e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:01/ January-2022 Impact Factor- 6.752 www.irjmets.com

PROTOTYPE AUTOMATIC LIGHTENING SYSTEM

B Muralidharan[*1], P Arunraj[*2], S P Aginesh[*3], Mr. V Ganesh[*4]

[*1]Assistant Professor, Department Of ECE, Sri Ramakrishna Institute Of Technology, Coimbatore, Tamilnadu, India.

[*2,3,4]UG Student, Department Of ECE, Sri Ramakrishna Institute Of Technology, Coimbatore, Tamilnadu, India.

ABSTRACT

The main objective of this project is to automate lights and fans in schools, colleges, and auditoriums. This project helps the society to automatically turn off lights and fans when the people leaving the room. So, this project also helps in saving electricity. Also, by using the proposed system, the light and fan are automatically switched ON when people entering the room. A prototype system is designed for executing the automatic control of light. It is consisted of PIR sensor, 555 timer, potentiometer, relay module and dimmer. Proteus Design Suite Software is used for simulating the circuit. Circuit operation under ON, OFF and standby modes are studied using the software. The hardware module of the circuit is also verified.

Keywords: PIR Sensor, 555 Timer, Potentiometer, Relay Module, Dimmer.

I. INTRODUCTION

The automation circuit is a reliable circuit that takes over the task of switching on and off of the lights in schools, colleges and auditoriums. This project also helps in saving electricity which is wasted in small amounts but in large area. It can be decided, that energy loss is occurred with a lighting system when the lighting system illuminates a light which is not being used currently at that particular time or when it illuminates a light even though sufficient lighting is available to work. The embedded systems and digital driven automation industry are now an established frontier in high-tech Research & Development all around the world. Bringing high-tech solutions demand energy saving schema and should be cost efficient. IoT cloud systems have a certain amount of lag in them, due to dependency on I/O retrieval via cloud. This paper proposes a novel idea of automating electric appliances in a more cost efficient and reliable method using smart sensor. The smart sensor system (3-S) works on a general principle of switching energy between transistors and relay modules. In order to reduce the load and the processing lag on the IoT and cloud smart sensors are included to do the work efficiently. The primary phase of this work is detecting the presence of a person with infrared rays and switching the relay modules on through transistors to turn on the appliance. The secondary phase deals with creating a delay time with the use of timer IC and triggering the first relay module to turnoff and switching on another relay module which puts the appliances in a standby stage before turning off.

II. METHODOLOGY

When a person enters the classroom the PIR sensor detects and sends the signal to the relay module and turns ON the light. But when the person leaves the classroom the PIR signal sends the signal to the relay module and the relay module sends current to the 555 timer IC and triggers the trigger pin (pin no-2), which apparently dims the brightness of the light and starts the time delay for which the light should be in dim and then turned off. Then the output from the 555 timer IC is received in a transistor and then the lights are turned off after the time delay created by the 555 timer. The time delay can be varied by adjusting the value of the variable potentiometer. Since the 555 timer gets triggered only on a negative impulse so to turn off the 555 timer when the person is detected. It is biased with a resistor which is connected to the VCC. The output from the 3rd pin of the 555 timer IC is received in the base of an NPN transistor and switches ON. So, a positive impulse is received. The emitter end of the transistor is connected to another NPN transistor, which turns ON the relay module. So, the light bulb becomes ON state and the room light is automated.

Identification of problem in the existing IOT system

Most of the automation systems tend to have a higher cost for production and the processing delay in the system. The main problem identified is the cost for production of the system and the to reduce the lag between

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:01/ January-2022 Impact Factor- 6.752 www.irjmets.com

the data processing stage in the IoT stage [12-14]. Feeding intelligence to the smart sensors and making the sensor and the system to take the decision will be the solution for the problem.

Proposed Smart Sensor System.

This work emphasis a concept of implementing different components to reduce the cost of the system than the existing systems used to automate the appliances. Components such as Passive Infra-Red (PIR) sensor, relay module, 555 Timer IC, PNP and NPN transistors are used to make a cost-efficient automation system instead of using microcontrollers. The sensors and the 3-S system make the decision instead of using IoT cloud. Fig.1 2. portrays the difference between the existing system and the proposed system.

III. MODELING AND ANALYSIS

In this project PIR sensor, 555 timer, Dimmer, Potentiometer and Relay module are used. The proposed 3-S system works on switching mechanism. This system consists of a Passive Infra-Red (PIR) sensor, 555 Timer IC, 3 relay modules and transistors. The passive infra-red sensor transmits infra-red rays in different direction and receives the reflected infrared rays. Fig.1 depicts the working of PIR sensor. If the passive infra-red sensor detects a person, it sends the signal as '1' or '-' to the first relay module.

