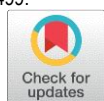# Smart Arduino Touch Switch Board for Home Automation

Rahul Kasbe[1], Omkar Yadav[2], Yusuf Amin[3], Deepti Vijay Chandran[4]

[1,2,3,4] Department of Computer Engineering, Smt. Indira Gandhi College of Engineering, Maharashtra, India.

Abstract: *We live in an exciting time where more and more everyday items "things" are becoming smart! "Things" have sensors and can communicate with other "things" and can provide control to more "things". The Internet of Things, IoT, is totally up to us people in a huge way and we are rapidly inventing new gadgets to enhance our lives. The prices of microcontrollers used in IoT devices with the ability to talk over a network keeps reducing and developers can now think and build things inexpensively. This IoT based home automation project is done using low-cost custom build Arduino UNO module, and Bluetooth module. A system that uses mobile app to control basic home functions and features automatically through mobile from anywhere in the house, an automated home is sometimes called a smart home. The home automation system differs from other IoT based systems by allowing a person or the user to operate the system from anywhere in the house through wireless connection without breaking any convention usability. This project provides significant electric power solution at homes and at the offices with help of dynamic control of electric equipments over the wireless network and using smart switch, and another is a low-cost touch screen panel. Project contains both hardware and software development where hardware program is built on Arduino IDE, whereas mobile application is built using MIT App Development.*

Key Word: Home automation, Bluetooth, Touch switch.

I.INTRODUCTION

Our project Smart Touch switch is basically a smart home automation system where the control is done by a smart phone application and processing is done by the microcontroller. The objective of the project is to design a prototype of smart control system for electrical and electronic appliances in a house that will require minimal installation while offering a more comprehensive power monitoring and control. It will be more reliable and user friendly than most of the smart home automation systems available in the market. It will provide automatic control of appliances during specific timings so as to reduce the burden of manually controlling them as well as reduced power consumption.

Nowadays, we have remote controls for our television sets and others electronic Systems, which have made our lives really easy. Have you ever wondered about home automation which will give the facility of controlling tube lights, fans and other electrical appliances in the house using a remote control? Off-course, yes but the available options are not cost-effective & we have found a solution to it. We have come up with a new system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smart phone. Time is very valuable thing. Every person wants to save time as much as they could. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. With your mobile phone. You can turn on/off your home appliances the range of Bluetooth.

II.PROBLEM STATEMENT

Home automation systems have four major challenges and they are poor manageability, inflexibility, difficulty in achieving security and high cost of ownership, The main objectives of this research are to design and implement a home automation system using IoT that is able to control and automate most of the house appliances through an easy manageable interface. The proposed system has a great flexibility by using Bluetooth technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration with guidance on how to perform the correct pose. This guidance is generated by solving an optimization problem that minimizes the distance between the current joint coordinates and the target joint coordinates for the correct pose.

III.SCOPE

The scope of IoT based home automation system is increasing day by day because of its growing technology.

3.1 Integrated smart home devices

Small things inside the homes can be controlled through voice commands and smart phones. This will make daily life easier and accurate. Saavn songs can be played with voice command.

3.2 Automation outside the homes

Sensors will inform the user if the parking space is available or not, irrespective of where they are. Additional security can also be made available with AI implementations. Sensors can also be used for streetlights.

3.3 Smart devices

Smart mirrors can be developed that can play music, TV can be used for social media platforms, while the fridge may sense outside temperature and work accordingly to the environment outside. Similarly, drones may be used for delivering packages on right time.

IV.LITERATURE SURVEY

This document was written to implement a smart home system with improved authorization and security practices, considering the detailed description of the different technologies that exist today. This work is done taking into account the various smart home systems such as B. central control-based smart home systems, context-aware smart home systems, Bluetooth-based smart home systems, short message services, the global system for mobile communication or mobile-based smart home systems and internet-based smart home systems. The paper concludes with a forward-looking orientation of smart home security research. We implement a smart home system based on Bluetooth as it is always popular among researchers. Easily scalable and accessible in terms of access and use, Bluetooth is a very popular and common method of communication in today's world.

4.1 Bluetooth-based Smart Home

Bluetooth is a short-range wireless technology typically used to establish communication between many different devices for the transmission of media or instructions. It uses radio waves with short wavelengths that cannot cover long distances (maximum 100 m). It can be used to connect devices. The work of N. Sriskanthan.

