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Survey on Simplismart: Android Driven Home Automation System Using IOT

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ABSTRACT: Due to the rapid development in the field of the Automation industry, human life is becoming more advanced and better in all aspects. In the present scenario, Automated systems are being preferred over the non-automated system. With the rapid growth in the number of consumers using the internet over the past years, the Internet has become an important part of life, and IoT is the newest and emerging internet technology. Internet of things plays an important role in human life as well as in the educational field because they are able to provide information and complete the given tasks while we are busy doing some other work. In this paper, a prototype and implementation of Smart Home Automation with Wi-Fi technology are demonstrated. ESP8266 is used as a Wi-Fi technology. The proposed system consists of a hardware interface and software interface. In the hardware interface, the integration of ESP8266 Wi-Fi technology for controlling home appliances and sensors is manifested, and an application is provided for controlling to multiple users of home, with smart phones, tablets, and laptops. This system is one of the best methods for controlling home devices with ease with multiple users and one of the best methods for an energy management system. The access to the whole system is given by its admin only to different users. This system is also expandable for controlling various appliances used at home and also for the security and safety purpose of the home through sensors as long as it exists on Wi-Fi network coverage.

KEYWORDS: - Internet of Things (IoT), Smart Home, Energy Management, Security, Smart Systems, Home Automation, Voice-Assistant, Customizable GUI, Home Appliances Control and monitoring, Remote Controlled, Android Smartphone, Esp. Node MCU, Network Security.

I. INTRODUCTION

This project presents the overall design of Home Automation System (HAS) with low cost and wireless system. It specifically focuses on the development of an IOT based home automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions. In this project, we design the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the home. We used Node MCU, a popular open source IOT platform, to execute the process of automation. Different components of the system will use different transmission mode that will be implemented to communicate the control of the devices by the user through Node MCU to the actual appliance. The main control system implements wireless technology to provide remote access from smart phone. We are using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. We provided a data transmission network to create a stronger automation. The system intended to control electrical appliances and devices in house with relatively low-cost design, user-friendly interface and ease of installation. The status of the appliance would be available, along with the control on an android platform. This system is designed to assist and provide support in order to 1fulfil the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home.

II. LITERATURE SURVEY

1. **"Smart Energy Efficient Home Automation System using IOT", by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra.**

This paper presents a step-by-step procedure of a smart home automation controller. It uses IOT to convert home appliances to smart and intelligent devices, with the help of design control. An energy efficient system is designed that

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accesses the smart home remotely using IOT connectivity. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker and Arduino IDE to code the microcontroller. This multimodal system uses Google Assistant along with a web-based application to control the smart home. The smart home is implemented with main controller unit that is connected with the 24-hour available Wi-Fi network. To ensure, that the Wi-Fi connection do not turn off, the main controller is programmed to establish automatic connection with the available network and connected to the auto power backup.

2. **"IOT Based Smart Security and Home Automation", by Shardha Somani, Parikshit Solunke, Shaunak O Ke, Parth Medhi, Prof. P. P. Laturkar.**

This paper focuses on a system that provides features of Home Automation relying on IOT to operate easily, in addition to that it includes a camera module and provides home security. The android application basically converts Smartphone into a remote for all home appliances. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of house entrance in real time. This notification will be received by the owner of the house via internet such that app can trigger a notification. So owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The system uses Raspberry Pi, a small sized computer which acts as server for the system. The smart home consists two modules. Home automation that consists; fan light and door controller, and security module that consists; smoke sensor motion sensor and camera module.

3. **"A Dynamic Distributed Energy Management Algorithm of Home Sensor Network for Home Automation System", by Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung.**

This paper proposes an optimization of home power consumption based on PLC (Power Line Communication) for an easy to access home energy consumption. This also proposes a Zigbee and PLC based renewable energy gateway to monitor the energy generation of renewable energies. ACS and DDEM algorithm are proposed for the design of an intelligent distribution of power management system to make sure ongoing power supply of home networks. To provide efficient power management the power supply models of home sensor network are classified groups viz. main supply only, main supply and backup battery, rechargeable battery power and non-rechargeable battery power. Devices with particular features are assigned to these groups. It targets to establish real time processing scheme to address variable sensor network topologies.