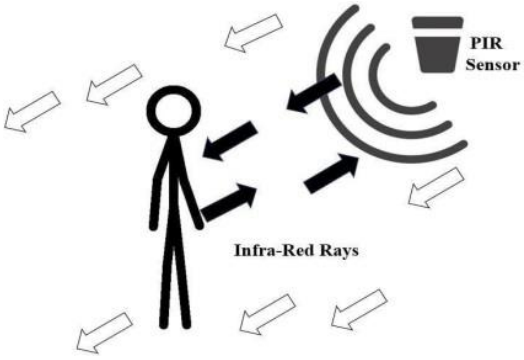

Fig 1

When the first relay module receives the signal from the passive infra-red sensor, it switches on the electric appliance. When then passive infra-red sensor detects that the person left the area, it sends the signal as '0' or '-'.Since the 555 Timer IC is a negatively triggered IC, the '0' signal from the passive infra-red sensor triggers the 555 Timer IC. The negatively triggered 555 Timer IC creates a time delay and sends the appliances into a standby stage through PNP and NPN transistors to run on half the power. For example, if a light is switched on by the passive infra-red sensor, the 555 Timer IC creates a time delay and makes the light to glow in a dimmed brightness (half the voltage is given to the light) for that delay time period. The power voltage can be adjusted by using a voltage regulator. The circuit operations under various scenarios is shown in the Table1. The delay time can be increased or decreased by attaching an adjustable potentiometer to the system. After the delay time, the appliance switches off. The appliance remains in off state till the passive infra-red sensor sends signal '1' to turn on the appliance. In the Table 1, 1 is ON state, 0 is OFF state, 1/2 is Half the voltage (Standby Mode) state.

Table 1: Circuit operation under various scenarios

Condition	PIR Sensor Output	555 Timer Output	Input to appliances via transistors
When a person enters the room	1	0	1
When a person leaves the room	0	1	1/2
When the person doesn't come back after 5 minutes	0	0	0

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:01/ January-2022 Impact Factor- 6.752 www.irjmets.com

IV. RESULTS AND DISCUSSION

The hardware module of the project is shown in the Fig.2. The motion is detected in the PIR sensor and the data is sent to the circuit and the bulbs are switched by the relay module.

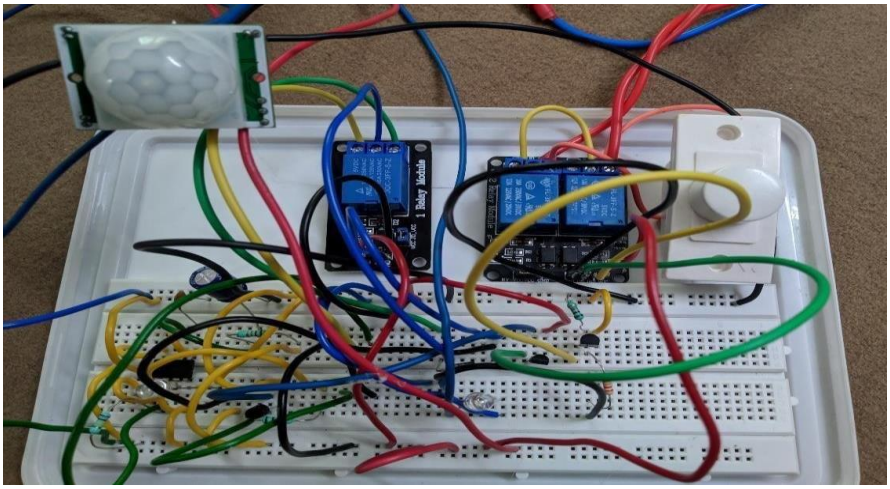

Fig 2: Hardware module.

V. CONCLUSION

The automatic lighting circuit is a reliable circuit that takes over the task of switching ON and OFF the lights in schools, colleges and auditoriums and save the energy. As nowadays enormous amount of energy is wasted in daily life. In this digital world technology is very advanced and expecting things to be done automatically without any human efforts. A prototype system has been designed for executing the automatic control of light. It is consisted of PIR sensor, 555 timer, potentiometer, relay module and dimmer. Proteus Design Suite Software has been used for simulating the circuit. Circuit operation under ON, OFF and standby modes have been studied using the software. The hardware module of the circuit has been verified. From the proposed system it can be concluded that an approach is taken to control the room lights. With the help of this system the energy wastage can be reduced and can be contribute to large amount of power saving. This project helps to reduce human work and energy.

ACKNOWLEDGEMENTS

We extend our sincere thanks to **Mr.V Ganesh**, Assistant Professor (Sr.Gr)/ECE for gracefully accepting us as her project students and being our supervisor and to facilitate us with his valuable support and guidance throughout our project.

VI. REFERENCES

[1] Y. Wu, C. Shi, X. Zhang and W. Yang, "Design of new intelligent street light control system," IEEE ICCA, Xiamen, 2010.

[2] Bai Y. and Ku Y," Automatic Room Light Intensity Detection and Control using a Microprocessor and Light Sensors, IEEE International Symposium on Consumer Electronics",2008.

[3] Sinha, Anjali Buddha Institute of Technology, International Journal on Emerging Technologies (Special Issue NCETST2017): 172-175, "Automatic Room Light Controller with Visitor Counter", 2017..

[4] Gaurav Varadkar, PVPPCOE Sion, Mumbai, IJESC Research Article, Volume 6 Issue No. 3 ISSN 2321 3361, "Automated RoomLight Controller with Visitor Counter",2008.

[5] Jonathan Gana KOLO, Federal University of Technology, Nigeria, Leonardo Electronic Journal of Practices and Technologies, "Development of a Light Dependent Automatic - Off Timer for House Holds Electronics", June 2008

[6] Himani Goyal, Understanding of IC555 Timer and IC 555 Timer Tester, International Journal of Inventive Engineering and Sciences (IJIES) ISSN: 2319–9598, Volume-3 Issue-2, January 2015.