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Design and Development of an Intelligent Home with Automation System by using IoT

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ABSTRACT

The Internet of Things (IOT) is a network of internet-connected devices that can gather data and transmit that data over a wireless network without the assistance of a human. PCs and laptops that use an API. Through Google Home Applications (GMA) and Google Assistant, customers can take control of linked devices thanks to an API, or application programming interface. The two most often used protocols for IOT applications are ZigBee and Z-wave. In order to build personal area networks with portable, low-power digital radios for uses like home automation, medical device data collecting, and other low-power, low-bandwidth requirements, Zigbee is an IEEE 802.15.4-based specification. Home automation typically uses more energy than other systems. We will discuss home automation systems and various types of communication methodologies, such as GSM, Wi-Fi, IOT, and Bluetooth in this proposed system. We will also discuss energy-efficient home automation systems. In this paper, we will propose a system to control a servo motor through the developed Android application, which can be used for controlling the door lock to open/close the house doors from anywhere.

Key words: Set-top box, thermostats, and home automation. An Android programme IoT, Wi-Fi, GSM, Bluetooth, and home automation.

1. Introduction

As communications technology has developed, home automation systems have garnered a lot of attention. An Internet of Things (IoT) application known as a "smart home" (SH) enables users to remotely monitor and manage home equipment in real time. An SH is a residence equipped with an automated system that includes sensors, actuators, and controllers to improve comfort, automation, safety, and security for occupants' better quality of life. Smart technologies have permeated every part of people's daily life in the modern period, including smartphones, smart TVs, washing machines, refrigerators, and smart sensors. These intelligent gadgets can interact and communicate with one another to create an intelligent environment. It is necessary to create an automation system to control smart device connectivity within SHs. Numerous automation systems have been created, and some of them are offered as marketable goods. Some of these items are used to locally or remotely operate home appliances (VOLUME XX, 2017 9). microcontrollers were developed. The microcontroller serves as the centrepiece of the IoT-based home automation system. The primary microcontroller in this project is a Wi-Fi-based controller board from Node Microcontroller Unit (NodeMCU), an opensource platform for Internet of Things applications. At the turn of the century, the price of electronic control dropped significantly, and home automation was born. The use of home automation systems is still mostly restricted to wealthy individuals or specialised hobbyists. various automation technologies, including music players, fans, TVs, and air conditioners with remote controls. A physical programmable circuit board makes up the NodeMCU, just like any other development board, like an Arduino or Raspberry Pi. The NodeMCU can be programmed using the Arduino software, an integrated programming environment (IDE) for writing and uploading instruction codes to microcontrollers. The utilisation of devices to access and manage all household sensors and appliances is a more advanced kind of SH automation system. The most widely used devices are created as mobile apps for smartphones running operating systems like Android or iOS, or as web-based dashboards linked to open-source IoT platforms.

2. Literature Survey

In paper [1]. Fabiano Fruett, Tiago M. Serrano, Luiz C. P. da Silva, Leandro Pereira, Feliphe Andreoli, and Tuo Ji The majority of IoT (Internet of Things) solutions are used in the home domain in this article. Even for home users, energy economy is regarded as crucial. Understanding user habits about energy usage and home appliance electrical characteristics is crucial for saving energy and lowering expenses. The introduction of smart plugs promotes energy efficiency. The goal of this study is to outline the creation of a low-cost Smart Plug that offers sophisticated energy metering features that are infrequently found in end-user devices. A Smart-Plug is a device that takes the place of standard power outlets. By tracking electrical parameters of connected appliances, the created Smart Plug contributes significantly to energy efficiency in the context of the smart home. Smart plugs work well with remotes. Customers can thus use from other locations as well.

In paper [2] Al-Ali A. R., Zualkernan I. A., Rashid M, Gupta R, and Alikarar M It is claimed that using energy efficiently in smart homes reduces greenhouse gas emissions significantly, improves sustainability, and saves money and energy. Controlling power usage over the intended period, peak power consumption, the impact of weather/atmospheric conditions, and consumption slab rates are crucial for an efficient cost-saving system. Smart devices, Wireless Sensor Networks (WSN), and Home Energy Management Systems are the three key components of energy management. The work described in this paper is expected to pave the way for future applications of smart energy management on IoT and Big Data platforms. Through a user-friendly mobile application interface, the system enables users to remotely monitor and operate equipment as well as generate online bills.

