As per UGC guidelines an electronic bar code is provided to secure your paper

International Journal for Modern Trends in Science and Technology
Volume 12, Special Issue 01, pages 483-492.
ISSN: 2455-3778 online
Available online at: http://ijmtst.com/ICRCSET2026.html
DOI: https://doi.org/10.5281/zenodo.19561916

Automatic Room Light Controller with Visitor Counter

S Sree Chandra, Dasari Mamatha, Bandela Estherurani, Gumma Gopi, Chintalapudi Chandra Gopi Sai

Department of Electronics and Communications Engineering, Chalapathi Institute of Technology, Mothadaka, Guntur, Andhra Pradesh, India.

To Cite this Article
S Sree Chandra, Dasari Mamatha, Bandela Estherurani, Gumma Gopi & Chintalapudi Chandra Gopi Sai (2026). Automatic Room Light Controller with Visitor Counter. International Journal for Modern Trends in Science and Technology, 12(SI01), 483-492. https://doi.org/10.5281/zenodo.19561916

Article Info
Received: 02 March 2026; Revised: 01 April 2026; Accepted: 04 April 2026.

KEYWORDS

Automated Light Control, Visitor Counter, Arduino Uno, Infrared Sensor, Smart Lighting

ABSTRACT

This work "Automated light controller with visitor counter system" is a reliable circuit that is controlling the room lights with count the number of visitors or persons in the room. When someone enters into the room counter will be incremented and the light in the room will be switched ON and when any one leaves or comes out of the room then the counter is decremented. The light will be switched OFF until all the persons or visitors leave from the room. The number of persons or visitors inside the room is displayed on the LCD display. The microcontroller does this work. It receives the signals from the IR sensors, and this signal is operated under the control of source code which is stored in microcontroller. Microcontroller arudinouno continuously monitor the Infrared sensor. When any object pass in front of the IR sensor signal is send to the microcontroller.

I. INTRODUCTION

The Home Automation using cloud network is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. This network uses a consolidation of a mobile phone application and PC based program to provide the means of user interface to the consumer. The home automation system differsfrom other system by allowing the user to operate the system from anywhere around the world through internet connection. In this project we have developed a Home Automation system as shown in figure 1.1, that employs the integration of multi-touch mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer. The home automation system differs from other systems by allowing the user to operate the system without the dependency of a mobile carrier or Internet connection via the in-home wireless remote.

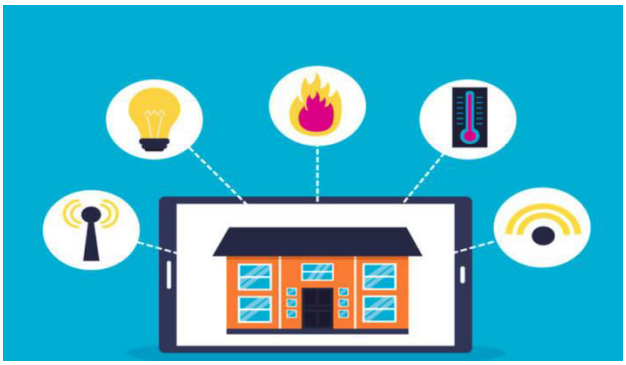


Figure 1: Smart Home

Advances in computer vision present an opportunity to expand and enhance the practice of collecting waste from the medical hospitality system. Precise waste collection and to protect the ward workers from air -borne disease and extend the market of computer vision applications in the field of precision hospital management.Starting from gathering images in order to create a website to monitor the bin status level by the combination of line follower and smart bin system. This method is a new approach in collection of waste from hospitals with an atomized system without any human interaction by network system and using automation. An embedded system is a microprocessor-based computer hardware system with software that is designed to perform a dedicated function, either as an independent system or as a part of a large system. Complexities range from a single microcontroller to a suite of processors with connected peripherals and networks; from no user interface to complex graphical user interfaces. The complexity of an embedded system varies significantly depending on the task for which it is designed. As much as 98 percent of all microprocessors manufactured are used in embedded systems

The inspiration behind this project was real life situations. With the growing need and increasing demand for vaccine, hospitals have become crowded. This might be a problem in the era of social distancing. Especially in vaccine rooms it is important to monitor the number of people in the room.

- Can be used in various places like seminar hall, where the capacity of the room is limited and should not be exceeded. This project can be used to display the actual number of persons inside the room.
- In case of fire emergencies, the fire brigade can obtain the number of persons inside so that they can prioritize their actions and as a result they will be quick in dealing with the situation.
- In museums we can restrict the number of people entering the museum, resulting in an increase of safety measures.

The objective of this project is a controller based model to count number of persons visiting room and light ON the room. Here use Infrared IR sensor it count the no of Persons in the room. In now a day all are like a automatic systems. With standard of living also increases. Automated Light Controller with Visitor Counter system is controlling the room lights with count number of persons in the room. When anyone enters into the room then the counter will incremented by one(+1) and the light will be switched ON and when any one person leaves from the room then the counter will decremented by one(-1). The light will be switched OFF until all visitors or persons leaves from the room. The total number of visitors or persons inside the room is displayed on the LCD. This system is designed to be low cost and expandable allowing a variety of devices to be controlled.

