

## Smart Home Energy Management System Using Gsm

Mr.G.Pameswaran<sup>1</sup>,Ms.S.Kamatchi<sup>2</sup>, Ms.S.Keerthana<sup>3</sup>, Ms.S.Kiruthika<sup>4</sup>,  
Ms.M.S.Lavanya<sup>5</sup>

<sup>1</sup>.Professor and <sup>2,3,4</sup>&<sup>5</sup>Final year B.E. (ECE) Students  
Department of Electronics and Communication Engineering  
TRP Engineering College, Tiruchirapalli,Tamilnadu,India.

[kamatchi13395@gmail.com](mailto:kamatchi13395@gmail.com)[keerthiselvaraj555@gmail.com](mailto:keerthiselvaraj555@gmail.com)[kirthiprabhu4495@gmail.com](mailto:kirthiprabhu4495@gmail.com)  
[lavyasomu24@gmail.com](mailto:lavyasomu24@gmail.com)

**Abstract:** As the home energy consumption is increasing due to the usage of large-sized home appliances, we propose a smart home system that holds the potential for improving energy efficiency and reducing cost of energy usage. It leads to the development of an energy management for residential buildings and industries using PIC16F877A and GSM. The key design of our project is to shift the power supply from normal utility mode to renewable energy mode i.e., solar energy. This energy source is connected to the main supply via battery and inverter. Moreover, the temperature sensor LM35 which detects the temperature variation is used to avoid the short circuit. This design also encapsulates the PIR sensor that detects the presence of the human motion and it allows the power on the corresponding home appliances. Thus, the use of smart energy management system can assist in reducing the energy usage in an efficient way.

**Keywords:** Energy Management, GSM,PIC16F877A, PIR Sensor, Temperature sensor.

### I. INTRODUCTION

Now a days in home areas, most considerable topic is energy saving and generation of power. The usage of wireless devices is increasing day by day so this smart home energy management helps us to know the energy consumption and generation.

The Energy management system can be used to control devices like lighting systems. It also provide metering and monitoring functions, which allows them to take decisions regarding energy activities across their sites and it includes planning and energy related production and consumption units. One of the main purpose of smart homes is to reduce energy consumption. To achieve this goal, smart controls must be implemented in a smart home. Moreover, useless power consumption occurs during day time and also when the human being is not present in the room,so through this project we are overcoming this problem.This smart home implementation can contribute to major reductions of energy use in the buildings. For this purpose we use temperature sensor, PIR sensor, microcontroller, GSM and solar panel.

### II. EXISTING SYSTEM

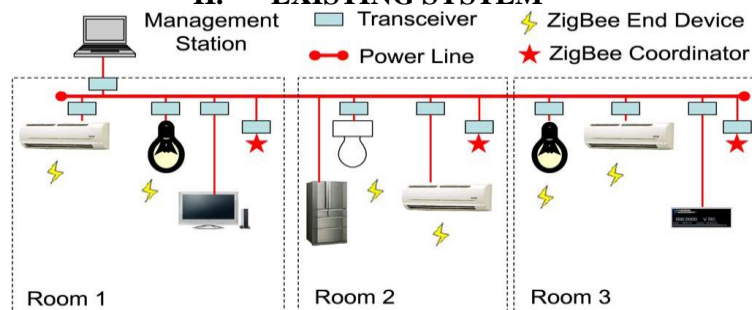


Figure [1]:Architectural Design of Smart Home Control Networks

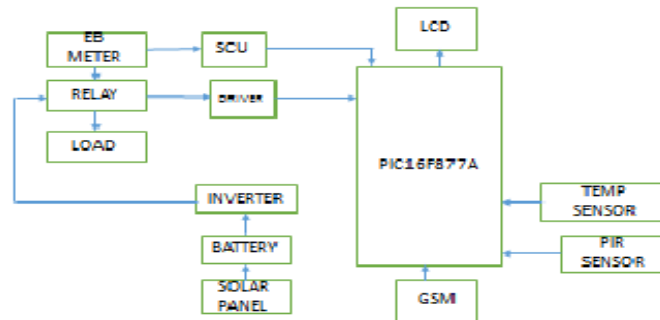
Fig [1] displays the existing architecture of the smart home control network. Three rooms in a smart home are considered as an example. Each home appliance is equipped with a PLC transceiver, which can directly receive commands to control the home appliance and send replies about the state of thehome appliance to the management station. An isolated WSN, which includes various sensor nodes and one coordinator that is

integrated into the PLC transceiver, is deployed in each room to collect environmental information, such as temperature, illumination, humidity, and other information.

