

Smart Home Management System Using Wireless Sensor Network (WSN)

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Abstract: Nowadays, shortage of electricity is a very serious problem due to insufficient production. The wastage of electricity can be avoided by switching off the electrical appliances when not in use. This can be achieved by using Smart home system which automatically turns off loads when not in use, the system can save energy in homes and offices. The system will automatically switch off based on the presence of people at home. Another major issue is that there might be occurrence of theft when nobody is present at home. The theft can be avoided by using MEMS accelerometer which intimates the user through registered mobile number when there is an unexpected break of windows or door through the GSM modem. The system in addition also has a provision for the user to fix energy consumption reading and when the user consumption exceeds a fixed reading, a message would be sent to the users registered mobile number through the GSM modem. Applications for this system include workstations, open office cubicles, home offices, and home entertainment systems.

Keywords: GSM modem, Smart Home Management System using Wireless Sensor Network (WSN).

1. INTRODUCTION

Embedded systems are computing systems with tightly coupled hardware and software integration, which are designed to perform a dedicated function. We have to implement two parts in an embedded system. It's depending upon the application requirements of the embedded project.

- Hardware for speed and performance.
- Software for flexibility

Embedded system are useful for implementing a product designed in software on a microprocessor and some small amount of hardware, is cheaper, more reliable, or better for some other reason than a discrete hardware design

2. SCOPE OF THE PROJECT

The main goal of our project is to develop a system which keeps track of all the appliances at home and the user can acquire the energy consumption parameters of the appliances thereby saving energy when not in use by using "Smart Home Management System using WSN" (Wireless Sensor Networks). System will automatically switch off the electrical appliances when not in use based on the presence of humans inside the home by PIR sensor. The next problem we are facing is occurrence of theft inside the home when the owner is not present inside the home. That time it intimates the message to the owner when there is an unexpected breakage of windows or door by the MEMS accelerometer through the GSM modem. The system also provides in addition for the user to fix an energy consumption reading and when the user consumption exceeds the fixed reading, a message would be sent to the users registered mobile number through the GSM modem.

3. DEVICE DESCRIPTION

(i) **PIR SENSOR: A passive infrared sensor (PIR sensor)** is an electronic sensor that is used to measuring the infra-red light radiating from objects in its field of view. They are most often used in PIR based motion detectors. The term *passive* refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work entirely by detecting the energy given off by other objects. PIR sensors is not used to detect or measure "heat"; instead they detect the infrared radiation emitted or reflected from an object.

(ii) MEMS accelerometer

MEMS accelerometers are Micro Electro Mechanical Systems that is used to measure the static or dynamic force of acceleration. Static force refers to the earth's gravitational pull. Accelerometers can be used to sense inclination, vibration, and shock.

(iii) RELAY

A relay is defined as an electrically controlled device that opens and closes electrical contacts, or activates and deactivates operation of other devices in the same or another electrical circuit.

A mechanical relay is essentially a combination of an inductor and a switch, where the electromagnetic force of the inductor causes a switch to change position. A solid state relay accomplishes the same function with semiconductor devices changing impedance to effectively activate or deactivate a circuit open or closed.

(iv) GSM MODEM

A GSM modem is a wireless modem that works with a GSM wireless network. 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. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. A GSM modem can be used to do the following operations,

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.

(v) ENERGY METER

Watt hour meter or energy meter is an instrument which measures amount of electrical energy used by the consumers. Utilities install these instruments at every place like homes, industries, organizations to charge the electricity consumption by loads such as lights, fans and other appliances. Most interesting type are used as prepaid electricity meters.

Basic unit of power is watts. One thousand watts is one kilowatt. If we use one kilowatt in one hour, it is considered as one unit of energy consumed. These meters measure the instantaneous voltage and currents, calculate its product and gives instantaneous power. This power is integrated over a period which gives the energy utilized over that time period.

