

## SMART ENERGY MANAGEMENT SYSTEM

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<https://www.doi.org/10.56726/IRJMETS50090>

### ABSTRACT

Smart Energy Management system is a concept which is the need of current scenario. In public places like waiting hall, libraries and in class rooms also, where lights and fans are required for common people. But most of the times we have seen that without the presence of any person over there, still all the electrical stuffs are remains in ON conditions. No one care about it, no one think to switch it off and because of this lots of electrical power get wasted. The concept of Smart Energy management system can provide the solution for such issues.

Microcontroller and sensor based circuit takes its own decision to control the Electrical appliances like lights and Fan depending upon the certain conditions. Sensors provides input to the microcontroller and it controls the lights and fan ultimately it saves the power.

### I. INTRODUCTION

Our paper Smart Energy Management System, aims to save the energy and make counts of available persons at the room. In this paper we are using various sensors, Controller, Relays and display device. However, this paper works on the basic signal processing of various parameters which are room temperature and light. For measuring environmental conditions, and number of persons available in the room, various sensors are used and the output of these sensors are transfer to the control unit. The control circuit is designed using micro-controller. The outputs of all sensors are fed to micro-controller. The output of the micro-controller is used to drive the LCD display, so that the measured value of each sensor can be displayed. In addition to the LCD display micro-controller outputs are also used to drive a relay independently. This relay energizes and de-energizes automatically according to the condition of the parameter.

The aim of the paper is to save the energy or power, used in Public places like waiting hall, libraries, Class rooms etc. When people not present in the room then the system automatically switched off all the appliances.

Whenever any person or group of persons enter in the room then the Counter based on IR Sensor sends signal to Microcontroller, then microcontroller check the light intensity available in that room. Light sensor is used to detect the light intensity of the room. Depending up on the light intensity it decides how many lights need to switch on. Similarly it check the room temperature also. Temperature sensor used here to measure the current room temperature. If room temperature is high and someone present in the room then only fan gets switched on otherwise it remains off. And when all the persons left the room the control unit automatically switched off the devices.

### II. METHODOLOGY

#### Hardware Component:

**Microcontroller:** It is a low power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash Programmable and Erasable Read Only Memory ROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the MCS-51. Instruction set and pin out. The on chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, it provides a highly flexible and cost effective solution so many embedded control applications [1-2].

**IR Sensor:** The IR detector is an obstacle detector that senses the light emitted by a IR LED. These are often fitted to security lights so that they will switch on automatically if approached. They are very effective in enhancing home security systems. The sensor is active because, it senses a beam of light or microwave energy that must be interrupted by a passing person in order to "sense" that person. When an intruder walks into the detector's field of vision, the detector "sees" a sharp increase in voltage level [3].



Fig 1: IR Sensor



Fig 2: Relay

**Thermostat:** It is a non-contact digital type temperature transducer suitable for measuring room temperature. The word 'thermistor' is an acronym for thermal resistor i.e. a temperature sensitive resistor. It is used to detect very small changes in temperature. The variation in temperature is reflected through appreciable variation of the resistance of the device.

**LDR:** LDR's or Light Dependent Resistors are very useful especially in light/dark sensor circuits. These help in automatically switching ON /OFF the street lights and etc., normally the resistance of an LDR is very high, sometimes as very high as 1000000 ohms, but when they are illuminated with light, resistance drop dramatically. Electronic opto sensors are the devices that alter their electrical characteristics, in the presence of visible or invisible light. The best-known devices of these types are the light dependent resistor (LDR), the photo diode and the phototransistors [4].



Fig 3: LDR

**Analog to Digital Converter (ADC):** Tracking A/D converter is a device commonly used in control system. An up down-counter control the DAC and the clock pulses are directed to pertinent counter input depending on whether the D/A output must increase or decrease to reach the analog input voltage. The obvious advantage of the A/D converter is that it can continuously follow the input signal and give updated digital output data if the signal does not change too rapidly. In addition, for small input changes, the conversion can be quite fast. Either the converter can be operated in the track or hold modes by a digital input control [5].

**Relay:** The relay is a device by means of which an electrical circuit can be controlled (opened or closed) by sensing a change in the circuit in which it is connected. It works on the principle of electromagnetic attraction and electromagnetic induction.

## LCD DISPLAY

This device has 2.40 Ghz transceiver and TV DISPLAY. TV display is a name because it has 16 columns and 2 row also it can display 16 characters per line. TV( Liquid Crystal Display) is an electronic device to display the data it can display 32 character every character made 5x8 pixel. A 16x2 TV display is depending on the LEDs. The introductory module is veritably generally used in colorful bias the leg out of TV display [6].

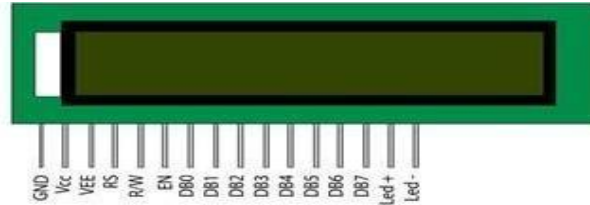


Fig 4: LCD Display

## WORKING:

In this work laptop is used as an input device. When input is given the IoT processor, It sense and sends the signal to arduino. According to the signal, arduino execute the program and sends the output to the driver circuit. Then driver circuit Energies the respective relay. The relay gets open and the load turns ON. Now, the sensors senses whether the load is ON or OFF and sends the status of the load to arduino. Finally, the LCD display the status of the load with the help of Arduino. Implementation is shown in fig 5.



Fig 5: Implementation

## III. ADVANTAGES

1. This product is Affordable.
2. Easy Operation.
3. Convenient to used.

## IV. CONCLUSION

We have tested our system on both hardware and software in our lab. We have successfully completed it. It is working properly according to our project ideas. After completing the project we personally feel that it will be very useful in all public places, it really saves the electricity. Moreover it can be used in our class room also.

## V. FUTURE SCOPE

Smart grids are not only aligned perfectly with the needs and demands of our time, they are also predicted to have significant long-lasting effects. For instance, the technology will overhaul aging equipment and bring things up to speed. This will help to reduce the likelihood of blackouts, burnouts and power surges. This technology will also reduce both, the cost of energy consumption, production and the need of the grid storage. With its full implementation, smart grids will make renewable power feasible and equip the grid to meet increasing energy demands. It provides the user real-time control over their electricity bills. Computational technologies to improve the reliability and efficiency of the system.

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