

Room matrix-based energy control system

P. Raja₁*, Dushyant Kumar Singh₂, Himani Jerath₃

1 Assistant Professor, School of Electronics and Electrical Engineering
(Lovely Professional University, Phagwara),

2 Assistant Professor, School of Electronics and Electrical Engineering
(Lovely Professional University, Phagwara)

3 Assistant Professor, School of Electronics and Electrical Engineering
(Lovely Professional University, Phagwara)

ABSTRACT:

It is very important that now a day's reduction of power consumption and optimal utilization of the power sources which is available for consumer. In this paper we have designed a controlling of electrical appliance through matrix-based system. The PIR sensor is placed in the coordination of column and row for the particular interval. The PIR sensor automatically controls the electrical appliance based on the object detection. The system is equipped with temperature sensor to control the operational of the fans seasonally without the intervention of manual switches. Additional features are introduced in the control using controller for making it a smart system. The system based on simplex wireless communication in which the sensors are connected to a RF transmitter which transmits the data to the RF receiver at the controller side and the appliances are controlled according the data send by the transmitter. The manual switches are taken down by the electromagnetic relay switches for the controlling of the lights and fans which are distributed across the room in a matrix form.

Keywords: PIR, NodeMCU, RF, Matrix

INTRODUCTION:

Matrix based energy control is a system in which a geographical area is divided into matrix form of M columns an N rows and each cell $m*n$ is controlled independently using the sensors. the presence of the human being is detected by the passive infra-red sensors each infra-red sensor detects the motion of the human being in a particular cell avoiding the interference with adjacent cell. A wireless RF transmission is used to separate the sensors and the power controlling unit. The RF receiver attached to the microcontroller receives the data sent by the transmitter gives the output which is fed into the microcontroller to the control the load according to the data received.

To control the fans, temperature sensors have been used such that the passive infra-red sensor cannot sense the temperature and function even in cold weathers where probably fan is not used, a counter is attached to the entrance door to calculate about how many of entered and exit the room.

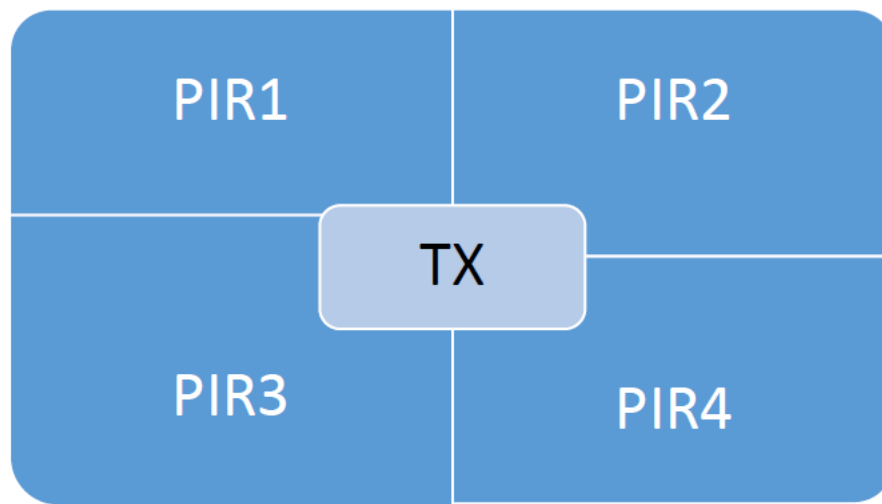


Fig 1 Room divided into 2*2 matrix

The analysis says that how much electricity is wasted, the amount of energy is unnecessarily wasted in Lovely Professional University that had been observed through case study.

S No	Particular	Detail
1	Lecture time in any class room (Average time /per day)	5 hrs.
2	Classes operating in simultaneously	60
3	Electricity is remained on in any room	8hrs.
4	Load per class (Average)	10.4 kWh
5	Unwanted electricity consumption (for 3 lectures per day)	3.15 kWh
6	Unwanted electricity consumption /day	239 kWh
7	Unwanted electricity consumption /Month	5068 kWh
8	Unwanted electricity consumption /Year	50,180 kWh

Table 1: Analysis of power consumption

PROBLEM STATEMENT:

In an educational institute, the status of electrical appliance are kept in ON condition even though the classes are not happening due to this condition the consumption of power is unnecessarily wasted inside the room and outside of the rooms also like street light/corridor lights etc, Thus, the wastage of energy/power is too much in educational institute.