In many institutions, offices, and public buildings, electrical energy is often wasted due to lights and fans being left ON even when rooms are unoccupied. Manual control of electrical appliances depends entirely on human attention, which leads to unnecessary power consumption, higher electricity bills, and reduced equipment lifespan. Additionally, there is no proper system to monitor the number of people entering or leaving a room, making it difficult to manage occupancy levels efficiently. Therefore, there is a need for an automated system that can intelligently control room lighting based on human presence while simultaneously counting visitors. The proposed Automatic Room Light Controller with Visitor Counter aims to solve these issues by automatically switching electrical appliances ON or OFF depending on room occupancy and maintaining an accurate count of people entering and exiting, thereby improving energy efficiency and resource management.

The intelligent embedded system designed to automate room lighting based on occupancy while simultaneously maintaining an accurate count of people entering and exiting a room. The primary objective of this project is to reduce unnecessary power consumption and improve energy efficiency in homes, classrooms,

offices, libraries, laboratories, and other public spaces. In conventional systems, lights and fans are manually operated, which often results in energy wastage when users forget to switch them off. This project eliminates human dependency by introducing an automated control mechanism based on real-time occupancy detection. The system typically uses infrared (IR) sensors placed at the entrance and exit points of a room to detect the movement of individuals. A microcontroller such as Arduino or any embedded controller processes the signals received from the sensors to increment or decrement the visitor count accordingly. The current count is displayed on an LCD or LED display unit, allowing real-time monitoring of room occupancy. When the first person enters the room, the controller automatically turns ON the lights (and optionally fans or other appliances). As more people enter, the count increases, but the appliances remain ON. When people leave, the counter decreases, and once the count reaches zero, the system automatically switches OFF the lights, ensuring that no energy is wasted when the room is empty.

2.LITERATURE REVIEW

[1] Author: Singh R., Verma P. (2018) This research presents an automated room light control system integrated with a bidirectional visitor counter using infrared sensors. The system is designed to reduce electricity wastage in classrooms and office cabins. Two IR sensors are placed at the entrance to detect entry and exit movement. A microcontroller processes the sensor signals to increment or decrement the visitor count. The count is displayed on an LCD screen for real-time monitoring. When the first person enters, the lights automatically switch ON. When the last person exits, the lights turn OFF automatically. The authors focused on reducing manual dependency in public buildings. The system demonstrated high accuracy in detecting movement direction. Debouncing techniques were implemented to avoid false triggering. Relay modules were used for controlling high-voltage appliances. The prototype was tested in a laboratory environment. Results showed significant reduction in power consumption. The design is low-cost and easy to install. The study highlights its usefulness in smart energy management systems.

[2] Author: Kumar A., Reddy S. (2019) This paper proposes a microcontroller-based visitor counter with automatic light switching functionality. The project utilizes Arduino Uno as the central controller. IR transmitter and receiver pairs are installed to detect human movement. The system differentiates between entry and exit using sensor sequence logic. An LCD module displays the total number of occupants inside the room. The lighting system is connected through a relay driver circuit. When occupancy becomes zero, the controller cuts off the power supply to lights. The system minimizes energy wastage in seminar halls and meeting rooms. The authors improved sensor positioning to increase counting accuracy. Noise filtering techniques were applied to ensure reliable detection. The hardware implementation was compact and power-efficient. Experimental results confirmed stable operation under normal lighting conditions. The design can be expanded for fan and AC automation. The study supports green building initiatives. The proposed system is affordable and suitable for educational institutions.

[3] Author: Sharma M., Gupta N. (2020) This research focuses on an intelligent room automation system with a digital visitor counter. The authors integrated IR sensors and a microcontroller to manage lighting automatically. The system counts the number of people entering and leaving a room. A seven-segment display is used to show occupancy data. The lighting circuit is controlled using transistor-driven relays. The system activates lights only when the room is occupied. Once the count returns to zero, appliances turn OFF automatically. The design emphasizes power efficiency and operational simplicity. The system was tested in office environments for performance evaluation. It showed high reliability in tracking occupancy changes. The authors addressed issues like sensor overlap and signal interference. The implementation reduces human errors in switching appliances. The system is cost-effective and easy to maintain. It contributes to energy conservation efforts. The research highlights the importance of automation in smart infrastructure.

[4] Author: Patel D., Shah K. (2021) This paper introduces a smart lighting control system combined with a visitor monitoring mechanism. The project is built using embedded C programming on a microcontroller platform. Infrared sensors are installed at entry points for motion detection. The system updates the occupancy count dynamically. An LCD panel provides continuous display of room population. The lighting load is

connected through electromagnetic relays. The authors implemented logical conditions for directional detection. The system ensures lights remain ON only when required. It significantly reduces electricity consumption in public buildings. The prototype was deployed in a classroom setting for analysis. Results indicated accurate counting with minimal delay. The authors suggested IoT integration for remote monitoring. The system is scalable for larger halls and auditoriums. It improves energy efficiency and operational convenience. The research demonstrates practical embedded automation techniques.

