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LOW POWER CONSUMED IMAGE DETECTION AND INTELLIGENT SURVEILLANCE SYSTEM FOR GREEN ENVIRONMENT IN CHEMICAL AND MEDICAL INDUSTRIES

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Abstract

The foremost idea of our scheme in surveillance technology, the power consumed by the surveillance camera is reduced whenever not in use by using indoor and outdoor sensors which wake up the microcontroller with power management for the surveillance camera, when there is any human entry in the target area. Also the users are given an alert by using Global System for Mobile Communication system when there is an entry of a human. The purpose of this surveillance system is to propose a system, which can reduce the power consumed by the surveillance camera, by using sensor technology along with GSM system hand in hand. This system will be valuable for both surveillance applications for high secured environment in Chemical and medical fields and for our engineering practice.

Keywords: Intelligent Surveillance system, PIR Sensor, CCTV camera, MCU 89C51, Chemical and Medical fields, GSM, Green Environment.

Introduction:

Embedded surveillance systems are frequently used in home, office, factory, also in highway vehicle monitoring and image detection. This system is mainly for security purpose, but it requires more power. We used our knowledge of instrumentation to design this system that is used to reduce the power consumed by the surveillance system. Lately embedded surveillance systems are frequently used in any places. Existing System consist of a surveillance CCTV camera, which go on recording the environment to which it get focused. About 9V-12V continues power supply is required to keep the surveillance CCTV camera in active state. If there is no intruder for a longer period of time, the standby power consumption of the surveillance CCTV camera seems to be very large. Thus more power is wasted. Thus, in the long run, the life of the surveillance CCTV camera is reduced. As the camera works continuously, the

memory storage capacity gets wasted and leads to power wastage. To reduce this power wastage we have proposed a new system to conserve power.

Materials and Methods

In the newly proposed system, low-power PIR sensors are placed near the home doors and windows in medical and chemical factories. When an intruder enters the sensing area, the sensors intimate the Microcontroller unit. Immediately the MCU activates power supply for the indoor sensors and CCTV camera. In addition, as the sensors goes to active state, text message is sent to alert the user’s through Global System for Mobile Communication (GSM) system.

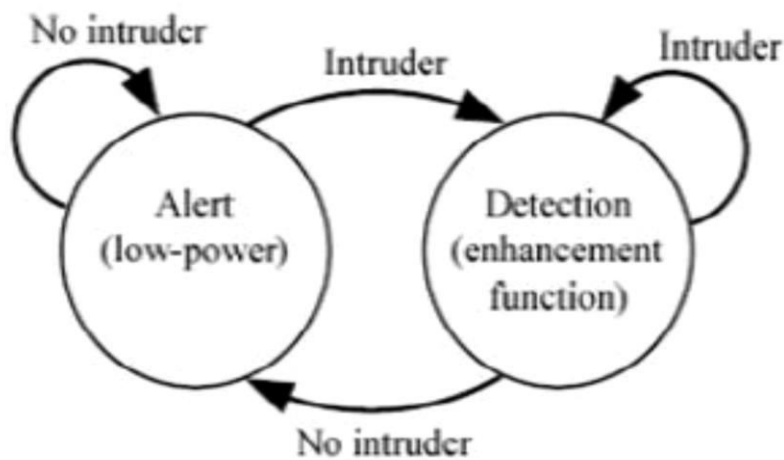


Figure.1: Transition state diagram to save power.

State transition diagram for the intelligent surveillance system to save power is shown in figure 1. This surveillance system makes use of two PIR sensors, transformer, amplifiers, bridge rectifiers, relay, GSM module, camera, LED, micro controller. The micro controllers are programmed using embedded C language. Architecture of Intelligent Surveillance system is shown in figure 3. PIR sensor which is called as Passive Infrared Sensor, detects the entry of the intruder, and gives an amplified voltage as an output. The PIR Sensor has a range of approximately 20 feet (6 meters) as shown in figure 2.

