

SMART ENERGY MANAGEMENT AND OVERLOAD CONTROL OF HOSTEL ROOMS USING IOT

¹Joshi A. A*, ²Avhad Sanket, ³Gatkane Vikas, ⁴Kakad Srushti, ⁵Kanawade Rasika

¹Asst. Professor, Dept. of Electrical Engineering, Amrutvahini College of Engineering, Sangamner,

²UG Scholar, Dept. of Electrical Engineering, Amrutvahini College of Engineering, Sangamner, India

³UG Scholar, Dept. of Electrical Engineering, Amrutvahini College of Engineering, Sangamner, India

⁴UG Scholar, Dept. of Electrical Engineering, Amrutvahini College of Engineering, Sangamner, India

⁵UG Scholar, Dept. of Electrical Engineering, Amrutvahini College of Engineering, Sangamner, India

ABSTRACT - In this paper method for energy management and overload control of hostel rooms is introduced with the help of IOT. In hostel rooms student uses extra devices which are not allowed in current system there is no system or equipment that can monitor and regulate excessive electricity consumption. We have created a system in the proposed system that uses IOT to identify excessive usage and take the appropriate action. We carried out a survey in the Amrutvahini College of Engineering hostel. We discovered through this survey that a system is required that can alert the hostel rector when a user is using a device excessively.

Key words- Smart Energy Management, IOT, Overload Control, Smart Meter.

I. INTRODUCTION

Smart energy management and overload control of hostel rooms using the IoT (Internet of Things) is a system that aims to optimize the energy consumption of a hostel by controlling and managing the usage of electrical appliances in the rooms. The system uses various IOT devices, such as smart sensors, smart plugs, and smart switches, to collect data and control the appliances in the rooms. The primary goal of this system is to reduce energy waste and put cut down on electricity bills. With the help of IOT devices, the system can monitor the energy usage of the appliances and provide real-time feedback to the hostel management and the occupants. The administration may take the necessary actions to reduce energy consumption, and the residents can make informed judgements about their energy consumption patterns with the use of this information.

Additionally, the system has overload detection and prevention devices that can stop the electrical circuits in the rooms from becoming overloaded. Overloading can harm the electrical system and, in some circumstances, present a fire hazard.

1.1. Existing System :

Some students who live in dormitories utilized extra appliances like geysers and electric irons that are not permitted. In that situation, the MCB only trips in a short-circuit scenario. However, the rector is not aware of which rooms students use frequently.

1.2. Proposed system :

There are several technologies available in smart buildings and homes for smart electric energy consumption. i.e., Bluetooth technology, Wi-Fi technology, and IOT technology. As a comparison of all these technologies, we have chosen the IOT technology. The IOT technology range is greater as compared to other methods. In the proposed system, we are creating a smart gadget that will identify the additional load consumed by consumers and hostel guests and send a message to both the customer and the hostel director. In general, we are working on designing a system that uses IOT to identify additional electricity consumption. When a consumer uses more electricity than necessary, the system displays this additional load in the form of a sine waveform and notification to the student as well as the rector of the hostel through SMS. And after the third notification, the energy supply is immediately turned off.