[5] Author: Iqbal H., Khan T. (2022) This study presents an advanced automatic room light controller with a real-time visitor counter and occupancy management system. The design uses dual IR sensors to detect movement direction precisely. A microcontroller processes signals and updates the visitor count instantly. The occupancy data is displayed on an LCD module. The lighting circuit operates through relay modules for safe switching. The system ensures that lights turn ON only when at least one person is present. When the room becomes empty, the controller automatically switches OFF appliances. The authors focused on reducing energy waste in commercial buildings. The system was tested under different environmental conditions. It demonstrated stable performance and accurate counting. The design supports expansion for fan and AC control. The authors highlighted its role in sustainable energy management. The implementation is simple and economical. It reduces electricity bills and maintenance costs. The study emphasizes automation for smart building applications.

3.EXISTING SYSTEM

Construction of fully electro mated system The Arduino is open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. The Arduino microcontroller board having 28 digital input/output pins. Low voltage switching relays were used to integrate the devices with the Arduino for demonstrating the switching functionality in this proposed project a mobile app is created and it includes all the features of controlling the home appliances with the help of speech recognition and inter connectivity of devices. The mobile app that is created contains all the commands like switching on/off the AC, Fan, Washing machine, etc. Thus, this concept basically contains the smart appliances in a home that can be controlled by Bluetooth and connected wirelessly with the mobile phones. The mobile app in the mobile phone will be containing the options to give different commands to the appliances and controlling it with our mobile app. The main page of the app will be having the login page that will be used to authenticate the user using the IP Address and the password. After successful login the user will be able to control all the appliances with the mobile app and the voice recognition.

Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. The presents the design and implementation of a low cost but yet flexible and secure cell phone-based home automation system. The design is based on a standalone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home.

Drawbacks

- Limited Communication Range
- Security Vulnerabilities
- Signal Interference and Connectivity Issues

4. PROPOSED SYSTEM

As we enter the twenty first century, the transaction among individuals and PC is breaking vintage confinements and coming into another domain. Inside the massively innovation driven worldwide of these days' phones have develop as a piece of our ways of life. Cell phones are not simply discussion device. Our endeavour attempts to infer arrangements furnishing better oversee on local machine with assistance of cell phone. The current contraption incorporates substantially machines in our home which can be been controlled through switches. Those gadgets can be turned ON and OFF physically at whatever point needed. This contraption is substantially less verified and subject to electric threats. Likewise, the wastage of vitality tends to a central point of subject.

The proposed task is considered systems administration our cell mobile to all machines through a smart trustworthiness circuit. The proposed gadget incorporates astute practical insight Circuit associated with the home hardware. Notoriety of every single home apparatus may be made do with the guide of buyer from distant with help of individual's cell phone Our endeavour attempts to infer arrangements furnishing better oversee on local machine with assistance of cell phone. The current contraption incorporates substantially machines in our home which can be been controlled through switches. Those gadgets can be turned ON and OFF physically at whatever point needed. This contraption is substantially less verified and subject to electric threats. Likewise, the wastage of vitality tends to a central point of subject. The proposed gadget incorporates astute practical insight Circuit associated with the home hardware. Notoriety of every single home apparatus may be made do with the guide of buyer from distant with help of individual's cell phone.

