

Energy Saving System

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Abstract- In today's the basic problems in any country is wastage of electricity. If we change our behavior and try to avoid the wastage of electricity then we can save more electricity. By saving electricity we can earn money by selling those electricity to our surrounding countries. And by efficient way of using electricity we can bring down the cost of our electricity bill. In this paper, I have design a system which is saving energy. I have design this system for schools, colleges etc. Only authorized person can enter into the classroom. There are two options present for students and teachers to use lights and fans in the classroom. First one is manually by switch and second one is automatically by detecting the position of person in the room lights and fans will be on.. When there is nobody present inside the classroom then automatically all electrical appliances will be off.

Keywords- Arduino Mega, Arduino Uno, IR Sensor, HC05 Bluetooth Module, RFID Sensor, LDR, DHT11 Temperature/Humidity Sensor, L293D IC.

I. INTRODUCTION

The place where there is more wastage of electricity is our schools and colleges. In educational campuses there is more wastage of electricity. This wastage of electricity is because of the student in the campuses. When we enter in the classroom then the lights and fans are off. We switch them on and use it. But sometime when we go outside the classroom we forgot to switch off the lights and fans. And due to this mistake the lights and fans are on, even if there is no one present inside the classroom. It may be on till the next day in the morning. By this mistake we have wasted the electricity in our campus. This is the example of one classroom, we have many classroom in one school/college. But there are many schools and colleges in our district. So, we can imagine that if we calculate this wastage in accordance to our country then it will be the huge wastage of the electricity.

In our schools and colleges we have identity card (ID-Card) with everybody. So we will use this identity card to save energy inside the classroom. These ID card will have RFID tag. Every students and teachers will have there own ID card. Every RFID card have unique identification number with it. Hence every student and teacher is having there, personal identification number with own ID card. We will these RFID card to give permission to teachers and students to enter inside the classroom. Thus we are giving access to only authorized person to enter inside the classroom. We can note down there ID card number, by these we can use these cards for the attendance purpose also. There will be card reader placed outside the classroom. Students and teachers will have to placed there ID card in the card reader. When the user is authorized,

then screen will display "AUTHORIZED ACCESS ". When there is no authorized user, then screen will display "DENIED ACCESS". Those students and teachers have enter there card improper. They can insert there card again into the card reader. Hence we have saved more energy inside the classroom with the help of RFID card present in ID card of teachers and students.

II. LITERATURE SURVEY

In the literature survey, I have discussed five paper. These paper are given below:

"Microcontroller based energy saving system". First paper is used to control the switch of lamp and control the speed of the fan. We are using two types of sensor they are LDR and IR. Depending on the person present inside the room the lamp will be on/off. If there is person present inside the room then lamp will be on otherwise it will be off. This is done with the help of IR sensor. Speed of the fan can be controlled depending on the room temperature. If temperature is above the threshold value then fan will be on otherwise it will be off. This is done with the help of LM35 series sensor.

Both sensor are given below;

- **IR Sensor:** IR sensor is used to sense the motion of object. IR sensor is the pyroelectric devices which detects the motion by measuring the differences in the infrared levels emitted by the object.
- **Temperature Sensor LM35:** LM35 series are integrated circuit temperature sensor. The voltage of LM35 series are directly proportional to the temperature. Hence

we can use LM35 series for measurement of room temperature.

“Automatic classroom lighting controller”. In the second paper, the method is based on the campus card. In school and colleges every student and teacher have there, own campus card. This campus card will act as a unique identification number of every person. We can use this unique identification number for energy saving. When student or teacher will enter in the classroom then there campus card will be detected. If the card is authorize then the light and fan will be on in the classroom. If there is no detection of card in the room then light and fan will be off.

“An intelligent system for power saving application”. In the third paper, they have describe the method for street light. This method is very complex. And this method is very costly method. But this method have more efficiency than other method. In this method every street light will be connected with the sensor. Initially all the street light will be off. When any person or vehicle will be passed through the street light. Then only that street light will be on and all other street light will be off. And when vehicle or person move from the street light then that street light will be off. Hence only that street light will be on where the person or vehicle is present and all other street light will be off.

“Microcontroller based street light energy saving system”. In the fourth paper, they have used the method for the street light. This method is very simple technique for the street light. There are two sensor used in this paper they are LDR and IR sensor. The street light will be on in the evening and it will be off in the morning. LDR sensor will sense the intensity at the street. If there sufficient light then street light will be off. IR sensor will sense the motion of the person. If there is no one present in the street then street light will be off. Street light will be on, only if there is person present on the street and if there not sufficient light on the street.