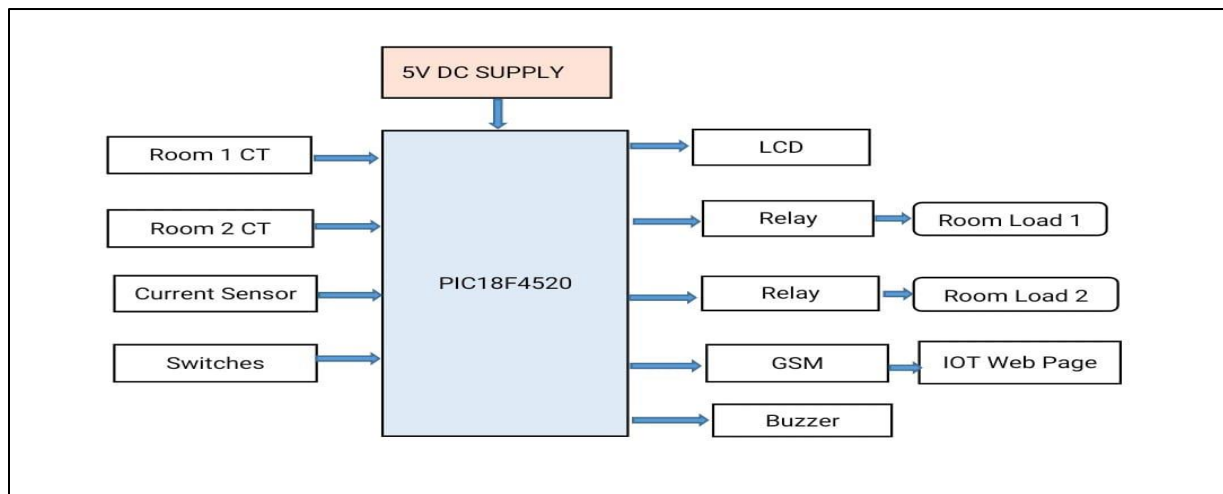


Fig.1. Block Diagram Of Proposed System

1.3. IOT (Internet Of Thing) :

IOT as a term has evolved long way as a result of convergence of multiple technologies, machine learning, embedded systems and commodity sensors. IOT is a system of interconnected devices assigned a UIDS, enabling data transfer and control of devices over a network. It reduced the necessity of actual interaction in order to control a device. IOT is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.

II. COMPONENT SPECIFICATION

COMPONENT	SPECIFICATION	QUANTITY
Micro-controller	PIC 18F4520	1
Transistor	BC547	3
Buzzer	5VDC	1
Resistors	1k, 10k, Random	8
Capacitor	0.1uf, 0.01uf	7
Regulator IC	LM 7805	1
Diode	1N4007	7
CT	5A	2
LCD Display	16*2	1
GSM module	GSM 800 12V AC OR DC	1
Tact switches	5V DC	4
Temp sensor	LM35 V DC	1
CAPACITOR	450uf/25V	1
CAPACITOR	1000uf/25v	1
TRANSFORMER	12VDC 2A	1
LED	UPTO 3V 1ma	1
PCB	120*80MM	1