Block Diagram

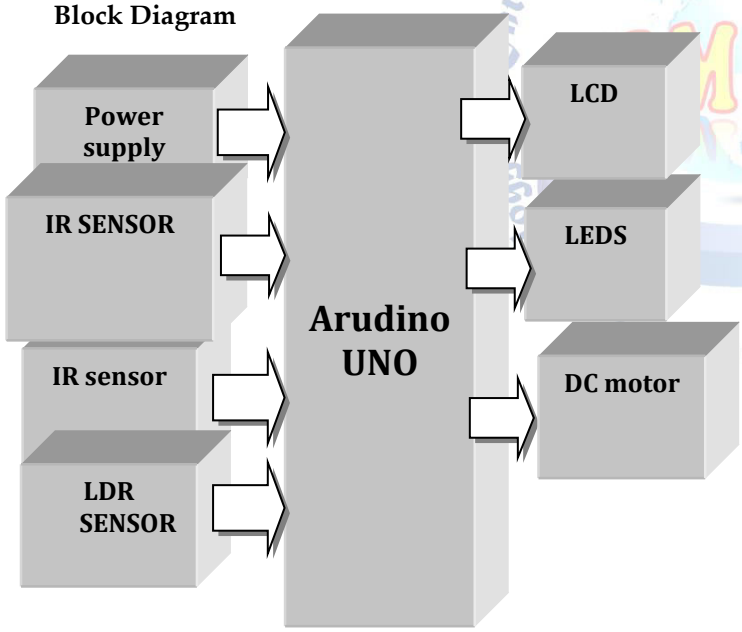


Figure 2: Proposed System

The visitor counter with load controller operates in such a way first we need to position IR Sensor A at the entry point and IR Sensor B at the exit point. The sensors are connected to the digital pins of Arduino UNO. When someone enters the room the (IR sensor-A) will get Triggered and sends the output value to the arduino. Then arduino read the value and count +1 as it programmed also sends the signal to the relay module connected to its another digital pins which will get triggered and leads to turning on lights and fans inside the room. Likewise, when IR Sensor A detects an additional visitor, the Arduino increases the count by one. This process continues, with the Arduino adding one to the total each time a visitor enters the room, thereby calculating the number of incoming visitors. Similarly when the visitors leaves the room from the exit gate, equipped with IR Sensor B, detects any obstacles get triggered and sends the output to arduino. Then the arduino increment the number of exiting visitors count from this gate by +1. Each time a visitor exits the room, the Arduino increases the count by one and calculates the total number of occupants by subtracting the number of exiting visitors from the total number of entering visitors. When the count of individuals inside the room reaches zero, the Arduino sends a signal to a relay, which then turns off the lights and fan in the room

ALGORITHM

•Initialization: Initialize the number of visitor to 0, Initialize all the devices such as PIR sensors, light, fan, and LCD.

• Counting logic

• Whenever the entry sensor will be activated then visitor count will get increment

• Whenever the exit sensor will be activated then visitor count will get decremented

• The updated count will be shown on the LCD. • Control logic • If Visitor count is greater than 0 then turn ON the light.

• If the visitor count is above a predefined limit (e.g. 3 people), turn on fan

• If visitor count is 0, turn off light and fan

In this work, we have used multiple sensors IR sensor which is used to detect the human motion, LDR sensor which is used detect the light. All these sensors are connected to the main microcontroller which is Arduino UNO as shown in the above fig. The loads are connected to 2-channel relay. All the sensor output are sent to Arduino All the counted and calculated data regarding visitors in the room is transmitted to an LCD display. The LCD shows the total number of individuals entering the room, those exiting, and the current number of visitors present. The entire system is powered by a switched-mode power supply (SMPS), which converts 230V AC into a 5V, 5A DC supply.

Flow chart

The system can be used in classroom to automatically control lights and fans based on the number of students in class room 2. Monitor and manage energy usage in office space. 4. Ensure that devices are only on when visitors are present, saving energy in homes.

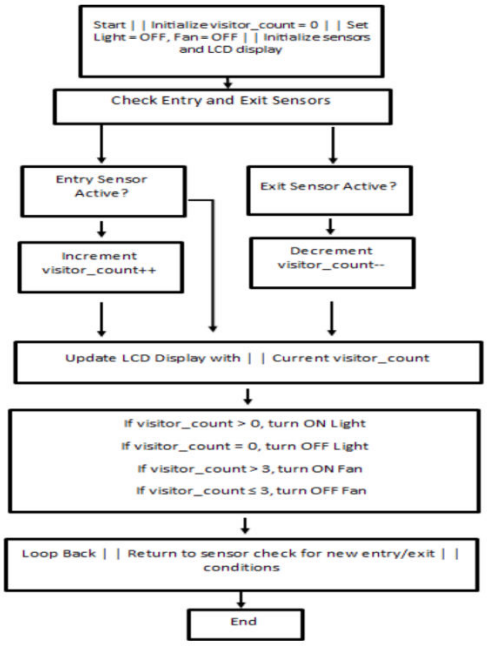
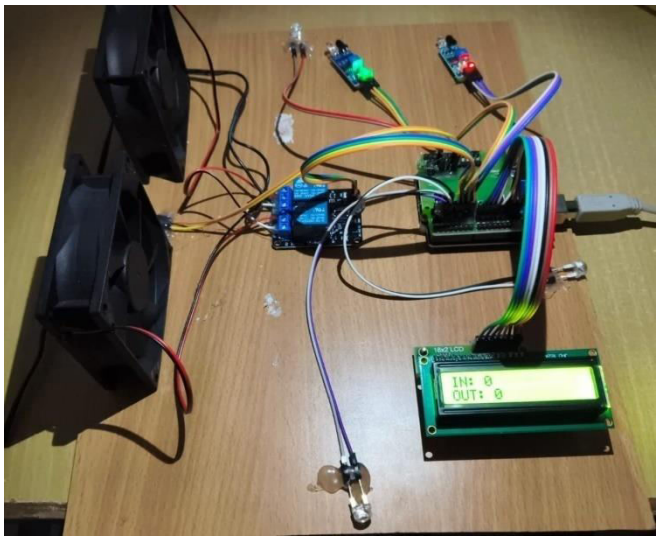


Figure 3: Flowchart of the Proposed System

5. RESULTS& DISCUSSION

The seamless integration of light and fan controls with visitor counting data represents a significant advancement in smart building technologies. By employing Arduino-based systems, the method enhances energy efficiency and comfort within spaces that experience varying occupancy levels. The data collected by bidirectional visitor counters can be programmatically analyzed to adjust light and fan according to real-time occupancy, thereby optimizing energy use. When visitor counts are low, for instance, lights and fans can be turned off entirely, leading to substantial energy savings and lower operational costs.This dynamic interaction not only elevates user experience but also contributes to sustainable building practices, making it a crucial area for further exploration in environmental resource management.