Shows the implementation of a smart home over Bluetooth with a host controller implemented on a PC and connected to a microcontroller-based sensor and device controllers. It is proposed to enable communication between devices. The system allows multiple device controllers to be connected to the host controller. Under some ideal conditions, Bluetooth has the highest range, up to about 100m. In comparison, Bluetooth communication generally uses more power, requiring frequent charging or replacement of device batteries. Bluetooth technology should only be used when there is rapid, short-term communication with very little security concern.

4.2 Wi-fi Based Smart Home

Wireless-Fidelity, commonly known as Wifi, uses radio waves to transmit data. Provides high-speed Internet and network connections. It is a wireless means of communicating with different places in the house and connecting different devices.

It can be used in a variety of specifications that vary depending on the purpose. Equipment can be placed anywhere. No unnecessary cables are needed in your home. No additional Ethernet output is required, it also offers a long range and is more efficient. Wi-Fi is very popular with many people.

4.3 Cellular Smart Home

Cellular smart homes are surprising businesses due to the popularity of cell phones and GSM. The work proposes a smart home system using SMS. This system detects illegitimate intrusions into the home and only allows legitimate users to change the door access code and control the lights in the home. Illegal home burglaries are identified by monitoring the status of the front door using sensors.

The work also proposes an SMS-based home automation system. In this system, an Android application has been created that runs on the user's mobile phone. Legitimate users can log in to the app with their username and password and remotely control it along with some of the available User Action List features. The app sends the required notification to the user.

V.LITERATURE SURVEY

In this 21st century, the transition between traditional analogue conventions and the effortlessly improvised process to achieve the same results will make life easier and more effortless. With the introduction of touch sensors in the classic rocker switches, along with an elegant and immersive appearance, the switches are becoming more than just traditional click switches for tactile activation, i. H. a touch, replace; the switch is turned on or off. In addition to touch activation, mobile phones are not only used to communicate, but also to control the activation process and reduce the time and effort otherwise spent.

Various attempts have been made to facilitate and change the traditional methods and understanding of the ways to activate a switch. The current loop helps to facilitate tracking and control the state of the application. With it, any application can be activated and deactivated at any time and from any corner of the world, as long as both are connected virtually and meet all requirements.

VI.PROJECT MODEL

This project used iterative software development. The iteration involves a loosely sequential set of activities through business modeling, requirements, analysis and design, implementation, testing, and deployment in varying proportions depending on where the iteration is in the development cycle. The iterations at startup and at elaboration focus on management, requirements and design activities. Build phase iterations focus on design, implementation, testing, and transition phase iterations focus on testing and implementation.

Project Advantages of Implementing Iteratively

An iterative approach is generally superior than linear and waterfall approach for various reasons.

• Risks are mitigated earlier, because elements are gradually integrated.

• Tactics and methods will meet changing needs customized.
• The improvement and refinement of the product is facilitated, leading to a robust product.
• Organizations can learn from this approach and improve their process.

VII.IOT DEVICES

7.1 Arduino UNO

The Arduino UNO is a standard Arduino board. Here UNO means "one" in Italian. It was named UNO to denote the first version of the Arduino software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects.Arduino.cc developed the Arduino UNO board. Arduino UNO is based on an ATmega 328P micro controller. It is easy to use compared to other boards like Arduino Mega Board etc. The board consists of digital and analog input/output (I/O) pins, shields, and other circuitry.The Arduino UNO includes 6 analog input pins, 14 digital pins, a USB connector, a power connector, and an ICSP (In-Circuit Serial Programming) header. It is programmed on the basis of IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

7.2 2.4" TFT LCD Module

A 2.4" TFT LCD module consists of a bright backlight (4 white LEDs) and a colorful 240X320 pixels display. It also features individual RGB pixel control giving a much better resolution than the black and white displays. A resistive touch screen comes pre-installed with the module as a bonus and hence you can easily detect your finger presses anywhere on the screen.

7.3 Relay Modules

The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area through ON or OFF.

7.4 Bluetooth HC 05

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions. It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air. It uses serial communication to communicate with devices.

VIII. SYSTEM ARCHITECTURE

This chapter provides a framework for designing a functional and cost-effective home automation system, first discussing general design considerations that need to be evaluated before beginning, followed by a review of the tradeoffs between different architectural approaches to designs, and then how this design is implemented using system-on-chip technology.
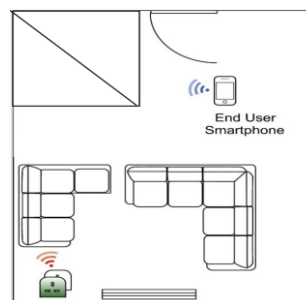
8.1 System Design

In the gadget layout and implementation section of the proposed technique to the recognized gaps with inside the reviewed literature, both software program and hardware gear had been utilized. These gears are properly proper for accomplishing our favored aim of constructing a viable wi-fi domestic automation gadget. In constructing the designed prototype, quite simply to be had circuit additives had been employed. The cost, efficiency, implication, and suitability of every of the additives used with inside the prototype layout had been cautiously weighed. The improvement gear used on this challenge had been powerful in supporting to supply the set targets the use of the proposed gadget.