1.4. Flowchart :

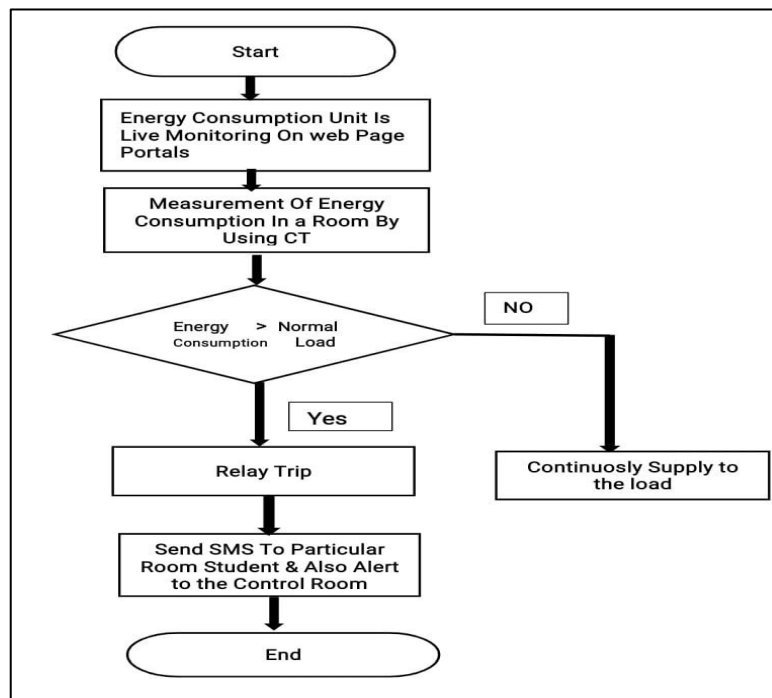


Fig .2.- Flowchart

Working flow of the system is as shown in above fig. At initial condition energy consumption unit is measured by current transformer and monitored with the help of IOT web technology, continuously energy consumption of data is send to the web page portal . If energy consumption is greater than total load then relay trip and system send SMS to particular room owner and also sends alert to control room. In another condition if Energy consumption is within the limit then continuously supply fed to load and system run normally.

III. COMPONENT REQUIRED

1.1. PIC18F4520 Micro-controller : It is an 8-bit enhanced flash PIC microcontroller that comes with nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, and security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects.



Fig.3. Pic18f4520 micro controller

1.3.2 16*2 LCD Display :

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. The command register stores the command instructions given to the LCD. The data is the ACSII value of the character to be displayed on the LCD. The purpose of using 16x2 LCD in our project is to display all the parameters of electricity meter and is connected to the port 0 of arm micro-controller.

1.3.3 GSM Module :

With its SIM800A chip and RS232 interface, this GSM modem makes it simple to connect to a PC or laptop via the USB to Serial adapter or to a micro controller via the RS232 to TTL converter. The correct COM port must be identified from the Device Manager of the USB to Serial Adapter once the SIM800 modem has been connected via the USB to RS232 connector. You can start transmitting AT commands once a serial connection has been established between your micro controller or computer. You should receive responses to AT commands.



Fig.4 GSM Module

IV. ACTUAL MODEL SETUP:



Fig.5. Actual model

In actual system we have used Four Lamps of different watts for demonstration. Two lamps are used per room in which one indicate normal load and another indicate extra load. For normal load we have set limit 120W , small lamp is 100w rating and another lamp is 200w rating. If only 100 watt load is connected system run normally. If both the lamps are connected simultaneously system will send warning message to user and relay will trip the circuit.

V. RESULT

The PCB simulation and design of the circuit were successful. Because these circuits are used in hostel rooms, we can readily track data on energy usage and identify which student rooms are using an excessive amount of power. The IOT Web page's outcome is depicted in fig. The amount of energy consumption that can be used in a specific room is displayed in a graphic structure on a website. Additionally, sending three warning SMS to the specific student's mobile number, followed by a third warning SMS to the rector that also includes the specific room number.

Operation	Load (L1) (100 watt)	Load (L2) (200 watt)
Normal Load	ON	OFF
Excessive Load	ON	ON
Relay Trip	Lamp OFF	Lamp OFF