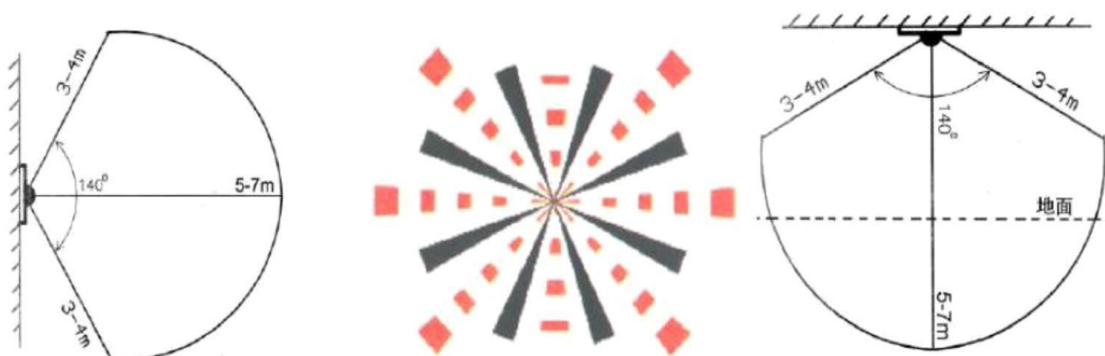


Figure 2: PIR Sensor Operating Range

Spotlight of Infrared Light is possible because of lenses present in PIR sensor and so, Evaluation of moving object becomes easy due to intensity of Infrared lights. This can vary with environmental conditions. It responds by making its output high when sudden change occurs, such as when there is a motion. This device is designed for indoor use. Operation outside or in extreme temperatures may affect stability negatively. Because of high sensitivity of PIR sensor system, it is not recommended to use the module in the following or similar condition. In a place where there are obstructing material through which IR cannot pass within detection area. Exposed to direct sun light or direct wind from a heater or air condition. Its main advantage is that the PIR sensors are independent of exterior source of energy such as electricity since the energy gets produced from Infrared Lights.

The MCU is Micro Controller Unit which is to store the data and then read the data statically from the PIR sensors and in turn controls the surveillance CCTV camera, and also through GSM system user is alerted. The CCTV camera can produce images or recordings mainly used for surveillance purpose by transmitting the images to limited set of monitors. The most obvious benefit is that the unit is no subject to the failure of any type of wiring, because CCTV cameras use wireless technology in order to accomplish their task. It operates only at 9-12V power supply.

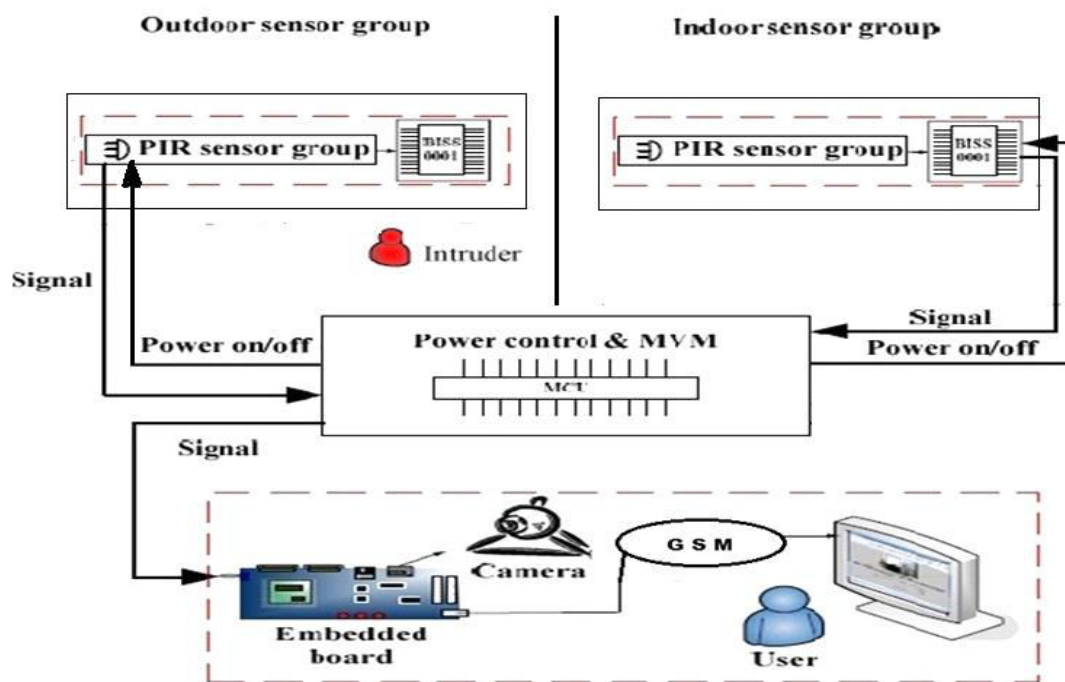


Figure-3: Architecture of Intelligent Surveillance system.

GSM modules are similar to modems, but there is one difference. A GSM Modem is external equipment. GSM modem exposes an interface that allows applications such as SMS to send and receive messages over the modem interface, whereas the GSM Module is a module that can be integrated within equipment which is used to establish communication between a computer and a GSM system. It is an embedded piece of hardware as shown in figure 4.