In paper [3] Lee Y.-T., Lee H.-W., Park H., Jung E.-S., & Kwon E. In order to help minimise power consumption, the cloud services are being used in various service areas using energy-efficient technology, goods, and services. The current restrictions on power consumption reduction for cloud services on a home appliance are discussed in this study. This model's primary objective is to avoid wasting energy on both VSs and legacy STBs that are unable to perform resource-intensive applications. The proposed PSCF has undergone tests to determine its viability in terms of energy efficiency, and average measurements have been recorded. When several customers use cloud services simultaneously for an extended period of time, a significant quantity of electricity is consumed. Remotely turning off electrical systems and appliances when not in use can increase energy efficiency. In addition to traditional home automation solutions that give customers active management, certain products actively monitor systems and give users information and instructions in order to increase control and improve energy efficiency.

In paper [4] Turkay B., Ayan O., In this way, recommender systems use data analysis and machine learning to assist users in finding what they're looking for. They are programmes based on patterns that attempt to link data from several sources within a single context in order to make recommendations. It is suggested to use a recommender system, which lowers energy use. Numerous publications in this domain concentrate on methods for HVAC (heating, ventilation, and air conditioning) equipment. To assist consumers in finding what they want, recommender systems use machine learning algorithms and data analysis. The major goals were to check how the service behaved in terms of processing speed and accuracy.

In paper [5] Souza A. N. de, Gastaldello D. S., Haroldo do Amaral L. M., Ikeshoji M. A., & Santana G. V. 2.5 Ayres R. M. J. In this paper, a recommender system that lowers energy use is proposed. Numerous publications in this topic concentrate on methods for heating, ventilation, and air conditioning devices. To assist consumers in finding what they want, recommender systems use machine learning algorithms and data analysis. The major goals were to check how the service behaved in terms of processing speed and accuracy. a novel recommender system architecture that may utilise energy usage information from various smart homes has been proposed.

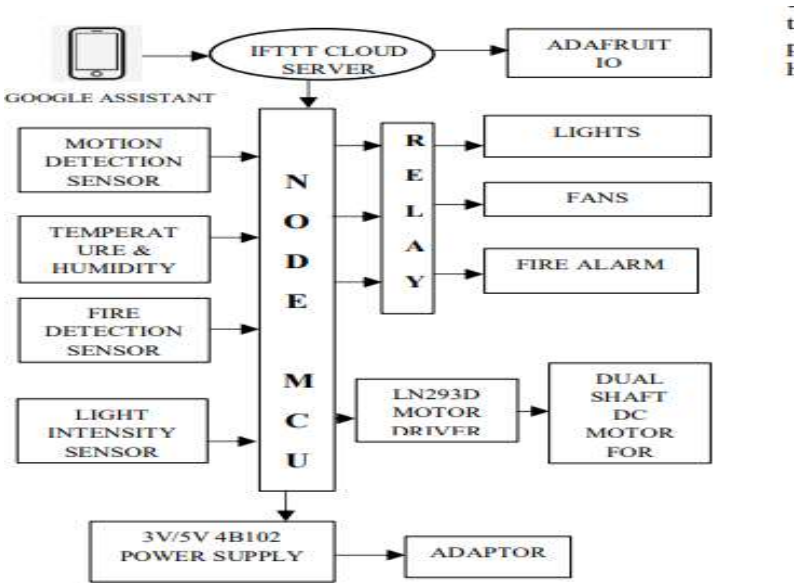
3. Data Collection

The data is collected from the references and official website of the . The data taken here is the data of people who attended Kumbh mela and hajj.