The bidirectional visitor counter with load controller is made using arduino microcontroller which reduce its complexity compared to other systems. This paper describes its circuit which is used for counting the number of people entering or leaving from the room and automatically control room load such as lights and fans. When someone enters the room the counter will be increment accordingly the lights and fans in the room will be turn on and after the room become empty it will



automatically turn off. Count of the people will be displayed on LCD display.

Figure 4: Hardware Implementation

The system uses a microcontroller connected to IR sensors, a relay module, cooling fans, and a 16×2 LCD display to monitor room occupancy. The IR sensors detect the entry and exit of people, updating the count on the display. Based on occupancy, the system automatically controls appliances like lights or fans through the relay to save energy.

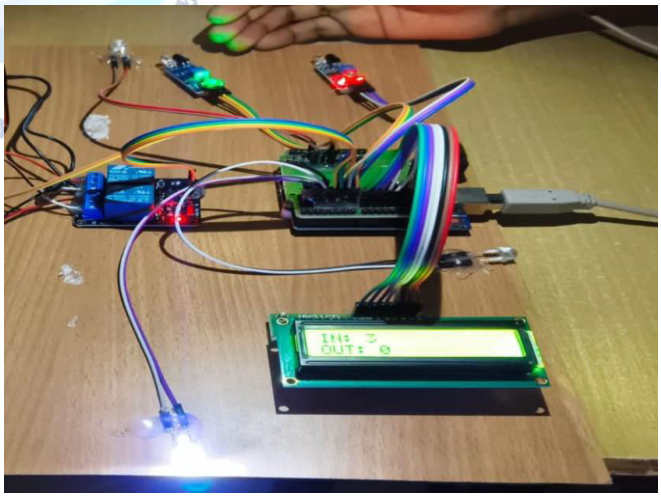


Figure 5: Visitor Count Based on IR Sensor

The system uses IR transmitter–receiver sensor modules placed at the entrance to detect the movement of people entering the room. When the IR beam is interrupted, the sensor sends a digital signal to the microcontroller, which increments the visitor count and updates it on the 16×2 LCD display. If the count is greater than zero, the controller activates the relay

module to turn ON electrical appliances such as lights and fans automatically.

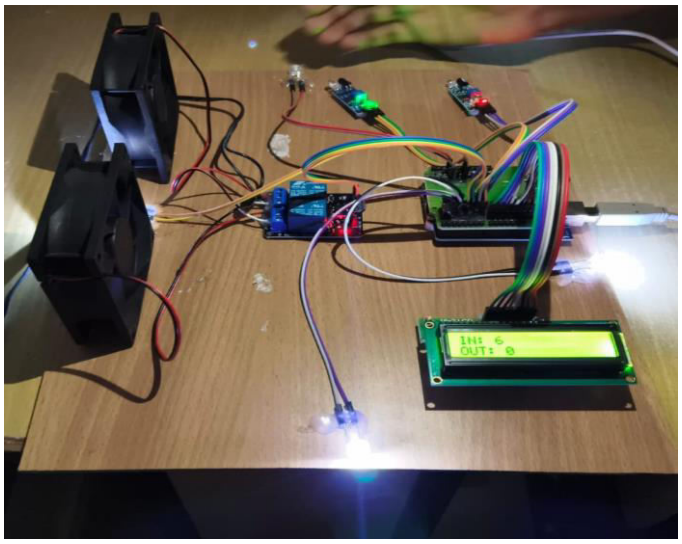


Figure 5: Visitor counting increase and exit Using IR Sensors

The IR transmitter–receiver sensor at the entrance detects a person when the IR beam is interrupted. The microcontroller increases the visitor count, displays it on the 16×2 LCD, and activates the relay to turn ON lights and fans.

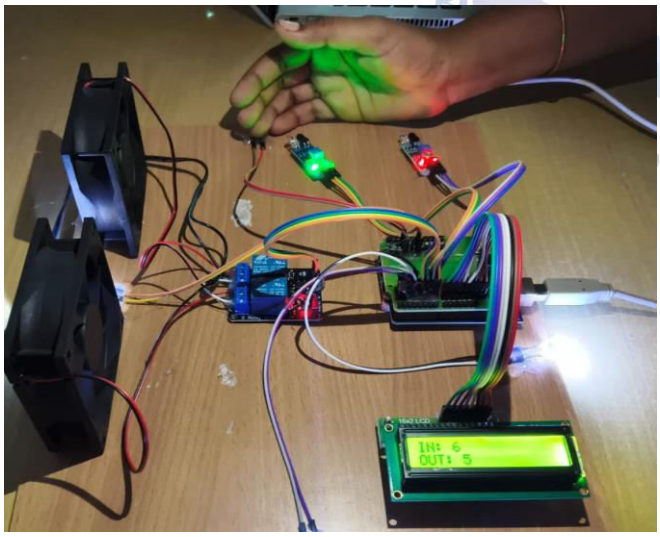


Figure 6: Visitor Exit Counting Using IR Sensors

The exit IR sensor detects a person leaving when the IR beam is interrupted and sends a signal to the microcontroller. The controller decreases the visitor count and keeps the appliances ON if the count is still greater than zero.

