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Automatic Room Light Controller Using PIR Sensor

[1] Dr. Sachin Sambhaji Patil, [2] Snehasish Paul, [3] Mohnish Shandilya, [4] Sanika Gadhave, [5] Sakshi Sudhrik

[1] Assistant Professor, [2, 3, 4, 5] Students

[1, 2, 3, 4, 5] Department of Electronics and Communication Engineering,

[1,2,3,4, 5] MIT Art, Design and Technology University, Pune, India

Abstract: Our project's creative solution, the Automatic Room Light Controller, aims to improve interior areas' energy efficiency and user ease. By employing a PIR sensor to detect motion, the system is intended to automatically regulate a room's lighting, doing away with the need for human light control. The Automatic Room Light Controller's main goal is to cut down on wasteful energy use by making sure that lights only turn on when a room is inhabited. The light turns on when the sensor detects motion, and it automatically turns off after a certain amount of time if no movement is detected. Because it stops lights from being left on in unoccupied spaces, this technology saves a substantial amount of energy.

Index Terms **–** PIR Sensor, Transistor, LED , Light , Automation etc.

I. INTRODUCTION

With automation and energy saving becoming more and more crucial in today's environment, intelligent technologies are more necessary than ever in managing daily chores effectively. A solution that can greatly lower energy use and improve user convenience is the Automatic Room Light Controller. In order to eliminate the necessity for manual light switching, the main objective of this project is to build a system that automatically adjusts a room's illumination based on the presence of people. To switch the lights on and off, traditional lighting systems sometimes require human interaction. But when lights are kept on in vacant rooms, this can result in needless energy waste. Furthermore, when leaving a room, people could neglect to turn off the lights, which could result in loss of energy.

II. LITERATURE REVIEW

In recent years, the demand for smart home systems has grown significantly, and energy efficiency has become a key consideration. Numerous studies have been conducted to improve lighting control systems in both residential and commercial spaces. Kang et al. (2016) highlighted the importance of automation in reducing energy wastage by using sensors and microcontrollers to automate lighting based on room occupancy. They proposed systems that rely on motion sensors and ambient light detection to control the lights, ensuring they are only on when needed.

Another significant contribution comes from Singh et al. (2018), who presented an integrated system combining PIR (Passive Infrared) sensors with Light Dependent Resistor (LDR) for automatic light control. Their research demonstrated that these systems not only save energy but also improve the convenience for users by automating the lighting based on both presence and ambient light levels. They also addressed the challenges of system reliability and sensor accuracy, which can impact the performance of automatic lighting systems.

In addition, Radhika and Shankar (2019) focused on reducing the energy consumption of lighting systems by integrating wireless technologies such as Bluetooth and Zigbee. Their work emphasized the potential of creating a scalable, smart lighting system that adapts to the user's lifestyle and occupancy patterns, further enhancing energy savings in commercial and residential buildings.

While the integration of motion sensors has been widely explored, Gupta and Sharma (2020) studied the limitations of basic PIR sensors, such as their limited range and false positives. Their work aimed at improving the detection range and accuracy of motion sensors, enabling more reliable activation and deactivation of lights in larger spaces. This contributed to further optimization of automatic lighting systems in dynamic environments.

III. PROBLEM DEFINITION

The project begins by identifying the main problem: energy wastage due to the manual operation of lights. Often, lights are left on in unoccupied rooms, leading to unnecessary energy consumption. This is especially common in areas like hallways, bathrooms, and rooms where people may forget to turn the lights off when leaving.

