

Intelligent Energy Saving System for Classroom Based on Pic Microcontroller

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Abstract:- Almost all the institution like colleges, universities etc, makes use of a system in which lighting can be controlled by a switch, for such a system, majority of the institution members forget to turn off the light, fans, etc while leaving the classroom. This leads to the heavy wastage of energy and the institution and up paying a heavy amount of money for this unwanted wastage. New innovations have led to the remote system. Even after this, leaving the device running where we are not using it is still a serious challenge.

So for the judicious use of energy we have developed the “Intelligent energy saving system”. In this system we divide the classroom into four grids. Lighting of a particular grid of the classroom can be controlled by human presence using this system.

Keywords:- PIC Controller, Automation, Relay, Energy.

I. INTRODUCTION

Many in this world are forced to live without electricity. In such places people get electricity only for a few hours a day. For brighter future, our generation people need a electricity which is reliable and efficient. This problem of low power and frequent power shortages is a serious issue for India's productivity.

This calls for a judicious use of the existing power and also for advanced technologies. Leaving the lights & fan's ON when we are not using them in our classroom is contribution to the wastage of energy.

So the intelligent energy saving system has been developed in which we have a camera to capture a human face in the classroom grids. So if there is human presence in the classroom then the lights of corresponding segment turns ON and vice versa, which proves to be an advantage in stopping electricity wastage. Captured image from the camera is processed in the MAT LAB. If there is face detection, then signals will be sent to the micro controller unit. There by through relay lights are controlled.

II. EXISTING SYSTEM

Intelligent energy saving system doesn't require manually switching the lights ON or OFF. PIR at the entrance of the room senses people entering in and out of the room. Counter keeps a count of the number of people entering or leaving the room and accordingly the light is switched ON or

OFF by the program in the microcontroller. When all the people leave the room all the lights switch OFF. Even this system has challenge i.e. the door should not wide enough for 2 or more people to enter as the counter may count them as 1.

Many researchers have used vacancy sensor replacing the standard wall switches. These are combined with passive infrared technology to detect the presence of presence in the room. A light in a room turns OFF within 5-10 minutes of its vacancy with this system. These sensors are fixed on the ceiling to get a 360° view which can cover up to 800sq.ft area. But these sensors have a drawback of limited range i.e. a single sensor might not be enough to reach the whole room and also it needs a lot of wires in case for wired sensors.

III. PROPOSED SYSTEM

Our proposed system can stand up to all the above drawback of the existing system. This system takes 2 things into account

- Human presence
- Intensity of light

The intelligent energy saving system can divide into two main parts.

- Camera capture unit
- Hardware processing unit

Camera capture unit continuously captures image from the classroom. It sends these images to the MAT LABS, where using the face detection algorithm the faces and non face are detected. The image captured by the camera divided in to 4 segments. When people are present in any of the grids then face is detected in the corresponding grid.

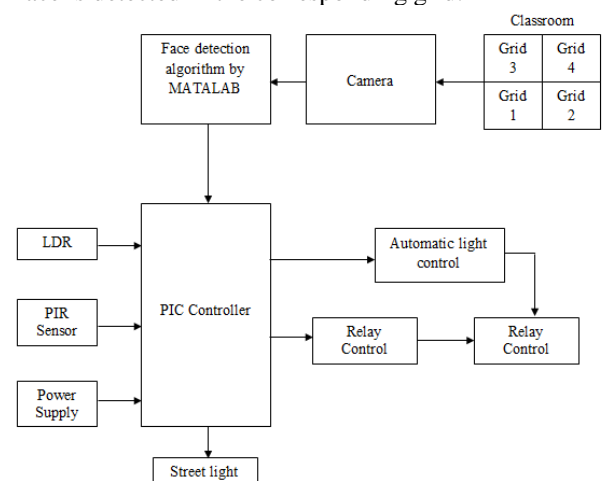


Fig 1:- Block Diagram For Proposed System

When faces are detected in any of the 4 grids dividing the classroom, then lights in the corresponding grid turns ON. Similarly if faces are detected in multiple grids then multiple grid lights turn ON. Hardware unit receives signals from MAT LAB via serial communication.

Intelligent energy saver system has been implemented by the use of PIC 16F877A microcontroller. Based on the camera captured images are processed by MAT LAB. The software in the PIC controller controls relay to turns lights ON or OFF.

The light required for a good working environment in a classroom is estimation by the CIBSE lighting guide is 300 lux. At present most institution have a brightly lit classroom because of the day light and the classroom light LDR in own system detects the intensity of light in the classroom. LDR is active only when all 4 grids are lit. So when all 4 grids are lit and if intensity becomes greater than 300 lux which makes the system to bring it back to 300 lux. This helps in saving power.

The new system using PIR can be used control street light to save power. During night time the streetlight is continuously kept ON with full light intensity. During the right time the new system reduces the light intensity to 25% by using PWM technique. If there is any sort of motion detected by the motion sensors then the light intensity will be raised to 100%.

