

Solar Panel based Security System using PIR Sensor and GSM

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Abstract: Proposed design provides security and saving of electricity at home, office, and Godown. It is suitable for remote location where electricity not available. This system operates in real time to provide security using PIR sensor and GSM. GSM can send alert message to our mobile phone when PIR detector detect any motion and also switch ac lamp. It also incorporates fire sensor and light sensor. In any fire condition or temperature beyond particular limit cross then it alert by sending message to mobile phone and it also turn on alarm. This design is based on Solar panel which eliminates dependency on conventional electricity sources. In addition it can provide safety and controlling devices through relay.

Keyword:- Solar Panel, GSM, Fire sensor, Light sensor, PIR sensor

I. INTRODUCTION

The main task of proposed design is to use of solar panel based security and safety where conventional electricity not available or suitable for remote area. System is used to control home appliances tenuously and offer security when the owner is away from the place [2].

The energy crisis has become one problem which the whole world is facing and home power consumption makes up the largest part of energy consumption in the world [4].

Light from the sun is natural and it is called sunlight. This sunlight can serve as a source of solar power which is converted to electric power for both household and industrial utilization. Solar light is used to provide energy to the security system along with other features.

Solar based security systems are able to save energy, environment friendly and convenient to install. It is powered by mono-crystalline and poly-crystalline solar panels which convert the solar energy into electricity saved in the storage batteries without maintenance. It can be controlled by a control system to prevent storage batteries from over-charging and over-discharging. Proposed design is safe & easy to implement. PIR Sensor detects any motion then it alert by sending SMS to owner using GSM. It can ON the lamp with alarm. If any fire occurs then it send SMS using GSM and also turn ON alarm. For saving electricity light

sensor automatically detect darkness and switch ON the lamp at night and automatically turn off lamp at day time. The proposed system includes LED, alarm and GSM.

II. HARDWARE ARCHITECTURE

Proposed design of System is shown in Figure 1.

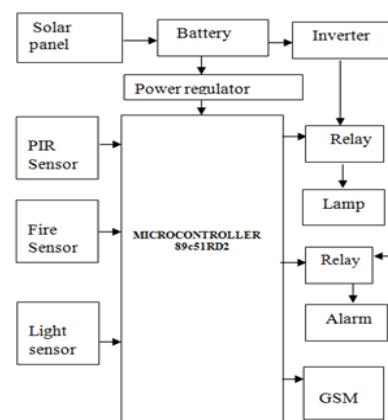


Figure 1. System architecture

System Contains 89v51Rd2 Microcontroller, solar panel, PIR sensor, LCD Display, LED, alarm, relay, light sensor, fire sensor and GSM Modem. All Devices Controlled By Microcontroller. Proposed design can provide security and safety. We use the PIR sensor circuit to detect motions. If any movement occurs, the PIR sensor receives the variations of the temperature made by the infrared energy emitted to the surroundings [4].

PIR can detect motion and it sends information to microcontroller and microcontroller initiate GSM for transmitting message to owner. It generates alarm sound as well as can handle relay for ON and OFF Lamp. This system can detect surrounding temperature if it raise beyond threshold limit then it sends information to microcontroller and microcontroller initiate GSM and alarm.

A. Microcontroller

A Microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. It is Low cost and low power consumption and easy handling. It fits for many uses such as controlling home appliances and safety devices. Figure 2 shows Microcontroller.



Figure 2. Microcontroller 89c51Rd2

B. PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are mainly used for motion detection. PIR sensors allow to sense motion; It is small, inexpensive, easy to use and low-power. It is important to note that PIR sensors don't detect or measure "heat" instead they detect the Infrared radiation emitted from an object which is different from but often associated/correlated with the object's temperature (e.g., a detector of X-rays or gamma rays would not be considered a heat detector).

A PIR based motion detector is used to sense movement of people and other objects. They are commonly used in burglar alarms and automatically activated lighting systems. They are commonly called simply "PIR". For that reason they are commonly found in appliances and gadgets used in homes or businesses. PIR sensor shown in figure 3



Figure 3. PIR Sensor

C. GSM Module

SIM300 can be integrated with a wide range of applications. SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz. SIM300 can fit almost all the space requirement in our application. SIM300 is a widely used in many projects and hence many variants of development boards for this have been developed.



Figure 4. SIM300

D. Solar panel

The solar PV panel is used, in essence, to trap the incident sunlight and charge the battery to be stored for future use. The panel is adjusted at specific inclination to enable maximum power point tracking. This provides maximum efficiency and most of the sunlight that falls on the panel is stored. The panel that we are making use of has a rated capacity of 12 volts and 5Watts power.

E. LDR sensors:

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. LDR is having very high resistance, when it is illuminated with light the resistance drops rapidly. The preset resistor can be turned up or down to increase or decrease, in this way it can make the circuit more or less sensitive. The LDR is used to sense the light changes and hence decide whether it is day or night. The threshold value of the resistor can be changed according to the requirement. The output of the sensor is interfaced with the microcontroller and the output drives the applications like turn on/off light. If it is day the lights are turned off and if its night the lights are turned on. Figure 5 shows LDR.



Figure 5. Light Dependent Resistor

III. RESULTS

Proposed system is efficient for rural areas where electricity is not available. This system senses motion of live body, and send SMS to predefine persons for intruder's alert. It also senses fires and sounds alarm and sends SMS to predefine persons for fire alert.

This system can operate day & night. We can set the system to operate night mode only to save the power. It is completely automated system. The complete Hardware system consumes very less amount of power. For maximum power output the solar panels should aligned with the sun.

IV. CONCULSIONS

It is able to provide a real-time accurate, effective system. Main Advantage of this design to provide automated detection and alerting system. It provides quick response time and easy to use. It has Simplicity in design. It has Real-time capability and low cost.

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