IV. BLOCK DIAGRAM

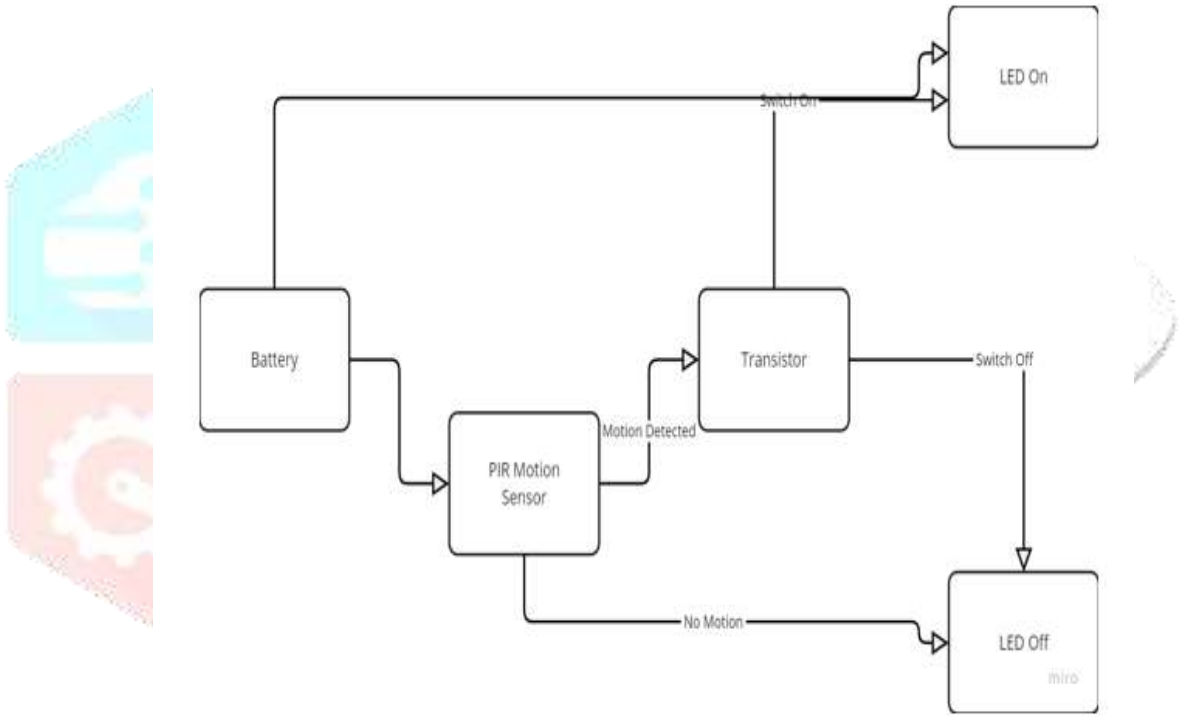

Fig.1 Circuit Diagram Automatic Room Light Controller

Fig.1 represents the Automatic Room Light Controller system, which consists of a PIR Motion Sensor, Transistor, Battery, LED, etc. PIR Sensor is an input components that sense human beings and generates a digital signal, which is further given to the Transistor. A transistor is acting as a switch. The LED is an output component that indicates whether to turn ON or OFF.

The Automatic Room Light Controller project successfully addresses energy wastage and enhances user convenience by automating the control of room lighting based on motion detection. By using a PIR motion sensor, transistor, LED, and battery, the system ensures lights are only on when needed, reducing unnecessary power consumption. The project follows a structured approach, from design to testing, to create a cost-effective and efficient solution. With its simple and reliable components, this system can be easily implemented in various settings, offering both energy savings and convenience. The Automatic Room Light Controller contributes to smarter, more sustainable living environments.

V. Future Scope

The future of the Automatic Room Light Controller holds exciting opportunities for further enhancement and broader applications. One potential direction is improving the PIR sensor's range and sensitivity, allowing the system to work more effectively in larger or more complex environments. Additionally, integrating Wi-Fi or Bluetooth connectivity could enable remote control via smartphones, providing more convenience and flexibility to users.

To further optimize the system, incorporating machine learning could personalize the lighting experience by adapting to users' specific movement patterns or room occupancy habits. The system could also be made more energy-efficient by exploring low-power components and alternative power sources, such as solar panels.

In the future, the system could be expanded to support integration with smart home platforms, allowing for seamless operation alongside other smart devices. The possibilities for future upgrades are vast, and with continued development, the Automatic Room Light Controller could play a pivotal role in promoting energy efficiency and smarter living spaces.

REFERENCES

1. *S. Kumar, R. Sharma, and P. Gupta, "Design and Implementation of Automatic Room Lighting System Using PIR Sensor," International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE), vol. 5, no. 6, pp. 1153-1157, June 2017.*
2. *A. Sharma, M. Sharma, and S. Thakur, "Smart Energy Management in Buildings Using Motion Detection Technology," IEEE Transactions on Industrial Electronics, vol. 67, no. 4, pp. 3450-3457, April 2020.*
3. *P. R. Shinde, A. G. Patil, and S. K. Gajbhiye, "Energy Efficient Lighting Control System Using PIR Sensor for Smart Homes," International Journal of Engineering Research & Technology (IJERT), vol. 6, no. 10, pp. 49-53, October 2018.*
4. *K. Singh and R. S. Kumar, "Automatic Light Control System with PIR Motion Detection for Energy Efficiency," Journal of Electrical Engineering & Technology, vol. 15, no. 3, pp. 671-678, September 2019.*
5. *J. K. Patel, S. M. Patil, and M. P. Yadav, "Design of an Intelligent Lighting Control System Based on PIR Sensor and Microcontroller," International Journal of Computer Applications, vol. 181, no. 6, pp. 1-5, March 2022.*

6. **Corresponding Author details:-**

Dr.Sachin Sambhaji Patil, Assistant Professor, School of Engineering and Sciences, Department of Electronics and Communication Engineering, MIT Art, Design and Technology University Rajbaug, Loni Kalbhor, Pune. He has completed B.E. E&Tc in 2008 , M.E. Electronics in 2012 and Ph.D in the subject of Electronics Engineering from Shivaji University Kolhapur in the year of July 2024. He has good publications record near about 54 papers published in international journals. He has total 16 years of teaching experience since 2008 to 2024.