IV. HARDWARE USED

A. PIC microcontroller



Fig 2:- PIC Microcontroller

PIC microcontroller in single integrated circuits performs one task and executes a specific application. It contains programmable I/O peripherals, memory and a CPU. Microcontroller are used in electronic devices like mobiles, washing machine etc

B. PIR Sensor

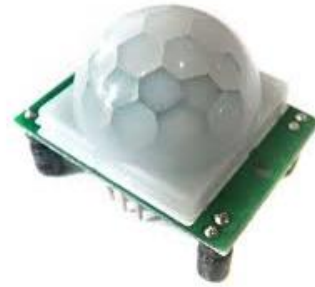


Fig 3:- PIR Sensor

Sensor detects motion by sensing the heat emitted by humans. When a living being approaches the sensor, they switch on automatically. This sensor does not be beam of lights to sense a person but instead the PIR is itself sensitive to the energy emitted by a living thing.

C. Relay

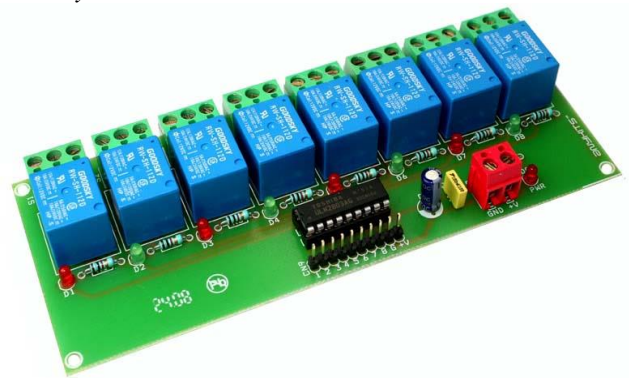


Fig 4:- Relay Unit

Relay is an electro machine device activated by the use of an electric current. Current in one circuit causes another circuit for close or open. Relay is used in various applications because of its easy to use. They are used widely in electronic applications.

D. LDR



Fig 5:- LDR Sensor

LDR's are useful in light /dark sensor circuit. LDR's in street light can switch the lights ON/OFF automatically. Resistance of LDR can be very high. This may be as high as 1000kohms.

E. Flow Chart

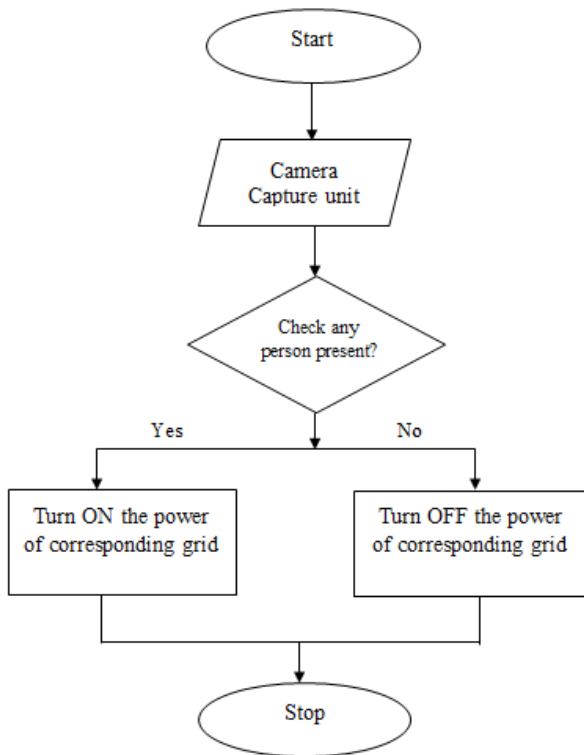


Fig 6:- Flow Chart of Proposed System

V. RESULTS

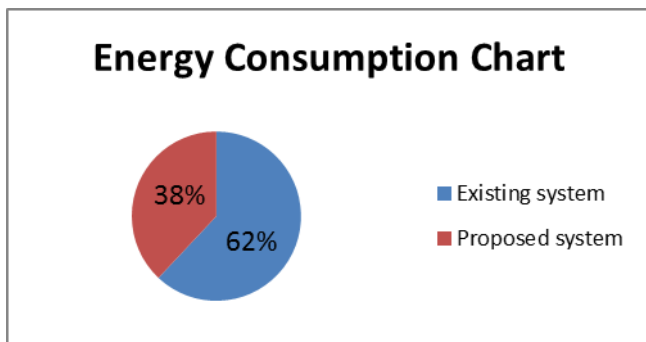


Fig 7:- Energy Consumption Chart

Experimental observation shows that the average electric units consumed in classroom have been recorded as 3.2 units per day using existing system. The average electricity units consumed in the classroom after implementation of new system is 2 units. Our objective of reducing energy wastage has been achieved by saving 1.2 units. This also means that about 38% of energy is saved.

VI. CONCLUSION

Energy is one of the major resources of human kind reports suggests that educational institutions wastes a lot of electricity. So for this reason intelligent energy saving system has been built, in which a room has been divided into grids and camera is placed for capturing human presence inside the classroom. It uses the human presence for switching the

appliances in a particular grid. This system saves the power and also more efficient.

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