When the last person exits the room, the visitor count becomes zero as shown on the LCD display. The microcontroller detects that the room is empty and automatically turns OFF the connected electrical appliances through the relay module. This automatic control helps reduce unnecessary power consumption and improves energy efficiency.

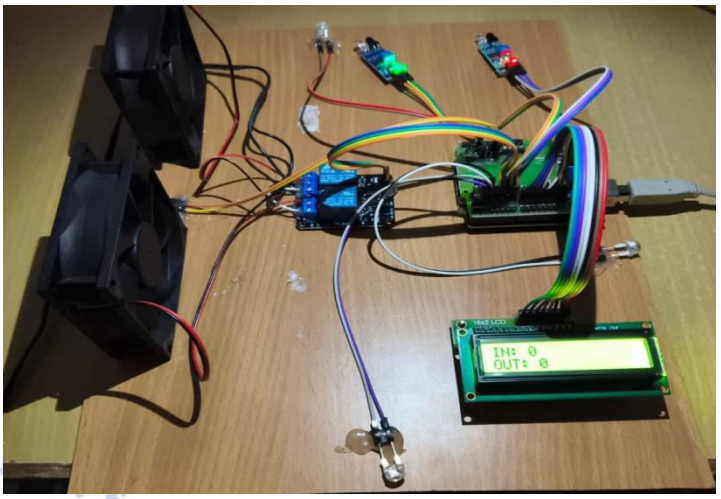


Figure 7: Visitor Counter System – Room Empty Condition

5. CONCLUSIONS

In this work, we have designed and implemented a Bi-Directional Counter & Home Automation using the concept of Embedded System. The target users of the project can be any one right from a common man to any organization. Lets say if any one uses our project for Seminar Purpose then the track record of the persons attending the seminar will give the exact idea about the no. of candidate attending and leaving the seminar and accordingly the Project Model will control the Electronics Gadget of the Seminar Hall, In making this project. This project is useful in developing countries and this project has a bright future. In this digital world Technology is very advanced and we prefer things to be done automatically without any human efforts. This project also helps to reduce human efforts. Also it is very useful to conserve resources. It is very useful in Schools, hospitals, malls, offices, auditoriums etc. This gives lots of knowledge of software as hardware.

Future enhancement

Automatic Room Light Controller with Visitor Countercan include **IoT integration** to monitor and control the lighting system remotely through a mobile

application or web dashboard. The system can send **real-time data of room occupancy and energy consumption** to the cloud for analysis. Additionally, **smart automation with AI or smart home platforms** can be implemented to automatically adjust lighting based on usage patterns. These improvements will help **in better energy management, remote monitoring, and smart building applications**.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] R. Singh and P. Verma, "Automatic room light controller with visitor counter using IR sensors," International Journal of Engineering Research & Technology (IJERT), vol. 7, no. 5, pp. 234–238, 2018.

[2] A. Kumar and S. Reddy, "Microcontroller-based visitor counter with automatic light control system," International Journal of Innovative Technology and Exploring Engineering (IJITEE), vol. 8, no. 6, pp. 1120–1124, 2019.

[3] M. Sharma and N. Gupta, "Design and implementation of automatic room light controller," International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE), vol. 9, no. 4, pp. 1456–1461, 2020.

[4] D. Patel and K. Shah, "Embedded based energy efficient room automation system," International Journal of Scientific & Technology Research, vol. 10, no. 2, pp. 310–315, 2021.

[5] H. Iqbal and T. Khan, "Smart lighting system with occupancy monitoring," International Journal of Engineering and Advanced Technology (IJEAT), vol. 11, no. 1, pp. 556–561, 2022.

[6] S. Kumar, R. Mishra, and P. Singh, "Energy efficient automatic lighting system using microcontroller," in Proc. IEEE Int. Conf. Smart Energy Systems, 2017, pp. 78–83.

[7] V. R. Balaji and M. Karthik, "IR sensor based bidirectional visitor counter," International Journal of Computer Applications, vol. 162, no. 9, pp. 22–26, 2017.

[8] T. Rajesh and P. Meena, "Design of automatic room light controller using Arduino," International Journal of Electronics and Communication Engineering, vol. 6, no. 3, pp. 89–93, 2018.

[9] A. S. Babu and R. Kumar, "Smart building automation system for energy conservation," in Proc. IEEE Int. Conf. Intelligent Computing and Control Systems (ICICCS), 2019, pp. 1450–1454.

[10] N. Arora and K. S. Sandhu, "Occupancy based lighting control system," International Journal of Engineering Trends and Technology (IJETT), vol. 67, no. 4, pp. 55–60, 2019.

