International Journal of Scientific Research and Innovation ISSN 2455-0140
Volume 12, Issue 1, March 2024, IJSRI1001

IoT BASED CLASSROOM AUTOMATION SYSTEM

R. ROBERT

Assistant Professor,

Dept. of Electronics and Communication Engineering,

Annai Velankanni College of Engineering,

Kanyakumari .

Email id: rrobertraj@gmail.com

Dr. V.V. VINOTH., M.E, Ph.D

Associate Professor,

Dept. of Electronics and Communication Engineering,

Annai Velankanni College of Engineering,

Kanyakumari.

Email id: vinfo.vv@gmail.com

Abstract- With the development in technology, Internet provides great change in human life. As increasing new technologies, people are switching more toward automatic systems using the Internet based things such as smart car, smart home, smart traffic signals etc. In this paper, we implementing automation and security along with the Internet of Things in classroom to create a system which will enable someone to remotely monitor and control anywhere. Arduino is used as a solution for the automation of classroom equipment such as lights, fans and air condition. Using Arduino data generation, processing and communication is done. This method improves the energy efficiency, indoor security and cost savings of the classroom.

Keywords- Classroom Automation, Internet of Things, Arduino, Cloud Computing, Energy Optimization

I. INTRODUCTION

World electricity consumption is increasing day by day because of the development of technology and the growth of the world population [4]. The world suffers from a shortage of electricity optimized ways of energy consumption are important. Using IoT [5], we can solve all of these problems and can be remotely controlled in the current network infrastructure. Smart sensors sense the data from objects and Wireless sensors networks are used to transfer the sensed data of sensor nodes [6]. IoT that provides data storage, analysis and security services [7]. The use of Classroom automation is monitoring and controlling fan, light, AC and other room equipment. Arduino, sensors and other microcontrollers are used to controlled the devices remotely and automatically [8]. The data sensed from the sensors is transmitted over the network for analysis purpose.

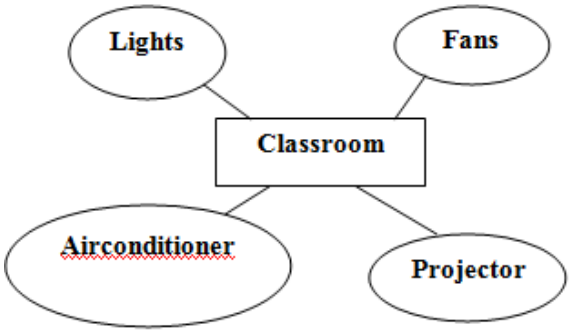

Fig. 1. Classroom Automation

II.LITERATURE REVIEW

For the development of new technology appliances can be remotely controlled by sensed data of PIR sensor for qualitative analysis of the students [9]. Raspberry Pi is used for the entire controlling system. In [10] classroom teaching quality based on video processing technology and allows the classroom to be made smarter [10]. The main goal of this method is to provide smart teaching support to the classroom in educational institutions and improve the teaching process [11].In [12] general, sensors

can be used for automation in classroom, to control and manage human based electrical equipment such as fans and lights. A camera is used to identify the presence of students, staffs in the classroom and. It can be easily work in universities and work environments [13].

III.SYSTEM DESIGN

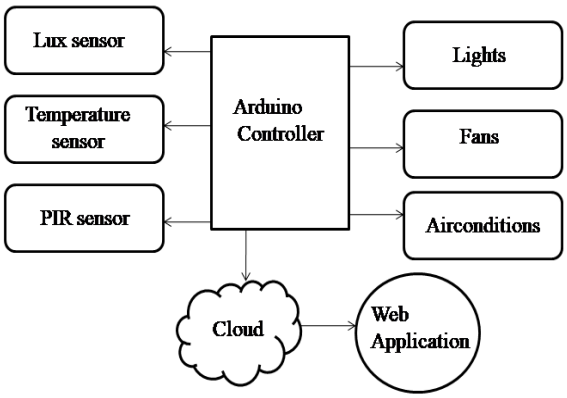

Fig.2 Block Diagram

Arduino is a microcontroller that is a main part in proposed system shown in figure 2. Arduino is connected with various input sensors such as temperature sensor, lux sensor and PIR sensor. With this, we will be able to get input sensed statistics from multiple integrated sensors and send it to the control unit for automatic decisions. Fans, lights are ACs are controlled by the Arduino Controller. In real time class room data is accessed using web application from the cloud.