4. **"Enhance Smart Home Automation System based on Internet of Things", by Tushar Churasia and Prashant Kumar Jain.**

This paper proposes a system that develops a model to reduce the computation overhead in existing smart home solutions that uses various encryption technologies like AES, ECHD, hybrid, etc. these solutions use intermediate gateway for connecting various sensor devices. The proposed model provides a method for automation with sensor based learning. The system uses temperature sensor for development but other sensors can also be used as per requirement. These smart home devices with sensors can configure themselves autonomously and can operate without human intervention. This work minimizes encryption decryption and focuses on authentication and automation of smart home devices with learning. The system bypasses local gateway mentioned in existing system to provide better security for smart home devices and sensor data and save computation overhead. The real time broker cloud is directly connected with smart home and manages all incoming and outgoing request between users and devices. The main purpose to use real time broker cloud is save time of cryptographic operations.

5. **"Visual Machine Intelligence for Home Automation", by Suraj, Ish Kool, Dharmendra Kumar, Shovan Barman.**

The paper present a vision-based machine intelligence system to sense on/off state of common home appliance. The proposed method of sensing the state of appliances results on a novel home automation system. The accessibility of the suite of devices in the home over a remote network is facilitated by the IP Addressing methods in the IOT. This project uses two boards viz. Raspberry Pi and Intel Galileo Gen 2. The communication between the User devices, Raspberry Pi and the Intel Galileo boards happens over a wireless network. The UDP protocol is deployed to facilitate the wireless communication of the nodes present in the home automation network. A Pi Cam and a USB Logitech camera attached to the rotating shaft of two different servo motor capture snapshots that are passed as inputs to the Machine Learning based models trained using dlib-C++ to detect the state of the operation of the appliances. The proposed method uses visual modality to automate the appliances, as privacy concerns may emerge while using the images from some specific places, as a counter to this issue, an SPDT switch is added to the Raspberry Pi which when turned off ensures that even

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if the images are taken from the webcams, they are just passed as inputs to the machine learning models and are not displayed on the website when the users access the website on the server address obtained from Raspberry Pi.

6. **"A Low-Cost Home Automation System Using Wi-Fi based Wireless Sensor Network Incorporating internet of Things", by Vikram. N, Harish. K. S, Nihaal. M. S, Raksha Umesh, Shetty Aashik Ashok Kumar.**

This paper illustrates a methodology to provide a low-cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi). This crystallizes the concept of internetworking of smart devices. A Wi-Fi based Wireless Sensor Network (WSN) is designed for the purpose of monitoring and controlling environmental, safety and electrical parameters of a smart interconnected home. The different sections of the HAS are; temperature and humidity sensor, gas leakage warning system, fire alarm system, burglar alarm system, rain sensing, switching and regulation of load & voltage and current sensing. The primary requirement of HAS to monitor and control of devices is accomplished using a Smartphone application. The application is developed using Android Studio based on JAVA platform and User Interface of those are exemplified. The primary focus of the paper is to develop a solution cost effective flexible in control of devices and implementing a wide range of sensors to to capture various parameters.

7. **"Voice Controlled Home Automation System using Natural Language Processing and Internet of Things", by Mrs. Paul Jasmin Rani, Jason Bakthakumar, Praveen Kumaar.B, Praveen Kumaar.U, Santhosh Kumar.**

The paper focuses on the construction of a fully functional voice-based home automation system that uses Internet of Things, Artificial Intelligence and Natural Language Processing (NLP) to provide a cost-effective, efficient way to work together with home appliances using various technologies such as GSM, NFC, etc. it implements a seamless integration of all the appliances to a central console, i.e. the mobile device. The prototype uses Arduino MK1000, known as Genuino MK1000. The NLP in this project gives the user the freedom to interact with the home appliances with his/her own voice and normal language rather than complicated computer commands. The appliances are connected to the mobile device through an Arduino Board that establishes the concept of Internet of Things. The Arduino Boards are interfaced with the appliances and programmed in such a way that they respond to mobile inputs.

III. PROPOSED SYSTEM

The proposed model of home automation system contains server, actuators, sensors and microcontrollers. The high-end server of google firebase will be setup to controlling, monitoring of the IOT devices. The proposed home automation system will be remotely control by wireless technological communication devices like smart phones, tabs and other wireless devices remotely through Internet. In this proposed home automation system can be control, managed remotely of room temperature, automatic on and off fans, automatic lights on and off, automatic gas leakage detected by sensors, automatic intrusion detection by sensors, automatic air conditioning system etc.