[11] P. G. Scholar and L. Joseph, "Automatic light control with bidirectional visitor counter," International Journal of Emerging Technologies and Innovative Research (IJETIR), vol. 6, no. 5, pp. 210–215, 2019.

[12] R. K. Yadav and S. Chauhan, "Microcontroller based automatic light and fan controller," International Journal of Electrical Engineering & Technology (IJEET), vol. 10, no. 2, pp. 98–104, 2019.

[13] J. Prasad and M. Rao, "Energy saving smart room automation system," in Proc. IEEE Int. Conf. Power Electronics, Smart Grid and Renewable Energy, 2020, pp. 432–437.

[14] S. Ahmed and F. Rahman, "Design of low-cost automatic lighting system," International Journal of Recent Technology and Engineering (IJRTE), vol. 8, no. 5, pp. 3021–3025, 2020.

[15] K. N. Rao and V. S. Kumar, "IoT-based smart room monitoring and control system," in Proc. IEEE Int. Conf. IoT and Applications (ICIOT), 2021, pp. 120–125.

[16] M. Jain and A. Agarwal, "Implementation of digital visitor counter with automatic light switching," International Journal of Research in Electronics and Computer Engineering (IJRECE), vol. 8, no. 3, pp. 155–160, 2020.

[17] B. Chandra and S. Patel, "Energy efficient smart lighting control using embedded systems," International Journal of Advanced Science and Technology, vol. 29, no. 7, pp. 1145–1152, 2020.

[18] R. S. Shetty and P. N. Rao, "Design and analysis of automatic room light controller for smart buildings," in Proc. IEEE Int. Conf. Communication and Electronics Systems (ICCES), 2021, pp. 889–893.

[19] R. Saravanakumar et al., "Dual-band performance enhancement of square wheel antennas with FR4 substrate for sub 7 GHz applications," in Proc. ACROSET, IEEE, Sept. 2024, pp. 1–7.

[20] D. N. Ravikiran et al., "Secure visual data processing: Image encryption and decryption through reversible logic gates in VLSI design," Int. J. Modern Trends Sci. Technol., vol. 10, no. 2, 2024.

[21] S. Saranya et al., "Meta surfaces with hole arrays for MIMO applications," in Proc. ICOEI, IEEE, Apr. 2025, pp. 340–347.

[22] R. Thommandru, "Survey on MIMO antenna for 5G applications," 2022.

[23] S. S. Vellela et al., "Improving network security using intelligent ensemble techniques," in Proc. AMATHE, IEEE, May 2024, pp. 1–7.

[24] S. Sree Chandra et al., "Fruit classification based on shape, color and texture using image processing techniques," Int. J. Modern Trends Sci. Technol., vol. 10, no. 3, pp. 100–107, 2024.

[25] R. Thommandru et al., "Millimetre wave self-isolated MIMO antenna with high isolation and radiation efficiency," in Proc. IDCIoT, IEEE, Jan. 2024, pp. 191–196.

[26] S. Sree Chandra et al., "Verilog-based solution for multi-vehicle parking," Int. J. Modern Trends Sci. Technol., vol. 10, no. 2, pp. 394–400, 2024.

[27] D. N. Ravikiran and C. G. Dethe, "Improvements in routing algorithms to enhance lifetime of wireless sensor networks," Int. J. Comput. Netw. Commun., vol. 10, no. 2, pp. 23–32, 2018.

[28] R. Saravanakumar et al., "Cross scoop fractal antenna design with notch at 15 degree for emerging applications at 5.2 GHz," in Proc. RAEEUCCI, IEEE, Apr. 2024, pp. 1–7.

[29] V. K. R. Devana et al., "A novel compact MIMO-UWB antenna with improved isolation using parasitic elements," Arab. J. Sci. Eng., 2025.

[30] R. Thommandru and R. Saravanakumar, "Performance analysis of circularly polarised MIMO antenna for wireless applications," in Proc. ICICNIS, IEEE, Dec. 2024, pp. 513–518.

[31] B. Nancharaiah et al., "Implementation and performance comparison of novel optimization approaches to counter starvation in wireless networks," Int. J. Comput. Netw. Inf. Secur., vol. 17, no. 1, pp. 17–27, 2025.

[32] R. Thommandru, "Cost-effective circularly polarized MIMO antenna for Wi-Fi applications," Nov. 2024.

[33] D. N. Ravikiran et al., "Optimized advanced encryption standard (AES) with enhanced S-box and automated key generation."

[34] R. Saravanakumar et al., "Analysis circular wave guide antenna for 5G mid-band applications," in Proc. ICACCS, IEEE, Mar. 2024, pp. 560–566.

[35] S. Swarna and V. R. Kolluru, "Active channel selection by sensors using artificial neural networks," Int. J. Eng. Educ. Res., vol. 12, no. 4, pp. 1466–1473, 2024.

[36] D. N. Ravikiran et al., "Parametric facial landmark detection using active shape models."