Figure 2 shows working flow of proposed system. For example Door sensor opens the classroom doors at 8AM. At that time Arduino is initiated and start the monitoring of classroom. PIR sensor detects the persons then the resources will be turned on, Temperature sensor ON depend on the temperature of the room, automatically ON fan or AC accordingly.

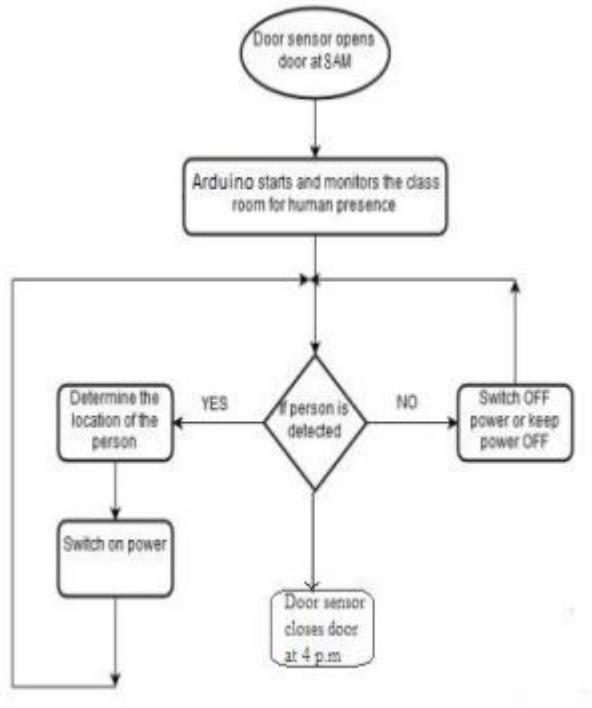

Fig. 3. Working Flow of Proposed System

Following hardware components are used to build this system,

Arduino

The Arduino controller identifies the data in temperature sensor, Lux sensor and PIR sensor. The Programming is done in Arduino to get DHT11 temperature , PIR,and GY30 Lux sensors data and produce control signals.

PIR Sensor

The Passive infrared sensor is detecting the presence of the human in a classroom, so that the light or other resources can turn ON automatically. PIR sensor detection range is 15m and operates on 12 voltages of direct current. In the end Passive Infrared Motion Sensor was selected for its function to detect Infrared radiations from the surroundings and produce a high output, in other case the time delay, the output is low.

Lux sensor

Light intensity sensor is used to sense and measure the amount of light. GY30 lux sensor sense the light from incident angle. It uses 3 to 5 voltages of power supply.

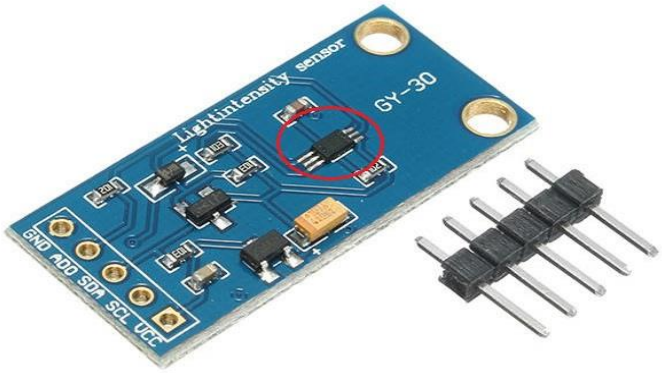

Fig.4 GY30 Lux sensor

IV.RESULTS

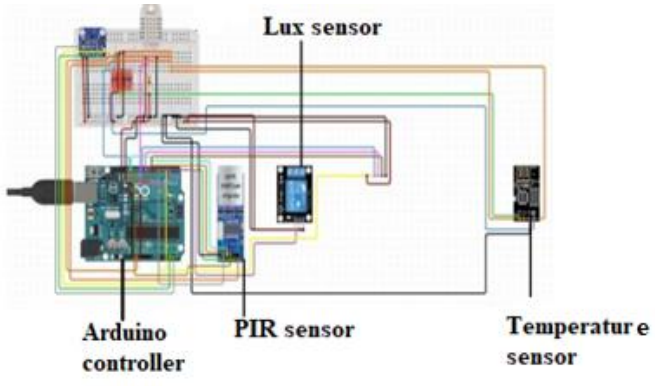

Fig.5 Circuit diagram

Figure 5 explains the circuit diagram of proposed system. When a person entered the classroom, PIR sensor ON , the output goes high. When the first student entering the classroom all the lamps and fans are turned ON, while the last student exiting the classroom, all the lamps and fans are OFF. This result indicates that electricity can be saved if all electrical appliances are shut down on time automatically after use.

