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Home Automation 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. 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 presentation, a prototype and implementation of Smart Home Automation with Wi-Fi technology are demonstrated. Raspberry PI 3B 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 Raspberry PI 3B Wi-Fi technology for controlling home appliances and sensors is manifested, and an application is provided for controlling to multiple users of home, with smartphones, smart watches, 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. 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: *IoT, smart watch, Raspberry Pi*

I. INTRODUCTION

A home automation system is a technological solution that enables automating the bulk of electronic, electrical and technology-based tasks within a home. It uses a combination of hardware and software technologies that enable control and management over appliances and devices within a home. Home automation is also known as domestic, and a home with an automation system is also known as a smart home. With the development of new electronic technologies and their integration with older, traditional building technologies, smart house is at last becoming a real possibility. Smart home is a house that uses information technology to monitor the environment, control the electric appliance and communicates with the outer world. Smart home is a complex technology, at the same time it is developing. A smart home automation system has been developed to automatically achieve some activities performed frequently in daily life to obtain more comfortable and easier life environment.

A geometric mean is useful in machine learning when comparing items with a different number of properties and numerical ranges. The geometric mean normalizes the number ranges giving each property equal weight in the average. This contrasts with arithmetic mean where a larger number range would more greatly affect the average than a smaller number range.

During festive holiday, we are advised not to switch on the light all the time. So why we are not advisable to leave our house with the light switches on all the time? This kind of action could attract burglar to coming into our house. When we are away from our house, whether on duty or having holiday, it is hard for us to monitor our house especially for the electrical appliance; light and fan of course we do not want this to be happening. Besides that, in term of cost, it is not a good practice as it will make our monthly electrical bill going up, just because we cannot control the electrical appliance during our holiday. If we feel something not being switch off, we could not even know the real situation and cannot going back just to switch it off. So people will buy or install additional device such as timer switch. But this kind of switch may have some disadvantages. One of the disadvantages is it only work with one profile. Means, we cannot set for several different timing. Normally this device allow up to one appliance.

II. LITERATURE SURVEY

Several methods have been proposed for Home Automation. Literature survey of these methods is presented here: Paper [1] 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 user can exercise seamless control over the devices in a smart home via the Android application based Graphical User Interface (GUI) on a smartphone.

The proposal of system [2] is to develop an IoT based Interactive Industrial Home wireless system, Energy management system and embedded data acquisition system to display on web page using GPRS, SMS & E-mail alert. This device is essential for sensor data collection and controlling of the industrial Home Wireless Sensor Networks (WSN) in the Internet of Things (IoT) environment. It is planned to style a re-configurable sensible device interface for industrial WSN in IoT atmosphere, during which ARM is adopted as the core controller. Thus, it will scan information in parallel and in real time with high speed on multiple completely different device information. Intelligent device interface specification is adopted for this style. The device is combined with the most recent ARM programmable technology and intelligent device specification. By detecting the values of sensors it can be easily find out the Temperature, Smoke, and Fire present in the industrial environment on the Website and we can handle any situation from anywhere in the world through IOT. So that critical situation can be avoided and preventive measures are successfully implemented.

In [3], Maninderpal Singh et al proposed a system for Smart Home Automation technique with Raspberry Pi using IoT and it is done by integrating cameras and motion sensors into a web application. To design this system, we are using a Raspberry Pi module with Computer Vision techniques. Using this, one can control home appliances connected through a monitor based internet. Raspberry Pi operates and controls motion sensors and video cameras for sensing and surveillance. For instance, it captures intruder's identity and detects its presence using simple Computer Vision Technique (CVT). Whenever motion is detected, the cameras will start recording and Raspberry Pi device alerts the owner through an SMS and alarm call.

Without the individual going to each house so most likely the manual meter perusing will be evaded. Clients will get week by week refresh the power utilization by methods for SMS. Power robbery can be kept away from absolutely by this paid ahead of time robotized power meter and furthermore gives data about the quantity of units overwhelmed by cost per unit. Framework presented in [4] encourages making viable utilization of power along these lines it will limit the power emergency in our nation and enhances the economy of electricity board.