In this proposed surveillance system, PIR Sensors require only around 4V-5V power supply, thus minimum power is consumed. If either indoor or outdoor PIR sensor goes to active state Due To The Intrusion, The Signal Is Sent To MCU Where It Transmits The Signal To Embedded Board From Which Text Message Is Sent Immediately To Alert The Users Through GSM Module. Surveillance CCTV camera's life is fortified by this new technology. Wastage of memory space, to store photos and recordings is very much reduced. The power consumed will also be less due to the presence of PIR sensors.

Result and Discussion:

The present module designed works comfortably using sensor technology as shown in figure 4. As described, that is the continuous power supply to monitor CCTV camera is curtailed here to a minimum of 4-5V from that of 9-12V so the reduction of power supply is done automatically depending upon the high reliability of PIR sensors.

This designed model works with ease without manual assistance as shown in figure 4. The power supply used here is linear power supply as it is oldest and simplest type of power supply. The step down transformer converts the AC input with the higher level to some lower level. A bridge rectifier converts the AC voltage into DC voltage. A four-transistor converter circuit (Bridge Rectifier) that can generate the highest output power than other types of rectifiers. The filter circuit resists the unwanted AC signals. The regulator then converts a DC voltage to a lower DC voltage of the same polarity. The two PIR sensors which are installed here which when intruded sends a signal to MCU. In MCU 89C51 micro controller is used. This micro controller is Programmed using Embedded 'C' language.

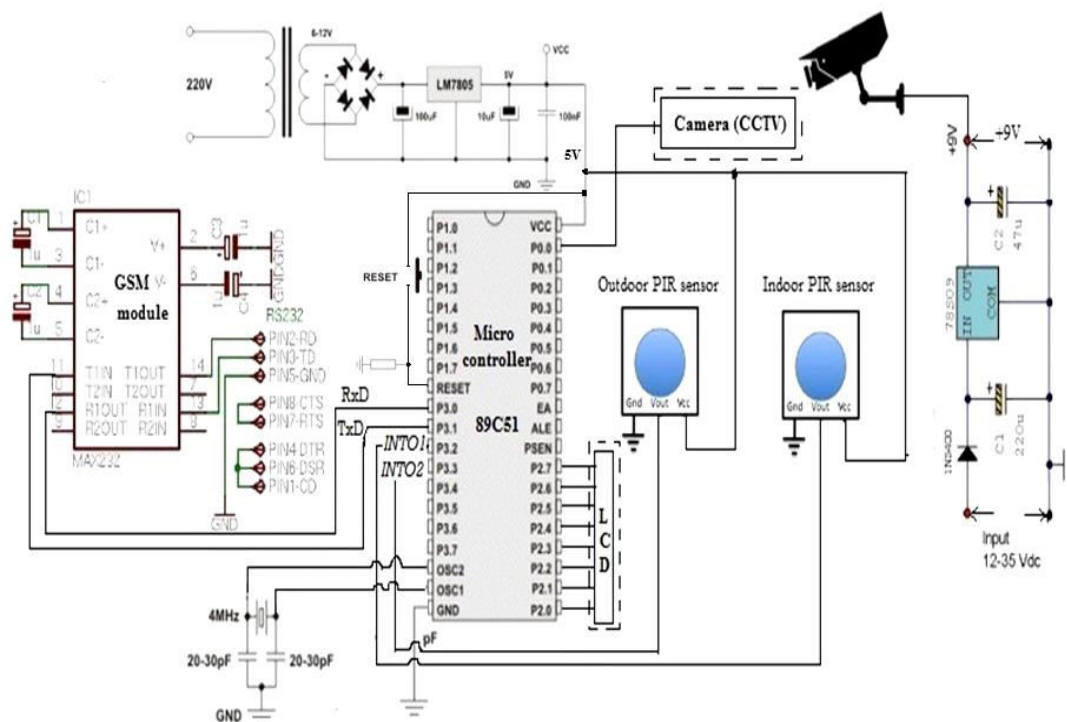


Figure 4: Design of Proposed circuit Module

The CCTV is the process that carried out using the video cameras for transmitting the signal to the specific location, on the limited set of monitors and CCTV camera starts working when a signal is received from the MCU. Thus, a message is sent to alert the users through GSM module which is connected to micro controller when it receives a signal from MCU. Based on the microcontroller output PIR sensors, GSM, LCD and the power management of the Surveillance camera used in the device is controlled.

Conclusion and Applications:

Finally, by overcoming many difficulties, we ended up with a working product. The cost of the system is inexpensive. The possible further improvements that could be done in this device is that, more advanced sensors which provide better accuracy can be used and hence more accurate output can be achieved. As this method of Surveillance technology is inexpensive and easy to implement. For example it can be implemented in ATM centers, so that Surveillance CCTV camera life and memory storage is not wasted unnecessarily. Also this technology can be used in College libraries, National highways, Educational institutes, Defense ministry, Banking sectors, Forensic department, Medical field and Research and Development centers.

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