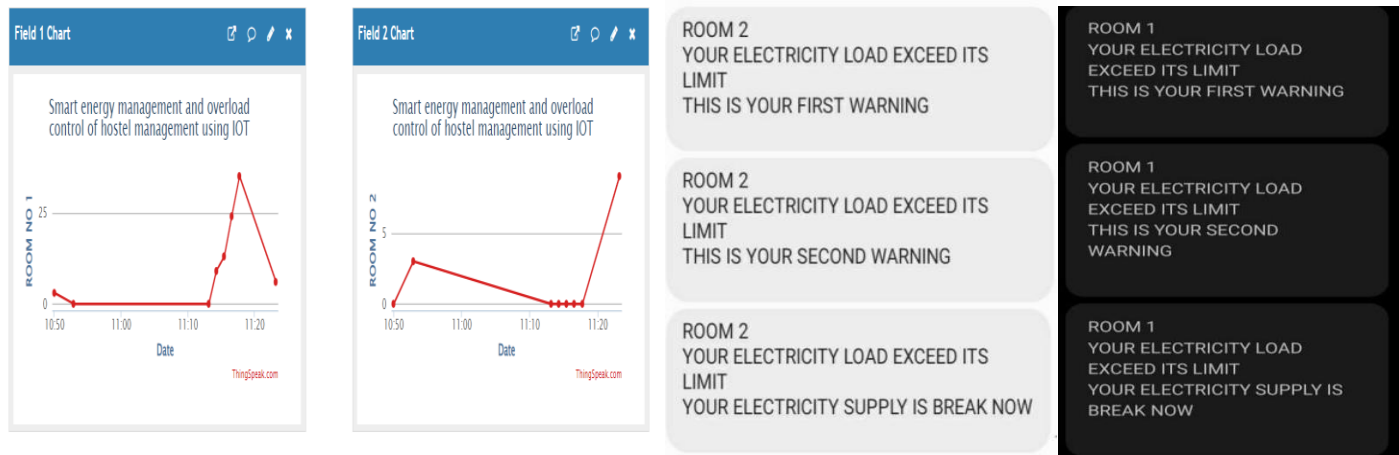


Fig.6. Web page result And SMS Alert

VI. CONCLUSION

Smart Home and Energy Management is current trend with the development of IoT. Lot of work been reported in regards to controlling the appliances of home and also on monitoring the electrical parameters towards hazard. Also work reporting in controlling the appliance for energy consumption. So with all these work reported, we here have developed an better IoT system for Energy Management .This project presents an integration of both hardware and software. The software is used to monitor power usage and the consumption of Through an over current relay, home appliances and control systems are alerted to any inconsistencies.

A microcontroller, a GSM/WiFi module, a relay, a low current sensor breakout (ACS712), and a liquid crystal display (LCD) make up the designed system. PIC is a microcontroller that can be used to programme customised code for output execution at any time. It is also a very sophisticated microcontroller that uses a variety of modules and shield platforms to receive and distribute data over the Internet.

REFERENCES

- [1] “Smart Energy Efficient Home Automation System using IOT”, by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun KumarMishra.
- [2] A Brief Review of the IoT-Based Energy Management System in the Smart Industry January 2020 DOI:10.1007/978-981-15-0199-9_38 In book: Artificial Intelligence and Evolutionary Computations in Engineering Systems (pp.443-459)
- [3] <https://www.arduino.cc/en/Guide/ArduinoUno>



- [4] Oscar Famous Darteh And Charity Oseiwah Adjei , “ Design of Internet Of Thing based Electricity Theft Detection Using Raspberry PI ”February-2021
- [5] AmitSachan “ GSM based SCADA Monitoring and Control System Substation Equipment” International Journal Of Engineering Research & Technology vol. 1 Issue 5, july-2012 , ISSN: 2278-0181
- [6] S.Sukhumar , P.Mukesh Aravind , P.Naveen Kumar “ GSM Based Automatic Trip Control System For Energy Management ”International Journal Of Engineering Research & Technology vol. 2 , Issue 12, December 2013, ISSN: 3297-2007
- [7] International Journal Of Engineering Research & Technology vol. 1 Issue 5, july-2012
ISSN: 2278-0181
- [8] Darshan Iyer N, Dr. KA Radhakrishnan Rao, DZIoT Based Energy Meter Reading, Theft Detection & disconnection using PLC modem and Power optimization dz,IRJET, (2015)
- [9] Ms. Hlaing Thida Oo Dr. Khin Than Mya Ms.Nyain Lwin,” IoT based Home Energy Management system for Rural Area in Myanmar”, ICT Virtual Organization of ASEAN Institutes and NICT ASEAN IVO Forum 2016
- [10] “Solar Based Smart Electrical Shock Protection And Agriculture Kit For Farmers” by Swapnil S. Wayal , Pallavi . S. Pawar , Arti . S. Wayal , Gargi . B. Tayade & Prof. Atul.A.Joshi
- [11] “Generation Of Electricity By Waste Material With Using Pollution Control Method” by Shaikh Adnan Hanif, Omkar Sanjay Ghatkar , Pathan Amankhan A. , Dhole Sanket & Prof. Atul. A. Joshi.