Integrated Home Automation & Door Lock Security System

Shreyas Rajesh Saraf [1], Prof.Supriya Dinesh[2]

Student, of E&TC Engineering, JSPM's Imperial College Of Engineering & Research, Wagholi

Pune, Maharashtra, India

Assistant Professor, Dept. of E&TC Engineering, JSPM's Imperial College Of Engineering & Research, Wagholi

Pune, Maharashtra, India

Abstract : The Integrated Home Automation & Door Lock Security System represents a technological so- lution that enhances convenience, comfort, and efficiency within res- idential environments. This system integrates various smart devices and sensors to automate and control household tasks, such as light- ing, heating, ventilation, air conditioning (HVAC), security, and en- tertainment systems. Through wireless communication protocols and centralized control interfaces, users can remotely monitor and manage their homes from smartphones, tablets, or computers. The HAS relies on a network of interconnected devices, including smart thermostats, smart lighting fixtures, motion sensors, door/window sensors, surveillance cameras, smart locks, and voice-activated as- sistants. These devices communicate with each other and with a cen- tral hub or controller, enabling seamless coordination and intelligent automation of household functions based on predefined rules, sched- ules, or user preferences. Overall, the Integrated Home Automation & Door Lock Security System of- fers a modern and efficient solution for managing household tasks and enhancing the quality of life for homeowners. By leveraging smart technologies and automation, the HAS simplifies daily rou- tines, improves energy efficiency, enhances security, and provides greater convenience and comfort within residential spaces.

I. INTRODUCTION

The Integrated Home Automation & Door Lock Security System represents a revolutionary paradigm shift in the way we interact with and manage our living spaces. With advancements in tech- nology and the proliferation of smart devices, homeowners now have the opportunity to transform their houses into intelligent, interconnected environments that enhance convenience, comfort, and security. The concept of home automation dates back several decades, but recent ad- vancements in wireless communication, sensor technology, and artificial intelligence have propelled it into the mainstream. Today, a Home Automation System encom- passes a wide range of interconnected devices and sensors that automate and control various aspects of household functions, including lighting, heating, ventilation, air conditioning (HVAC), security, entertainment, and more. At its core, the HAS relies on a network of smart devices, sensors, and ac- tuators that communicate with each other and with a central control unit or hub. This central hub serves as the brain of the system, coordinating and orchestrating the operation of all connected devices based on predefined rules, schedules, or user inputs.

The benefits of implementing a Home Automation System are manifold. Firstly, it offers unparalleled convenience by allowing homeowners to remotely monitor and control their homes from anywhere with an internet connection. Whether adjusting the thermostat, turning off lights, or checking security cameras, users have complete control over their home environment at their fingertips. Moreover, the HAS promotes energy efficiency by optimizing the use of re- sources, such as electricity and heating/cooling, through intelligent automation. By automatically adjusting lighting, HVAC systems, and other energy-consuming de- vices based on occupancy, time of day, and ambient conditions, the system helps reduce energy waste and lower utility bills.

Furthermore, the Integrated Home Automation & Door Lock Security System enables personalized automation and customization, allowing users to tailor their home environment to their individual preferences and lifestyle. Whether setting up automated routines, creating custom schedules, or in- tegrating voice-activated assistants for hands-free control, the system adapts to the unique needs of each homeowner. In summary, the Home Automation System represents a transformative tech- nology that empowers homeowners to create smarter, more efficient, and more se- cure living spaces. By leveraging the power of connectivity, automation, and intel- ligence, the HAS enhances the quality of life for residents while promoting sustain- ability and resource conservation in the modern home.

OBJECTIVE OF THE PROJECT:

- To provide seamless and user-friendly control of various home devices and systems.
- enable voice commands for hands-free control, enhancing accessibility and convenience.

- develop a responsive Android app that allows users to remotely manage their smart home from anywhere.
- integrate a wide range of home automation devices, such as lighting, heating, security, and entertainment systems.

II. LITERATURE SURVEY

Paper Name: Web Services and GSM based Smart Home Control System
Author: Tahar Dahoumane,Mourad Haddadi.
Abstract: Integration of various and promising technologies has been observed in smart home control systems in recent years. Such smart systems can in- corporate wireless protocols, web services architectures, mobile communica- tions standards, and many other technologies. It is crucial to make the right decisions when selecting the technologies that will be included into the fu- ture smart house. This study presents a sophisticated control system for smart homes. The suggested solution enables users to remotely and flexibly monitor and operate home appliances and gadgets. The user of this proposed system has the option to take control of the system remotely using GSM as an alter- native to the internet. XBee ZigBee modules, Raspberry Pis, created smart plugs, and GSM modems are used in the creation of this system.