[37] C. H. Nagaraju et al., "Assimilation of blockchain for augmenting IoT-based smart home security," in Blockchain Technology for IoT and Wireless Communications, CRC Press, 2023, pp. 79–87.

[38] R. Saravanakumar et al., "An armor-mounted antenna with deflected ground for sub-6 GHz applications," in Proc. ICRISST, IEEE, Mar. 2024, pp. 1–7.
[39] D. N. Ravikiran and C. V. Akhil, "A face recognition method for security applications in smart homes and cities."
[40] S. Swarna and V. R. Kolluru, "An intelligent data communication in IoT-based healthcare application using optimized routing protocol," J. High Speed Netw., vol. 31, no. 2, pp. 159–179, 2025.
[41] D. N. Ravikiran et al., "Reversible logic-based cryptography design for secure and efficient data processing."
[42] S. Swarna et al., "Optimized low-energy adaptive uneven clustering hierarchy for cognitive radio sensor networks," 2026.
[43] R. Thommandru, "Innovative meta ring array antenna design for Ka-band," 2004.
[44] D. N. Ravikiran et al., "IoT-based advanced automatic toll collection and vehicle detection system."
[45] P. B. M. Krishna et al., "Design of CMOS ring modulator by built-in thermal tuning," in Cognitive Computing Models in Communication Systems, 2022.
[46] B. Potti et al., "Genetic algorithmic approach to mitigate starvation in wireless mesh networks," in Proc. ICCT, Springer, 2016.
[47] K. K. . Kommineni and A. . Prasad, "A Review on Privacy and Security Improvement Mechanisms in MANETs", Int J Intell Syst Appl Eng, vol. 12, no. 2, pp. 90–99, Dec. 2023.
[48] Kommineni, K.K., Prasad, A. Enhancing Data Security and Privacy in SDN-Enabled MANETs Through Improved Data Aggregation Protection and Secrecy. Wireless Pers Commun 139, 855–882 (2024). https://doi.org/10.1007/s11277-024-11635-w
[49] "Blockchain-Enabled Secure Data Aggregation for SDN-Enabled Ad-Hoc Networks," International Journal of Intelligent Engineering and Systems, vol. 18, no. 5, pp. 704–717, Jun. 2025, doi: https://doi.org/10.22266/ijies2025.0630.49.
[50] K. K. Kommineni, P. Ande, "Blockchain-driven key management and privacy-preserving data Aggregation Scheme for SDN-enabled MANETs," International Journal of Intelligent Engineering and Systems, vol. 18–18, no. 9, pp. 601–615, 2025, doi: 10.22266/ijies2025.1031.39.
[51] Vellela, S. S., & Balamanigandan, R. (2022, December). Design of Hybrid Authentication Protocol for High Secure Applications in Cloud Environments. In 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS) (pp. 408-414). IEEE.
[52] Vellela, S. S., Balamanigandan, R., & Praveen, S. P. (2022). Strategic survey on security and privacy methods of cloud computing environment. Journal of Next Generation Technology, 2(1).
[53] Vellela, S. S., & Balamanigandan, R. (2024). An efficient attack detection and prevention approach for secure WSN mobile cloud environment. Soft Computing, 28(19), 11279-11293.
[54] Polasi, P. K., Vellela, S. S., Narayana, J. L., Simon, J., Kapileswar, N., Prabu, R. T., & Rashed, A. N. Z. (2026). Data rates transmission, operation performance speed and figure of merit signature for various quadurature light sources under spectral and thermal effects. Journal of Optics, 55(1), 633-643.
[55] Vellela, S. S., Rao, M. V., Mantena, S. V., Reddy, M. J., Vatambeti, R., & Rahman, S. Z. (2024). Evaluation of Tennis Teaching Effect Using Optimized DL Model with Cloud Computing System. International Journal of Modern Education and Computer Science (IJMECS), 16(2), 16-28.
[56] Praveen, S. P., Vellela, S. S., & Balamanigandan, R. (2024). SmartIris ML: harnessing machine learning for enhanced multi-biometric authentication. Journal of Next Generation Technology (ISSN: 2583-021X), 4(1).
[57] Vellela, S. S., Rao, M. V., Krishna, C. V. M., Rao, T. S., & Dasthavejula, R. (2026). Piezoelectric and Shape-Memory Materials for Actuators and Energy Harvesting in Mechanical, Electronics, and Biomedical Engineering Using AI-Based Design. In Advanced Materials for Biomedical Devices (pp. 195-206). CRC Press.
[58] Vellela, S. S., & Balamanigandan, R. (2024). Optimized clustering routing framework to maintain the optimal energy status in the wsn mobile cloud environment. Multimedia Tools and Applications, 83(3), 7919-7938.
[59] Praveen, S. P., Nakka, R., Chokka, A., Thatha, V. N., Vellela, S. S., & Sirisha, U. (2023). A novel classification approach for grape leaf disease detection based on different attention deep learning techniques. International Journal of Advanced Computer Science and Applications (IJACSA), 14(6), 2023.