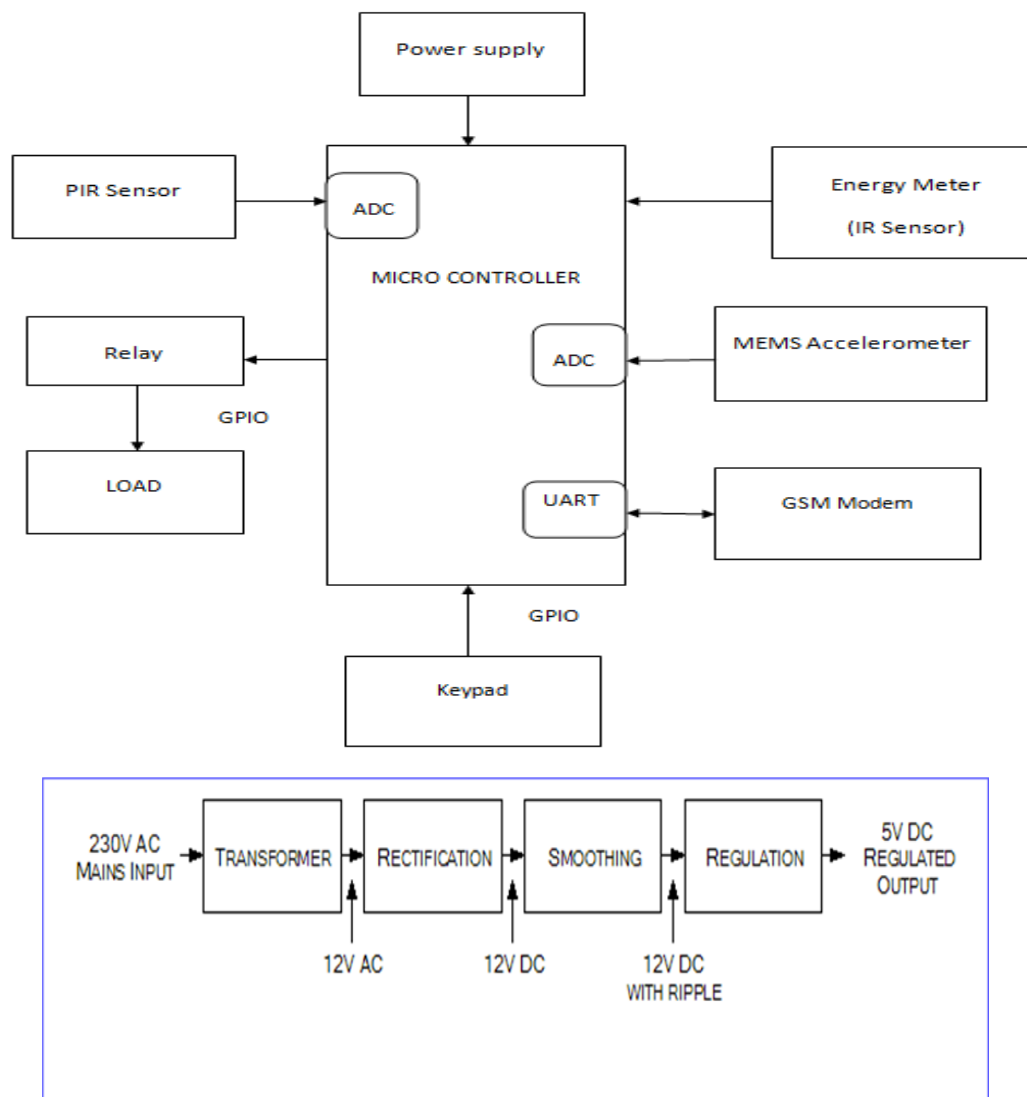
4. EXISTING SYSTEM

- Smart web has been characterized as an integrated system that can increase the efficiency, reliability and flexibility of the electricity network through a two-way flow of electricity and information.
- As the customers choose to tailor their energy consumptions in responding to price or environmental concerns, the peak load burden will be reduced, and hence Smart Grid can meet increased customer demand without adding expensive infrastructure.
- At the same time, integration of the renewable energy sources will increase the power diversity, and reduce our dependence on fossil fuel as well as the greenhouse gases.

5. PROPOSED SYSTEM

- Energy consumption control mechanism is limited to only certain devices like light illuminations, whereas several household appliances possible to controlled.
- Energy control is based on fixed threshold power consumption, which may not be applicable to different consumers.
- Controlling the home appliances through network management functions, in practice inhabitant requirements may vary according to their behaviour but not with network characteristics. Not a single system has taken into consideration of variable tariff of electricity, which is consumed throughout day and night.

6. ARCHITECTURE DIAGRAM



7. CONCLUSION

- The Smart home system avoids the wastage of electricity by switching off the electrical appliances when not in use
- And it informs the user if there is any theft by using MEMS sensor through the GSM modem/Wi-Fi.
- The system also sends the energy meter reading through the GSM modem to the EB office.
- Thus the Smart home system improves the energy management in home.

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