Paper Name:IOT BASED HOME AUTOMATION
Author: Anusha Nallanagula, Akhil Kumar, Bhanu Prasad
Abstract: Despite being in use for decades, the home control system is still a luxury item for affluent clients due to the project's expenses and budget. The Integrated Residence Automation System states that security is one of the pri- mary reasons home automation technology is not used. Occasionally, because of their hectic daily routines, they forget to turn off the devices at home. Our hectic daily routines and clumsy attitude can occasionally leave us in a hurry and make us forget to turn off the lights. Power costs will significantly rise as a result. It is also a type of electrical waste that will exacerbate the health crisis on the globe. The system makes use of NODEMCU in tandem with domestic appliances. Home appliances that can be utilised to control technol- ogy and offer a wholesome living conditions to prevent damage and loss to any the business assets. The principal Arduino is the piece of software used in this project. The. The Think Speak programmed is being used to provide the command. Most initiatives related to home digitalization occasionally referred to as household appliances, utilise this application or programme. and hardly ever utilise other apps. In contrast with an other project It makes use of a tablet, laptop, and additional much more Easy to use.

Paper Name:VOICE CONTROL HOME AUTOMATION SYSTEM US- ING RASPBERRY PI
Author: Rohit Jaykar, Shraddha Chobe, Tejshree Kamegaonkar, Varsha Sur- wase
Abstract: The idea is to operate home appliances with voice commands. There are a lot of gadgets available that can achieve this. On the other side, creat- ing your own is amazing. The idea is to operate home appliances with voice commands. There are a lot of devices available that can do this. Creating your own, however, however, is excellent. Make a personal assistant to aid you in completing your responsibilities. Your helper is the sole individual who needs spoken orders. This project makes use of the Raspberry Pi and involves con- figuring an Adafruit creating an account, connecting it to the IFTTT app, and incorporating Google Assistant for voice control.

Paper Name: Home Automation Application with voice commands using Arduino
Author: Arpita Shelke, Pooja Kalasappanavar, Radhika Kotgire
Abstract: Since the utilization of energy is expanding step by step, there is an extraordinary need to stop the abuse of energy altogether. Home automa- tion is one of the best ways of the utilization of this innovation everybody can improve their lifestyle at the homes, it erases human endeavors and stress, en- ergy efficient in this way make a smart home. This home mechanization or innovation progress is mind blowing in previous time and in the future too it will develop dramatically as their necessities, prerequisites, and advantages. Everybody wants to save their time and energy alongside this there are like- wise incapacitated individuals in houses and they can't move regularly in the home for controlling machines, so utilizing a home automation framework empowers those all individuals to control all the apparatuses effectively and with ease. This paper gives the pragmatic methodology and execution of a dependable, effectively open, reasonable, minimized and modest. Home au- tomation framework that depends on an android phone, home appliances can be controlled with simply a single touch on the android portable application.

Paper Name:SMART HOME AUTOMATION SYSTEM BASED ON IoT
Author: Vivek Kadiyan , Mandeep Singh , Adarsh Kumar , Ashu Saini , Hi- manshu Singh
Abstract: The smart home automation system based on IoT (Internet of Things) is designed to provide an intelligent and connected environment within a res- idential setting. The system utilizes sensors, actuators, and internet connec- tivity to enable automation, control, and monitoring of various home devices and systems. Through the integration of IoT technologies, the smart home au- tomation system enhances convenience, energy efficiency, security, and overall comfort for the residents.

III. SYSTEM DESIGN

3.1 Block Diagram:
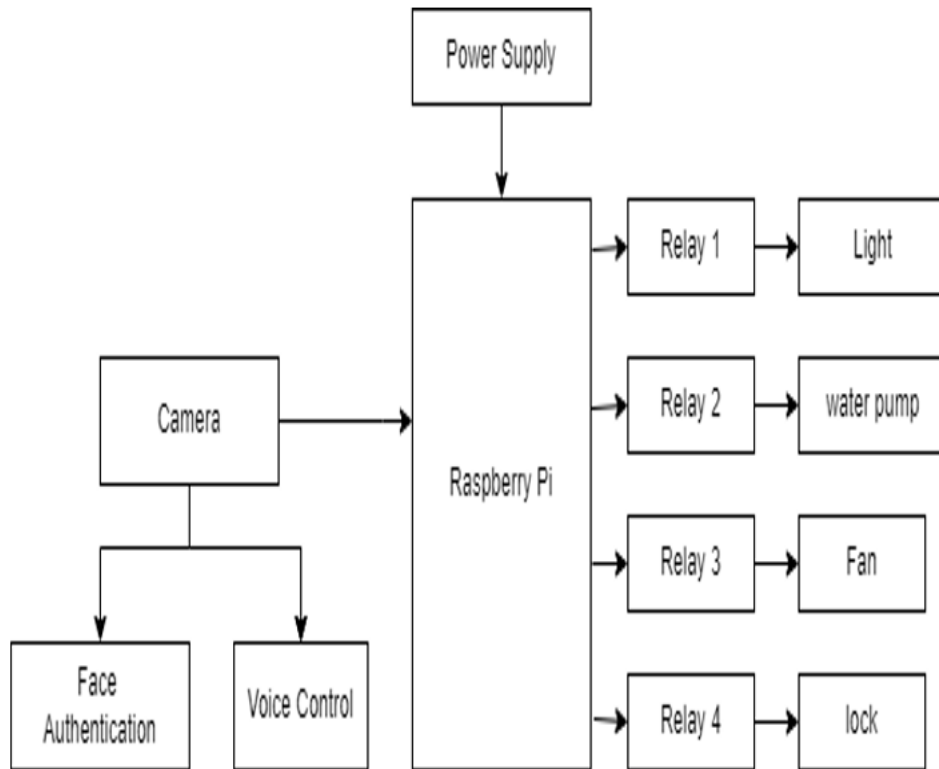
There are some basic components which are connected to 4 channel relay.   Command is entered through smartphone or google assistant, smartphone trans- fers the command to controller. Controller controls the relay and relay controls the components. Power supply required for controller is 5V Dc and for 8 chan- nel relay is 230 V AC.