V.CONCLUSION

IoT automation is required to save energy as well as cost in an efficient classroom automation system. The proposed system controls the basic electric resources to classroom. The objective of this paper is to save electricity in the classroom by switching off the lamp and fan automatically when the class is not being occupied by the students. It save electricity in the classroom.

REFERENCES

[1] M. Ram, M. Child, A. Aghahosseini, D. Bogdanov, A. Lohrmann, and C. Breyer, “A comparative analysis of electricity generation costs from renewable, fossil fuel and nuclear sources in G20 countries for the period 2015-2030,” J. Clean. Prod., vol. 199, pp. 687–704, 2018.

[2] K. R. Koswattage, I. Shimoyama, Y. Baba, T. Sekiguchi, and K. Nakagawa, “Study on selective adsorption of deuterium on boron nitride using photonstimulated ion-desorption,” Appl. Surf. Sci., vol. 258, no. 4, pp. 1561–1564, 2011.

[3] N. N. Sasane, N. S. Sakat, K. N. Shital, V. Kaushik, and P. K. Pallav, “IOT based energy meter billing and monitoring system-A case study,” Int. Res. J. Adv. Eng. Sci., vol. 2, pp. 64–68, 2017

[4] M. Ali and M. K. Paracha, “An Iot Based Approach for Monitoring Solar Power Consumption with Adafruit Cloud,” Int. J. Eng. Appl. Sci. Technol., vol. 4, no. 9, pp. 335–341, 2020.

[5] T. Sali, “Classroom Automation System,” Int. J. Innov. Eng. Technol., vol. 8, no. 3, pp. 27–32, 2017.

[6] A. R. De La Concepcion, R. Stefanelli, and D. Trinchero, “Adaptive wireless sensor networks for high-definition monitoring in sustainable agriculture,” WiSNet 2014 - Proc. 2014

[7] H. F. Atlam, A. Alenezi, A. Alharthi, R. J. Walters, and G. B. Wills, “Integration of Cloud Computing with Internet of Things: Challenges and Open Issues,” in 2017 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications

(GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData), 2017, pp. 670–675.

[8] D. T. Nguyen, C. Song, Z. Qian, S. V. Krishnamurthy, E. J. M. Colbert, and P. McDaniel, "IotSan: fortifying the safety of IoT systems," in Proceedings of the 14th International Conference on emerging Networking EXperiments and Technologies - CoNEXT '18, 2018, pp. 191–203.

[9] J. Talwar, S. Ranjani, A. Aras, and M. Bedekar, "Intelligent classroom system for qualitative analysis of students' conceptual understanding," Int. Conf. Emerg. Trends Eng. Technol. ICETET, pp. 25–29, 2013.

[10] E. Guan, Z. Zhang, M. He, and X. Zhao, "Evaluation of classroom teaching quality based on video processing technology," Proc. - 2017 Chinese Autom. Congr. CAC 2017, vol. 2017-Janua, pp. 1926–1929, 2017

[11] A. Atabekov, "Student research abstract: Internet of things-based smart classroom environment," Proc.

ACM Symp. Appl. Comput., vol. 04-08-Apri, pp. 746–747, 2016.

[12] R. Revvathirani, P. Sangeetha, S. Sripriyatharshini, and G. Yamuna, "Implementation of automated smart classroom using sensors," no. 1, pp. 3–6.

[13] R. Ani, S. Krishna, H. Akhil, and U. Arun, "An Approach Towards Building an IoT Based Smart Classroom," 2018 Int. Conf. Adv. Comput. Commun. Informatics, ICACCI 2018, pp. 2098–2102, 2018.

[14] B. N. Gatsheni, R. B. Kuriakose, and F. Aghdasi, "Automating a student class attendance register using radio frequency identification in South Africa," Proc. 2007 4th IEEE Int. Conf. Mechatronics, ICM 2007, no. May, pp. 8–10, 2007.

[15] P. M. Johnson, H. Kou, J. M. Agustin, A. Kagawa, and T. Yamashita, "Practical automated process and product metric collection and analysis in a classroom setting : Lessons learned from Hackystat-UH," 2004.