IV. PROPOSED SYSTEM ARCHITECTURE

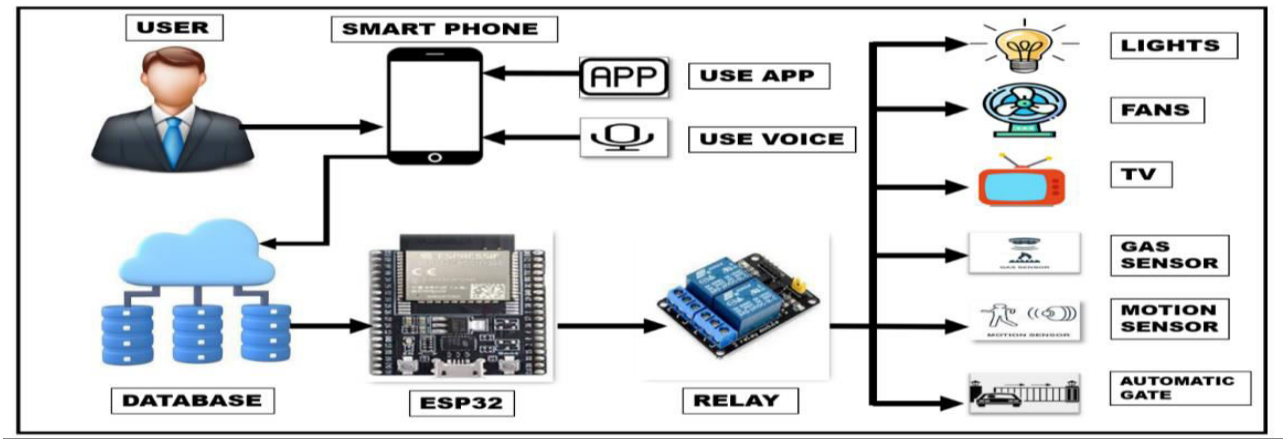

Fig 1. Proposed System Architecture

- The home automation system especially managing the house hold appliances remotely for convenient to human being.
- This system contains for notifying occur any violation for providing security and violating dangerous things will not be happened in the home.

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- The system connected with Buzzer Alarm system can sound alarm for notify human in a home for signaling any problem happened.
- And also, there is an alert SMS to user mobile or e-mail can be sent to the concerned user for alert for safety in home.
- A voice-controlled switch system to create an automated and comfortable home environment.
- The aim of this device is to create a cost-effective, dependable, and measurable home automation system that can be used to switch it on or off any electrical device remotely by a microcontroller and simple hardware.
- The project's aim is to configure and build a home automation system which can response to any command given to household appliances with a single click, using a microcontroller and an Android app on a tablet.

V. OBJECTIVES OF SYSTEM

- **Design of an independent Home Automation System**
  Home Automation System to formulate the design of an interconnected network of home appliance to be integrated into the Home Automation System. The objective to account for every appliance and its control to be automated and integrated into the network further formulated into the Home Automation System.

- **Wireless control of home appliances (Switch and Voice mode)**
  To develop the application that would include features of switch and/or voice modes to control the applications.

- **Monitoring status of appliances remotely**
  Being able to view the status of home appliances on the application, in order have a better Home Automation System.

- **Secure connection channels between application and Node MCU**
  Use of secure protocols over Wi-Fi so that other devices are prevented to achieve control over the HAS. Secure connections are obtained by SSL over TCP, SSH.

- **Controlled by any device capable of Wi-Fi (Android, iOS, PC)**
  To achieve flexibility in control of the home appliances, and device capable of Wi-Fi connectivity will be able to obtain a secure control on the Home Automation System.

- **Extensible platform for future enhancement**
  With a strong existing possibility of adding and integrating more features and appliances to the system, the designed system needs to be highly extensible in nature.

- **Security**
  This system contains for notifying occur any violation for providing security and violating dangerous things will not be happened in the home. The system connected with Buzzer Alarm system can sound alarm for notify human in a home for signalling any problem happened. And also, there is an alert SMS to user mobile or e-mail can be sent to the concerned user for alert for safety in home

VI. CONCLUSION

This paper introduces a smart home automation model that makes use of the Internet of Things. This work will be enhanced by adding transfers to the Esp 32 board for managing home appliances from a remote location in a real-world scenario. In addition, the creators suggest a traditional IoT structure with a distributed computing architecture for interfacing and supervision.

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