3.2 Working:

The model B+ stays ahead in terms of processing speed and comes with an improved wireless capability. The dual-band WiFi 802.11ac runs at 2.4GHz and 5GHz and provides a better range in wireless challenging environments and Bluetooth 4.2 is available with BLE support. The top side is painted with metal shielding, instead of plastic in the earlier models, that acts as a heat sink and drains the excessive amount of heat if the board is subjected to the high temperature or pressure. This B+ model is three times faster than Pi 2 and 3 which is a major development in terms of speed, capable of executing different functions at a decent pace. The ethernet port comes with 300 Mbit/s which is much faster than earlier version with 100 Mbit/s speed. It is known as gigabit ethernet based on USB 2.0 interface. Four pin header is added on the board

3.3 Algorithm:

Haarcascade Algorithm:

Haar cascade is an algorithm that can detect objects in images, irrespective of their scale in image and location. This algorithm is not so complex and can run in real-time. We can train a haar-cascade detector to detect various objects like cars, bikes, buildings, fruits, etc. Haar cascade can be understood as a binary classifier. It assigns positive to those cascade windows that can be a part of our object . and negative to those windows that can't be a part of our object. Haar cascades can work in realtime. Before the deep learning revolution redefined computer vision, Haar features and Haar cascades were the tools you must not ignore for object detection. Even today, they are very useful object detectors because they are lightweight. It is an Object Detection Algorithm used to identify faces in an image or a real time video. The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper "Rapid Object Detection using a Boosted Cascade of Simple Features" published in 2001.

IV. METHODOLOGY

System Architecture

1. Voice Recognition Module: This module is responsible for processing voice commands and controlling the home appliances accordingly.
2. Face Detection Door Lock System**: This system uses a camera to detect and recognize the user's face to grant or deny access to the home.

3. Home Automation Controller: This controller manages and coordinates the operation of various home appliances based on the voice commands received.

Voice Controlled Features

1. Voice Command Processing: The system uses a microphone to capture voice commands from the user.
2. Command Interpretation: The voice commands are processed and interpreted by the system to identify the intended action.
3. Home Appliance Control: Based on the interpreted commands, the system controls the corresponding home appliances such as lights, fans, air conditioners, etc.

Face Detection Door Lock System

1. Face Detection: The system uses a camera to capture the user's face.
2. Face Recognition: The captured face image is processed and compared with the stored images to identify the user.
3. Door Lock Control: Upon successful recognition, the door lock is unlocked to grant access to the user.

Implementation Steps

1. Data Collection: Collect voice samples and face images for training the voice recognition and face detection algorithms.
2. Algorithm Development: Develop voice recognition and face detection algorithms using machine learning and deep learning techniques.
3. System Integration: Integrate the voice recognition module, face detection door lock system, and home automation controller into a cohesive system.
4. Testing and Validation: Test the system's performance, accuracy, and reliability under various conditions and validate its effectiveness in controlling home appliances and securing the door.

V. CONCLUSION

In conclusion, the Smart Home Control System project has successfully de- livered a user-friendly and versatile solution that empowers homeowners to control their devices and systems through voice commands and an Android app. This project enhances convenience, energy efficiency, security, and cus- tomization in the home environment, ultimately improving the quality of life for users while offering scalability and reliability. The proposed Home Automation System with Voice Controlled Features and Face Detection Door Lock System offers a comprehensive and intelligent solution for home automation and security. By leveraging voice recognition technology for hands-free control of home appliances and implementing face detection for a secure door lock mechanism, the system enhances the convenience, efficiency, and security of managing and controlling a smart home environment. The successful implementation and integration of the system demonstrate its potential to revolutionize the way we interact with and manage our homes.

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