LITERATURE REVIEW

The economy of any nation principally relies upon the vitality use in various field of science and innovation. A tremendous measure of vitality is squandered in training organization, the creator of [4] examined the Aligarh Muslim Universities vitality profile, as indicated by which the vitality is squandered in a gigantic

sum in the college study hall, road lights and so forth. Since 66% of the all-out vitality is devoured by workplaces, study hall, streetlights and the rest of the vitality.

As indicated by the investigation of the Shandong University, the publisher of [12] power utilization of thunder/lighting record up to 40% of the all-out force utilization and of which 70% of the force gets squandered because of deferred killing. Furthermore, to beat this issue the paper of [9,12,13] have planned programmed light governing framework as per the inhabitancy just by estimating the present enlightenment of the room.

Consequently, the creator of [7, 18] have present the idea of the double sensor so as to choose the bearing of development and tallies the quantity of individual spreading field of perspective on the double sensor module various way.

HARDWARE DESCRIPTION

Figure 2. represents the block diagram of the entire system, where the RF receiver module is connected with controller to receive the sensor data transmitted by the RF transmitter

SF (1) to SF(n) represents the number of PIR sensors at the front matrix of the room in order to control the front appliances SB (1) to SB(n) represent the number of PIR sensor connected in the back side of the matrix room in order to control the backside appliances of the room. IR (1) and IR (2) represent the Infra-Red counting sensor system to sense the occupancy of the room and control accordingly to the number of persons in the room. The temperature sensor is to use to sense the temperature of the room and control the fans in according to the temperature. the driver circuit consists of the relays to drive the loads of different class room according to the instructions. And LCD is used to display the temperature and current occupancy of the room.

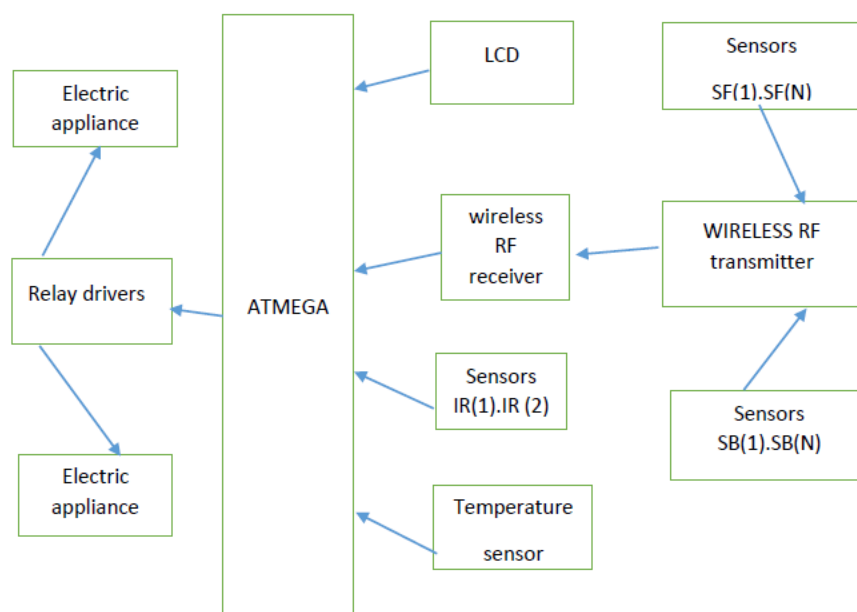


Figure 2.: General block diagram

PIR sensors allows you to detect movement, identify the human whether he/she has moved in or out of the sensors range. They are frequently alluded to as PIR, "Latent Infrared", "Pyroelectric", or "IR movement" sensors. PIRs are fundamentally made of a pyroelectric.

Based on the detection from the PIR and IR sensor the electrical appliance is controlled through the relay which is connected to the controller. The detection is monitored by controller and sends the signal to relay to operate/control the electrical appliance of the room. In this way we can control the wastage of electricity.



Figure 3.4: PIR sensor module

HT12D is a decoder incorporated circuit that has a place with 212 arrangement of decoders. HT12D changes over the sequential contribution to resemble yields. It translates the sequential locations and information got by state a RF 14 collector, into equal information and sends them to yield information pins. The sequential info information is contrasted and the residential areas times ceaselessly. The info information code is decoded when no blunder or unequalled codes are found. A substantial transmission is showed by a high sign at VT pin.

The RF recipient segment, gets the RF signals with the assistance of reception apparatus. These signs are decoded and sent to the microcontroller. The recipient module requires no outside RF parts with the exception of the receiving wire.

