin and placed on the ground.

a)circuit view of priority mechanism(1)



b)circuit view of priority mechanism (2)

COMPARISION OF MAJORITY VOTING MECHANISM AND PRIORITY MECHANISM

	Power consumption in alert state	**Power consumption in detection state**	**Average power consumption**
Existing design	20 mW	11W	1.102W
Proposed design	10mW	8W	0.809W

VI. CONCLUSION

In this design multiple sensor groups with low power consumption for the detection of an intruder has been employed. The MCU stays in a sleep state, unlike the traditional surveillance system which stays in the detection state. The power consumption in the alert state or sleep state has been reduced by 10.9 times by remaining 90% in the alert state and 10% in the detection state, two sensor groups to improve the detection reliability of the alert

state has been used .In addition our home embedded surveillance system reduces unnecessary memory consumption for the capture of images without an intruder, compare to previous surveillance system

FUTURE WORK

In future we will extend my project to home power management system and surveillance system. Future the power consumption will be further reduced using the non-dissipative sensor sensing method. Remote control of the entire embedded surveillance system will also be implemented. Thus in future, a remote controlled embedded home surveillance and power management system will be implemented with more performance and accurate results.

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