

# Integration of a Smart Remote Controlling System with Electrical Appliances in Order to Optimize the Usage and to Develop an Energy Efficient System

Shradha Dwivedi<sup>1</sup>, Venkateswaran Radhakrishnan<sup>2</sup>, Peeyush Dwivedi<sup>3</sup>,  
and Yashir Ambula<sup>4</sup>

<sup>1</sup> Faculty, Mathematics, Math and Computing Skills, University of Technology and Applied Sciences, Salalah, Oman

<sup>2</sup> Faculty, College of Computing and Information Sciences, University of Technology and Applied Sciences, Salalah, Oman

<sup>3</sup> Faculty, Business Studies Department, University of Technology and Applied Sciences, Salalah, Oman

<sup>4</sup> Faculty, College of Computing and Information Sciences, University of Technology and Applied Sciences, Salalah, Oman

Correspondence should be addressed to Shradha Dwivedi; [Shradha.Dwivedi@utas.edu.om](mailto:Shradha.Dwivedi@utas.edu.om)

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**ABSTRACT-** Electricity is a powerful tool and must needed recourse of energy of all time in life existence since its invention. Its optimum utilization is a need of the era where various measures are taken on controlling methods by some enforced and imposed ways, we discuss a smart system which works to control unnecessary wastage of resources by keeping a time-to-time check on the system can be collaborated with a smart alert system. The idea is to not to control the usage but to curb the wastage for the optimum and efficient use of the available resources.

In this project we proposed a smart system in which a signal will be send to mobile phone first if there is no human presence detected. After getting alert of human absence, electrical appliances can be switched OFF through mobile phone. This Idea is helpful when at the same working time some rooms are in use and some rooms are unused. So, by remote controlled switching of the appliances, electricity can be saved. This control can be done from the 25-20 meters range so in this case no need to approach the room manually to operate the switches. The objective of the project is to model a system to optimize the use of available resources for meeting the energy needs by saving energy while it is not under use. In this way a huge amount of energy can be saved. This will not only reduce the electricity bill but it will promote the optimum utilization of energy sources. Remote controlling of electrical appliances through a smart mobile system also restates the human nature of laziness in switching OFF appliances while they are not in use so it has a wide use in domestic's field also.

**KEYWORDS-** Smart Remote Device, IoT, Sensors, Mobile Technology, Energy Saving

## I. INTRODUCTION

The basic block diagram of the smart switching system integrated with the conventional switching method is shown in the fig.1. Shows how the process will take place. The proposed system uses motion sensors, IOT device which is connected to electrical appliances all connected to mobile application.

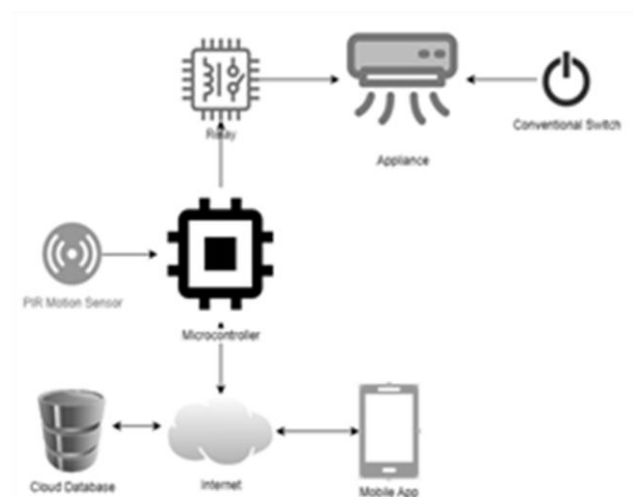


Figure 1: Block Diagram for the Proposed System

IOT is the main controlling unit to control the electrical appliances via mobile application. In this system first sensors attached to the electrical appliances senses the human presence. An alert is generated in the 25-30 meters range at least to the mobile application if there is no human using the appliance[1]. After that a message will be sent through the user to the control unit to switch OFF the appliance. This system .This system enables the controller/user to correspond with the control unit by

sending a message through WIFI. This is the advantage of the system that switching of an electrical appliance through mobile application which adjust and enhance its usage as per the human nature of laziness in switching OFF the unused appliances or the physical distances when appliances are in different floors in the building. With use of smart system, it doesn't stop the manual functioning of the electrical switches. It works as usual whenever it is needed.

## II. OBJECTIVES

To accomplish the proposed project, following objectives are intended to achieve:

1. The first objective of the project is to make an energy efficient model to reduce the waste of electricity at institutional level.
2. The second objective of to set and promote an energy efficient system which is controlled through mobile application only.
3. By utilizing advanced technologies effectively, saving energy wastage and time is the main objective.
4. Developing a system which will help in reducing a heavy electricity bill to some noticeable extent.