SYSTEM SOFTWARE DESCRIPTION AND PROJECT IMPLEMENTATION

Here the two sensors SN1 and SN2 are set on a level plane in some steady fixed separation d . Sensor SN1 recognizes the inheritance rest trailed by sensor SN2 inside the fixed timespan that development is well-thought-out as section condition where as though the SN2 distinguishes the inheritance rest trailed by SN1 inside the fixed timeframe then that development will be well-thought-out as leave condition.

Here each passage and exit are being tallied in this way, on the off chance that the inheritance of any room is more noteworthy than zero, at that point the checked worth is recorded. Furthermore, likewise the machine is controlled.

The PIR sensor introduced in each electronic gadget are liable for the turning ON/OFF of these apparatuses with the end goal that, if the sensor presented in these machine gets the human sign in its discerning extent

then that sensor imparts the sign to the basin by means of RF transmitter module and the RF beneficiary module accessible at the basin get the data and control the exchanging.

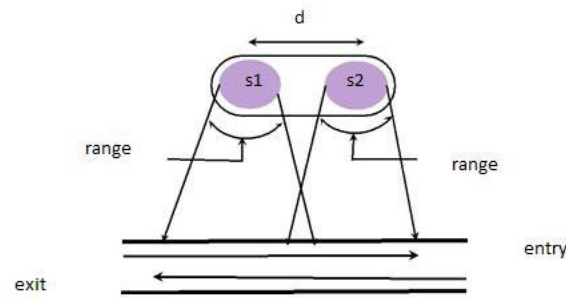


Figure 4.1: Direction of Movement

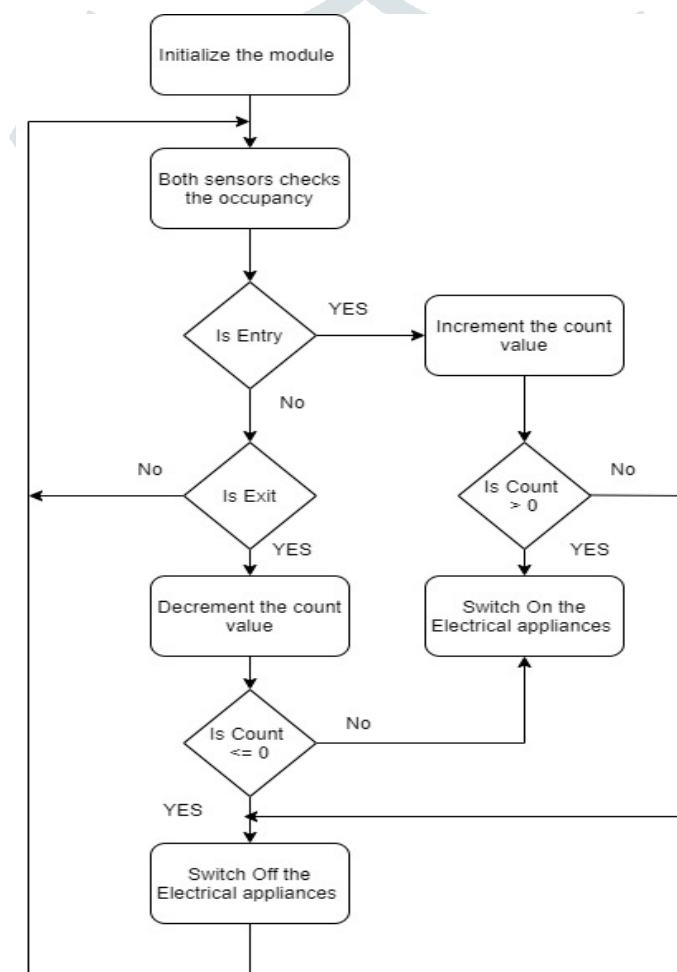


Fig 4.2 flow diagram of counter

CONCLUSION AND FUTURE WORK

An increasingly wise frameworks are required to be implanted for observing and controlling the force assets according to the prerequisite, giving an easy to use condition. Right now, have built up a remote sensor utilizing PIR which detects the current circumstance, when it distinguishes a person it transmits the data to the focal controlling framework in regards to the present status. It takes a shrewd choice to control the comparing gadgets of the homeroom.

We have presented the idea of double sensor, for distinguishing the bearing of development of individuals, and including the quantity of individuals in the rooms of the college. A procedure to control the light have been execute utilizing the switch info and temperature control been presented. The general framework consolidates canny checking and control of intensity giving an effective force utilization.

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