In [5], Avani N. Chaudhari et al implements and develop an Android application for power measuring and payment a bill using a wireless plug. This system is designed to monitor the energy consumption and sent the consumption to the smart phone and also electricity office. We can pay our bill of consumption of power using android application without going to the bill payment office. Users can monitor consumption of energy units and its bill at anywhere and any point of time using android application. This system consists of three main parts which include data gathering and data processing and smart phone.

A new embedded technology based approach for automated energy meter reading system is proposed in [6] which enables the meter readings to be updated onto the web server automatically on a regular interval basis and sends bills to customers each month. It provides a facility of recharging the energy meters remotely. Customers can pay bills of postpaid meters and can recharge the prepaid meters by sending a message to the service provider. The meter readings are sent to nearby located central station (gateway) using RF link and from there to web server using GSM. It also provides the facility of electricity tamper detection. The wireless controlling of meter reading system is mainly done using ARM 7 microcontroller. Embedded C is used for ARM coding and web server is designed using HTML. Database is created using MySQL.

In paper [7], Tianyi Song et al proposes an improved energy-efficient, secure, and privacy-preserving communication protocol for the smart home systems. In proposed scheme, data transmissions within the smart home system are secured by a symmetric encryption scheme with secret keys being generated by chaotic systems. Meanwhile, we incorporate Message Authentication Codes (MAC) to our scheme to guarantee data integrity and authenticity. We also provide detailed security analysis and performance evaluation in comparison with our previous work in terms of computational complexity, memory cost, and communication overhead.[7]

In paper [8], Apriori algorithm for a smart home automation and metering system using IoT is presented. The main purpose of this system is to control the home appliances and electronic devices with the help of a supervisory system. The supervisory system is designed in such a way that everyone can access it. The system provides users with the ability to control, manage the electronic devices, can monitor the consumption of electricity, and to pay the

electricity bills, securely and reliably. The supplier can also monitor and accordingly and maintain the issues in an efficient manner.

Alexandra Moraru et al [9] presented vertical system coordination for predicting the amount of individuals in lab. Framework stamped sensor data with additional data and made an expanded dataset and connected machine learning figurings. In the wake of separating the gauge comes about due to the fundamental and the extended datasets, framework presumes that the amount of individuals can be foreseen in perspective of sensor data. Additionally, the desire can be improved while including additional information for every one of the three ML estimations. Framework utilized also exhibited the redesigns in accuracy of desire when obliged the estimations of the class of 0 or no individuals.

Picking the right ML system to apply on sensor data depends upon the application and on the typical outcomes. Choice trees and Bayesian frameworks give best results over direct backslide, in the meantime, to make general ends; more examinations on greater datasets are required. It has been discovered that the model made by decision trees to be the most direct to decipher and well performing. The results gotten are engaging for advance extension of the structure, by making an arrangement of sensors with the objective that more information can be gained. Furthermore considering enhancing the present system with semantic progressions for upgrading, the data for more expanded and exceedingly exact desires [10]

III. PROPOSED METHODOLOGY

This project proposes an efficient and a quick solution of the controlling various home appliances using smartwatch and mobile device as well as web application. The smart watch is used to control devices centrally. Samsung Gear S3 smart watch is used in this project.

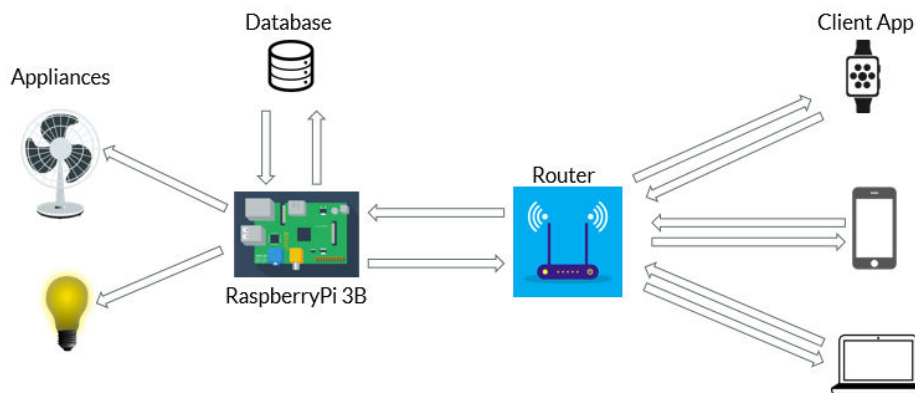


Fig 1. block diagram of proposed system

The project is to control the home appliances centrally via a smartwatch, smartphone or any other device with an internet connection.