## III. LITERATURE REVIEW

Future of mankind is depending on the technology growth which helps mankind in many ways and one of its many uses is smart remote controlling system. A smart remote controlling system is much needed thing in the era of controlling the electrical appliances. In this decade, tremendous control technologies on electrical switching is being implemented in order to optimize the usage of electricity. Many researchers have done work previously in IOT devices like Subramaniam et al. [2] found multiple method switching system for electrical appliances using programmable Logic controller. Here main focus was on programmable devices. Similarly, Wadhwani et. Al [3] have done work on home automation and security system using IOT devices.

Manikandan et al. [4] also worked on IoT enabled Smart Switch With user-friendly Electrical Interfacing. Above all work mostly on smart home switching system but our project has a wide work area as it will develop a model for a big working area of an organisation. It is vision to be implanted in a big building to control all appliances from a corner control through Mobile application. As idea behind proposed project is not automation or using a programmable device but to control electricity wastage through remote controlling.

## IV. METHODOLOGY

Here in this project, we plan to set a model to save electricity by connecting electrical appliances with mobile application for the range of 25-30m at least so that electrical appliances can be switched OFF when not in use without using any manual efforts physically. We are aware of the fact that developing a model which use remote controlling for electrical appliance from a 25-30m distance is a difficult task but if it works fine, it can be a revolutionary thing in saving electricity as we are trying to overcome human nature of ignorance and laziness in

switching OFF electrical appliances. Model includes an application development and its implementation.

### A. Control Components Used In Smart System

**A.1 Human Presence Sensors:** A motion sensor is an electronic device capable of detecting nearby motion. The most common motion sensor used in IoT is the PIR (Passive Infrared) Motion Sensor which can detect movements for a distance of around 3 to 7 meters. The sensor is able to detect changes in the amount of infrared radiation in its field of view like for example, in an empty room, the sensor initially detects room temperature. When a person walks into the room, the sensor will pick up the rise in temperature as it detects body temperature. The sensor then converts the difference in temperature as a change in the output voltage thereby triggering the detection.



Figure 2: Motion Sensor

**A.2 Device to Control the Electrical Switches:** Relays are devices that can open and close circuits by receiving electrical signals from an outside source such as a microcontroller. Since microcontrollers operate on a much lower voltage, usually 3 or 5 volts, than the electrical circuit where the appliance or electrical device to be controlled is connected, which is usually from 110-240 volts.

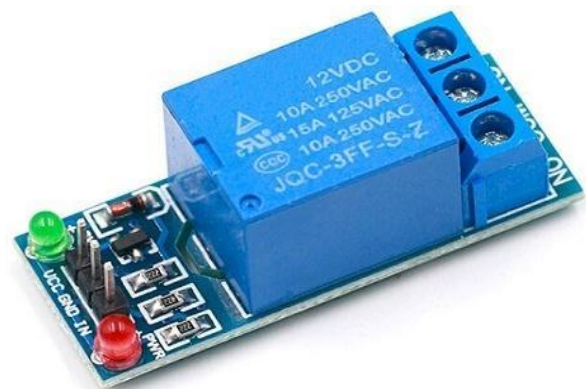


Figure 3: Relay Model

### A.3 GSM Modem to Make the System WIFI Enable:

There is no need for a separate GSM module since the system will be deployed in a house or a building that usually have WiFi network. Today, Single Board Computers (SBC) such as the Raspberry Pi or Micro Controller Unit (MCU) such as the Arduino Uno WiFi

already have WiFi connectivity. GSM modules can be used if the system or part of the system is deployed in the field.



Figure 4: GSM Modem

**A.4 Mobile App:** The mobile app is a most important part of the system. Mobile app is the lifeline of the project, which makes the project more flexible. So, in its first part human presence/absence alert will be generated in the mobile app. In its second part appliances will be switched OFF through mobile application only.

## V. ACADEMIC, SCIENTIFIC SIGNIFICANCE

The proposed project has definitely an innovative idea to be implemented to save electricity. Developing a model by incorporating a modern technology will have a scientific significance. It will support in establishing in academic significance also as while working for the project research assistance those are studying at diploma level will learn many things regarding IOT. Developing an innovative model can raise interest of everyone in saving electricity as it is handled by the use of mobile phone which is a life line of mankind now a days.

## VI. CONCLUSION

The project holds the potential for revolutionary impact, particularly in the realm of mobile remote control for electricity conservation on an institutional scale. This innovation is poised to significantly enhance a country's overall electricity-saving efforts. Our project's scope deliberately remains expansive, allowing for future advancements such as the development of a model for error detection and a power failure system. The error detection system is designed to seamlessly integrate with smart systems, enabling the identification and notification of faulty electrical appliances connected to it. Additionally, the power failure system, when integrated with the smart system, provides alerts to users, pinpointing specific floors or rooms affected by power outages. The envisioned system stands as a promising and innovative solution, offering valuable contributions to the respective industry.