“Microcontroller based energy saving module”. In the fifth paper, they have used bidirectional counter. Bidirectional counter is placed outside the classroom. When any student or teacher try to inter the classroom. At that time bidirectional counter will count the number of person enter in the classroom, and counter gets increment when person enter in the classroom and counter gets decrement when person leave the classroom.

When there is person present inside the classroom then light and fan will be on. When there is no one present in the classroom then automatically lights and fans will be off. By bidirectional counter we can also get the number of person present in the classroom.

III. METHODOLOGY

I have read all the five paper and based on the observation of them. I have made a table to compare the advantage and disadvantage of five paper. This table is shown in table 1.

Table 1. Summary of 5 paper.

Paper	Method	Benefits	Draw back	Price
1	Fan will be on depending on temperature and light will be on only if there is somebody present in the room	Simple method	Energy saving will be moderate	Very less
2	Every person will have campus card. Light and fan will be on by the detection of campus card	Only authorized person can use light and fan	Requirement of campus card at every place is necessarily	Medium
3	If person detected then street light will be on	High efficiency	Very complex method	Higher
4	In evening street light will be on and off in the morning	Automatic street light can be controlled	Efficiency is very low	Less
5	We can get count of the person present in the room by bidirectional counter.	Attendance can be taken by this method	It takes more time and it is complex	Medium

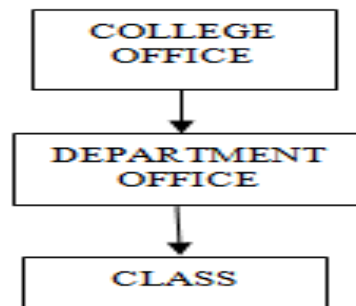


Fig 1. Basic design of system.

In above figure 1, I have given the overview of the system. Which I got the understanding from the five paper. Depending on there, advantage and disadvantage the new system is designed. This system is for whole college or school. The main control of the whole system is in the college office. A person sitting in the college office can control the whole system. He can switch on the whole electrical appliances in the college or he can switch off the whole electrical appliances in the college. Now the second layer in the system is the department office. Generally at one floor there is one department. Person sitting in department office can control the electrical appliances of there, department so every department has control on there, electrical appliances. And the last layer in the system is the classroom. This is main block in the system. The electrical appliances that is lights and fans present in the classroom can be controlled with the help of sensors present inside the classroom.

The propose diagram for one classroom is given below;

1. Block Diagram:

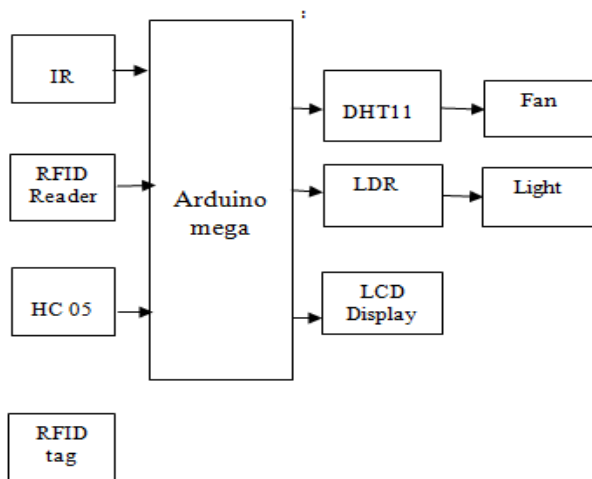


Fig 2. Block Diagram.

The block diagram consist of Arduino, IR sensor, RFID sensor module, HC 05 module, LCD display, LDR sensor, DHT11 sensor, light and fan. RFID reader is connected to Arduino. We have to place RFID tag to RFID reader to check the authentication of the person. IR sensor is used to sense the motion of the person. DHT11 sensor is used to sense the temperature of the room. If temperature is above the 25 degree then, only fan will be on. LDR sensor is used to sense the intensity of light. If room light is low then only light will be on.

2. Flowchart:

Only authorized person have the access to enter in the classroom. When person enter in the room then we have two options. In first he can switch light and on/off manually with the help of switch. In second the lights and fans will be on/off automatically with the help of sensor. If temperature is above 25 degree then only fan will be on.

Light will be on only if light intensity in room is below the threshold. If there is no one inside room then lights and fans will be off automatically. This flowchart is given below in figure 3.