In Architecture of existing smart home control network, WSN coordinators, while PLCs are used as a network backbone to connect all WSN coordinators and transfer the collected environmental data to the management station and the control messages to home appliances. The design in this paper is quite different from that of conventional WSN based smart homes in which the control commands for home appliances are transferred using WSNs. A similar solution that also combines wireless and PLC technologies is the INSTEON technology. However, the wireless technology in INSTEON is mainly used to relay control commands and extend the scale of a control network, rather than gather environmental information for smart controls. Another issue in a smart home is how a user can remotely connect and get access to a smart home control network

Therefore, this system has a drawback of extending the coverage of a smart home control network and also it didn't adopt the mobile cellular service architecture such as GSM, GPRS, or 3G/4G. Thus there is a difficulty in remotely monitoring the smart home and controlling it in real time.

### III. PROPOSED SYSTEM



Figure[2]:Proposed system

In our proposed system Fig[2], we present the smart home system architecture, that composed of three substrates as shifting of power supply, temperature sensation and human detection which results in energy management. The microcontroller co-ordinates the entire system implementation. It optimizes the power consumption by switching the main power supply to renewable energy (solar energy) when it exceeds the threshold unit in digital EB meter.



Figure [3]:Proposed Architecture

Additionally, the proposed architecture saves the home appliances from short circuit by detecting and turning off the appliances with the help of temperature sensor. Here in this paper, the PIR sensor detects the presence of human and maintain the power control of the room. Thus, as a whole power consumption can be efficiently used by this system.

### IV. HARDWARE REQUIREMENT

- PIC16F877A
- GSM
- PIR SENSOR
- LM35(Temperature sensor)

- Solar panel
- LCD
- Inverter

## V. SOFTWARE REQUIREMENT

- MPLAB (Hi-tech compiler)
- PROTEUS Software

## VI. HARDWARE ARCHITECTURE

### Solar panel:

Solar panel is a device made up of photo voltaic cells. This device converts source of light available from the sun into electricity. By using maximum power point tracking using two LDR and a DC power generation can be increased.

### Inverter:

Inverter is used to convert the supply from 12v to 230v for providing the home appliances from renewable sources.

### LCD:

Liquid crystal display is a electronic device panel comprising molecules of liquid crystals which consists the light modulating properties.

### LM35(Temperature sensor):

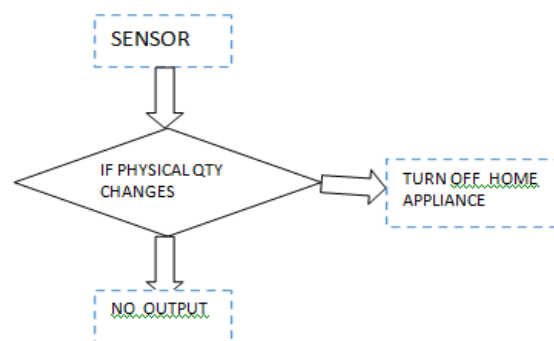
LM35 is a device which senses variation in temperature across it and it give the readings in centigrade since its output voltage is linearly proportional to temperature.

### GSM:

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From a mobile operator perspective, a GSM modem looks like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

### PIR Sensor:

A passive infrared sensor is an electronic device that measures infrared light radiating from objects in the field of view. It senses the motion of the human body by the change in surrounding ambient temperature when a human body passes across the sensor. Then it turns on the lighting load to which it is connected. The lighting load will remain ON until it senses motion. Once the motion is seized it switches OFF the lighting load.



Figure[4]: Flow chart of sensor

## VII. CONCLUSION

Thus, in this paper we have proposed the design and architecture of a smart home system which enhances comfortable living assistance. Solar energy is tremendously available in nature, so there is enough production of power to supply the home appliances. The cost of the implementation is low and also the system

reduces the cost of the power. With a help of this architecture a user can control various home appliances and save the total power consumption in an efficient way.

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