## CONFLICTS OF INTEREST

The authors declared that they have no conflicts of interest.

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## ABOUT THE AUTHORS



**Dr Shradha Dwivedi** has earned her Ph.D. in "Mathematical Study of probability distributions" .having 16 years' of work experience in research & academics at National & International level. Currently, working in one of the most prestigious institutes of Oman UTAS Salalah as a lecturer of Mathematics in Preparatory studies centre ,Math and Computing Skills since 2017.During her teaching tenure she taught various math courses for bachelor; advance diploma, diploma and foundation level. Having a work experience in many prestigious institute in India and Oman. As a researcher, she worked on Mathematical study of probability distributions, their Order statistics and Bayesian analysis. Reviewer of impact factor journals and published many papers in Scopus indexed journals. She is a lifetime member of Ramanujan mathematical society (RMS), 'Indian mathematical society' and a member of IEEE. Acquired certificates by Microsoft certification as Microsoft certified educator (MCE) and Microsoft technology associates (MTA).Holding a good 'h' index in research gate, google scholar. Possessing a good hand in various soft wares for the research perspective and mathematics teaching. Always looking forward to evolve as a remarkable researcher and a teacher.





**Dr. R. Venkateswaran** earned his Ph.D. in computer science. Presently, he serves as a faculty member in the Cyber and Information Security division of the Information Technology Department and acts as the counsellor for the IEEE student branch at the University of Technology and Applied Sciences, Salalah. With over two decades of academic and administrative expertise in both India and abroad, Dr. Venkateswaran is an active member of professional organizations such as CSI, IEEE, ISACA, and various IT forums. Dr. Venkateswaran has conducted technical workshops and seminars for both students and staff and holds industry certifications, including Cisco Certified CCNA R&S and Certified Ethical Hacker (CEH) from EC Council. Under his guidance, students have earned best paper and poster awards at conferences and symposiums in Oman. Adding to his professional credentials, Dr. Venkateswaran holds Microsoft Technology Associate (MTA) certifications in Networking, Information Security, Mobile Security, and Database Administration, along with Huawei cloud and security certifications. Recognizing his exceptional performance, dedication, and significant contributions, the University management honored him with the "Certificate of Recognition" for the Academic Years 2012-13, 2014-15, 2016-17, and 2021-22. In July 2020, his article on "Cyber Security" was published in the Oman Observer, a leading newspaper in Oman. Dr. Venkateswaran has further demonstrated his commitment to research by securing many research grants from the Ministry of Higher Education, Research and Innovation from Oman.



**Dr. Peeyush Dwivedi** got his Ph.D. awarded in Software Reliability Estimation through Soft Computing Techniques. Presently, he is working as a faculty of Digital Marketing in the College of Commerce and Business Administration of University of Technology and Applied Science, Salalah. Having around 25 years of Academic and Administrative expertise in both India and Oman, Dr. Peeyush is an active member of various professional organizations, Academic Communities and forums. Dr. Peeyush is an author of three books in the field of System Analysis and Design, Software Engineering and Operating Systems. He is in charge of implementing the University ERP system for the college. He is regularly providing Training and conducting technical workshops and seminars for staff for the same. Dr. Peeyush is a dedicated researcher and got his research papers published in various reputed international journals. Dr. Peeyush is member of the committee for the development of curriculum and courseware for various CEBA programs. He has been awarded with the "Certificate of Recognition" by the University Management for the Academic Years 2012-13, 2013-14, 2021-22 and 2022-23.



**Mr. Yashir Ambula** is a graduate of Bachelor of Science in Computer Science with a Master's Degree in Education. He is a Licensed Professional Teacher and an ISC2 member. He has been an integral part of the University of Technology and Applied Sciences-Salalah (UTAS) for 14 years, contributing both academically and practically. Mr. Yashir has a total of 28 years teaching and administrative experience in the Philippines and Oman. He is a Cisco Netacad Networking Instructor for 13 years, sharing his expertise and guiding students in understanding the complexities of Networking, IOT and Cybersecurity. He conducts trainings for students as well as professionals. Mr. Yashir handles IOT graduation projects for Bachelor's level including courses in Networking, Security and IOT for Diploma and Advanced Diploma levels. He holds certifications on Huawei HCIA Security, Microsoft Technology Associate in Networking and Security, showcasing a commitment to staying current with industry-relevant skills and is actively pursuing further knowledge in these fields.