8.2 GUI Design

Every part of the system has some level of programming to enable flexibility and adaptable control to achieve the complete home automation system. The design software environments used in this paper for the hardware and application programming include the Arduino Integrated Development Environment (IDE), Android Studio, Visual Studio Code & MIT App Development. All code on any Arduino component was done with the Arduino IDE; the Android application was built with Android Studio & MIT App Development.

IX.CONCLUSION

Android is the world's most powerful open source operating system for mobile platforms, easily adaptable to any functionality we imagine. In this review, we implemented such an affordable smart home automation system using some of the inexpensive devices where reliability and authenticity were our main concerns. In this way, many problems such as cost and flexibility can be overcome. In addition, it is very convenient to use and will improve the comfort of our home. Examining different home automation systems shows that different types of technologies are used to implement this type of system.

All proposed systems were presented and compared in it, with some advantages and disadvantages of the systems being pointed out. Various home automation systems have been discussed in this review. Due to its performance, simplicity, low cost and reliability, the home automation system positions itself in the global market, the day when every home will be a smart home is not that far away.

X.FUTURE SCOPE

This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home. Household appliances can be easily controlled via a Mobile/Tablet. Status of light, fan and other electrical appliances can be known. With the help of IP camera, video of rooms or certain area of a house can be recorded. This helps to provide security.

References

1. P. S. Nagendra Reddy, K. T. Kumar Reddy, P. A. Kumar Reddy, G. N. Kodanda Ramaiah and S. N. Kishor, "AnIoT based home automation using android application," 2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES), Paralakhemundi, 2016, pp. 285-290, doi:10.1109/SCOPES.2016.7955836.
2. K. Mandula, R. Parupalli, C. A. S. Murty, E. Magesh and R. Lunagariya, "Mobile based home automation using Internet of Things(IoT)," 2015 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT), Kumaracoil, 2015, pp. 340-343, doi: 10.1109/ICCICCT.2015.7475301.
3. V. Puri and A. Nayyar, "Real time smart home automation based on PIC microcontroller, Bluetooth and Android technology," 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom), New Delhi, 2016, pp. 1478-1484.
4. D. Pavithra and R. Balakrishnan, "IoT based monitoring and control system for home automation," 2015 Global Conference on Communication Technologies (GCCT), Thuckalay, 2015, pp. 169-173, doi:10.1109/GCCT.2015.7342646.
5. Chintan H. Patel, Kinyari P. Parmar, Nikunj I. Parmar, Mr. Sachin Patel – ―Smart switchboard using touch and voice commands
6. Lalith Mohan Satapathy, Sameer Kumar Bastia, Nihar Mohanty – ―Arduino based home automation using Internet of Things(IOT)
7. J. Kavitha, O. Naveen, P. Manoj Kumar, K. Subba Rao – ―Bluetooth based home automation using Arduino and android application
8. Home automation IEEE PAPER 2017 – engineering research papers https://www.engpaper.com
9. A review paper on home automation https://www.oaji.net
10. Arduino based home automation using Internet of Things (IOT) https://acadpubl.eu
11. Mukesh Kumar, Shimi S.L "Voice Recognition Based Home Automation System for Paralyzed People"International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 4,Issue 10, October 2015.
12. G.Sankar, K.N.Sreekumar, M.Kumaresan, "Resistive Touch Screen Based Home Automation System Design" Journal of NanoScience and NanoTechnology", Vol2, ISSN 2279 – 0381, Pp 140-143, February 2014.
13. Sivaram, A. M., Lydia, E. L., Pustokhina, I. V., Pustokhin, D. A., Elhoseny, M., Joshi, G. P., & Shankar, K. (2020). An Optimal Least Square Support Vector Machine Based Earnings Prediction of Block chain Financial Products. IEEE Access.
14. Shankar, K., Zhang, Y., Liu, Y., Wu, L., & Chen, C. H. (2020). Hyper parameter Tuning Deep Learning for Diabetic Retinopathy Fundus Image Classification. IEEE Access.