IV. RESULT AND DISCUSSIONS

It is the one where all the testing is done with postman and web application is created. As we seen in the image we control these appliances via centralized control. These appliances can be control by web with the input “0” and “1”. As “0” stands for appliance OFF and “1” Stands for Appliance “ON”. This is how the web application works accordingly as per the input.

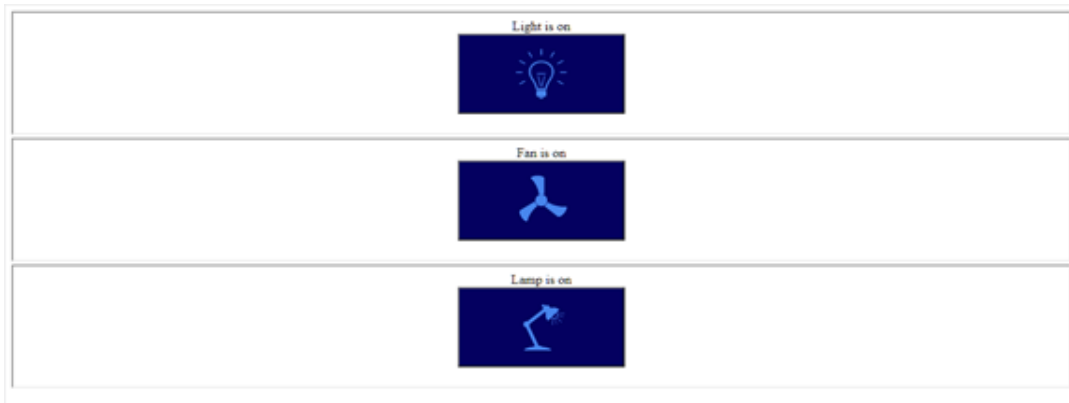


Fig. 2. Appliances

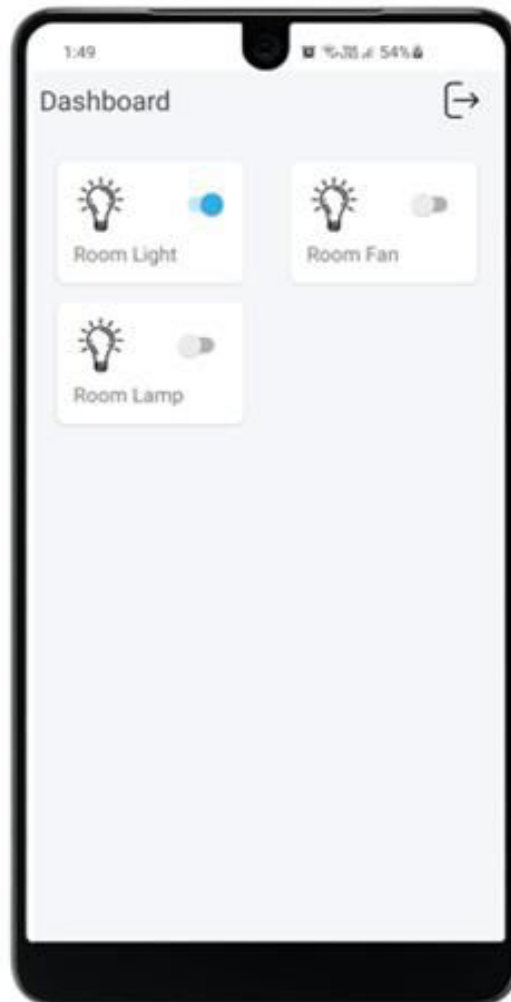


Fig.3. Mobile App

V. CONCLUSIONS

Home Automation is undeniably a resource which can make a home environment automated. People can control their electrical devices via these Home Automation devices and set up controlling actions through Mobile. In future this product may have high potential for marketing. It is very Flexible and programmable. Supports wide variety of peripherals and accessories. The system can access from any internet based device such as phone smart watches etc. The System allows multi-vendor appliances to be added with no major changes.



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