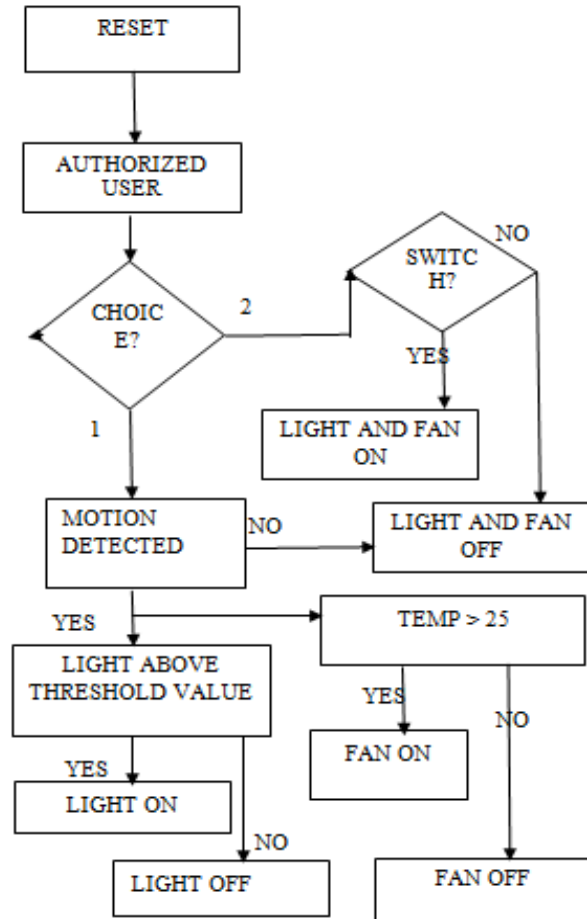


Fig 3. Flowchart.

IV. OBSERVATION AND RESULT

I have used two Arduino, Arduino uno for RFID sensor outside the classroom and Arduino mega for the lights and fans inside the classroom. By Bluetooth module HC 05, we can select two option. First one is manually by switch and second one is automatic by sensors. And temperature of room will be display on the LCD display.

In my system, we can also divide it into three system. First one is basic, in which we are using only LDR sensor for controlling light and DHT11 sensor for controlling fan. Second one is moderate method where we are using IR sensor for controlling light and fan. Third method is advanced method in which we are using LDR and IR for controlling light and DHT11 and IR for controlling fan. The above three method can be further divide into types depending on the season summer and winter. Efficiency of light will be same in both winter and summer season. The efficiency of fan will be different in winter and summer season.

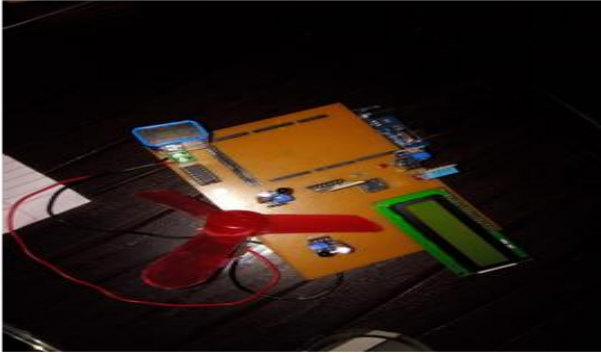


Fig 4. Text Here Your Fig Name

Table 2. Efficiency in summer.

S. No.	Method	Light	Fan
Basic	Ldr/Dht11	50 %	83%
Moderate	Ir	66%	66%
Advanced	(Ldr + Ir)/ (Dht11 + Ir)	83%	88%

Table 3. Efficiency in Winter.

S. No.	Method	Light	Fan
Basic	Ldr/Dht11	50 %	20%
Moderate	Ir	66%	66%
Advanced	(Ldr + Ir)/ (Dht11 + Ir)	83%	70%

V. ADVANTAGE

In this system we can take attendance with the help of two IR sensor which can act as a counter. We are providing backup with the switch. If sensor is not working proper then, user can press switch manually to use lights and fans. We are taking care properly that, there should not be any wastage of electricity in room. And the main benefits of this system is that, unauthorized person don't have the rights to use lights and fans.

VI. FUTURE SCOPE

We can use this system to save energy in school, colleges etc. It can be implemented for domestic uses. It is possible to use this technology to save energy at trains and railway stations. We can reduce the operational cost of airport by developing this system. If we implement this system for street light then, it will save cost for the government. By this technology we can reduce usage of electricity in rural areas.

VII. CONCLUSION

From taking the guidance of the five paper. I have make a system which is more energy efficient. Only authorize person can enter inside the classroom. When a person

enter inside the classroom, they have two option manually or automatically (sensor) to use the lights and fans inside the classroom.

Lights and fans will be on only if there is somebody present inside the classroom. If no one is present inside the classroom then automatically the lights and fans will be off. Lights will be on only if there is darkness inside the classroom. Fans will be on only if temperature of the room is above 25 degree.

Thus, I have made efficiently energy saving system for the educational campuses.

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