4. Methodology

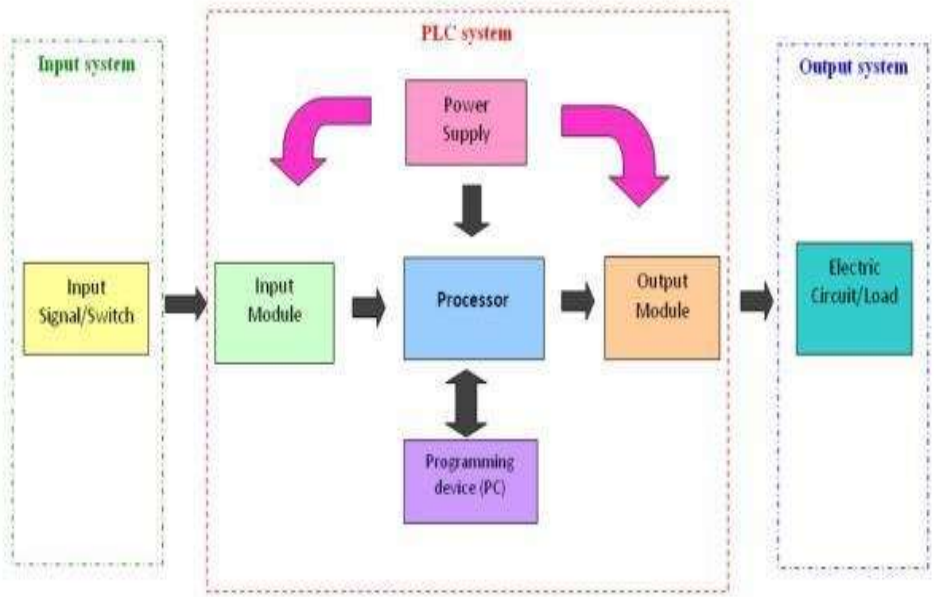
Method 1: Google Assistant

The Node MCU is the system's brain and microcontroller. It has direct connections with all of the sensors and actuators. It has an ESP8266 Wi-Fi module built in. A platform for prototype designs with open-source functionality is offered by the development and open-source chipset NodeMCU. The firmware can also be used to prototype Internet of Things projects that require Lua language. The ESP32 32-bit MCU now has support. There are open-source prototype board designs for the NodeMCU open-source firmware. Node and MCU are combined to form the moniker "NodeMCU" (micro-controller unit). The microcontroller is the primary component of the IoT-based home automation system. The main microcontroller in this project is a node microcontroller unit (NodeMCU) Wi-Fi-based controller board [25], an opensource platform for IoT applications. NodeMCU is primarily used to collect data from sensors and transfer it to an Internet of Things server. Additionally, this microcontroller receives instructions from users via cellphones or computers to carry out particular activities. Meters and sensors Residence Appliances (Application) Control Center for GUI TV Energy Meter Data Moisture sensor fan Environment PIR Sensor Temperature Sensor Bulb Smoke Sensor. A physical programmable circuit board makes up the NodeMCU, just like any other development board, like an Arduino or Raspberry Pi. The NodeMCU microcontroller can be programmed using the Arduino software, an integrated programming environment (IDE) for writing and uploading instruction codes to microcontrollers.



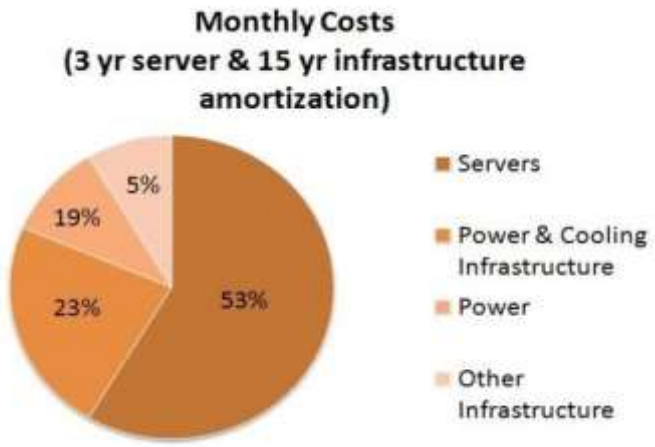
Method 2 : PLC Architecture

We create an intelligent task scheduling, PLC-based energy-efficient home automation system. The system has basic energy-saving features that improve resident comfort and is automatically managed. It is also extremely expandable to smart homes. This system includes of household appliances including a room heater, garden light, outside light, pump motor, and garden motor that are managed by relays and a PLC in accordance with a predetermined schedule. As the main controller, a Logo PLC system (Model-0AB3) is utilised. The primary programme for a PLC is designed using a ladder diagram. This PLC has the ability to process, sequence, time, and store instructions. Wired X10 technology, a protocol for electrical device communication used for home automation, was employed (domestics). Power line wiring is mostly used for signalling and control.



5. Results and Discussion

The power needed for cloud services is predicated on the consumption of allotted resources on both a VS and an STB. Each component, including the STB, PCG, and VS, has its power consumption assessed before the overall aggregate of measurements is calculated. To ensure a high return on investment (ROI) for service providers, cloud services have been quickly adopted in numerous service categories. Previous research on energy efficiency was done to lower standby power consumption for home appliances like set-top boxes (STBs), which can function as thin clients for cloud services, or it only displayed power models of virtual machines (VMs) on the cloud side without taking into account the power consumption states of its corresponding thin clients. In order to effectively provide cloud services while consuming low power levels on both the cloud side and an STB, this research presents a power-saving control framework (PSCF).



6. Conclusion

This study provides an overview of the detection of driver fatigue. On the basis of eye condition, a new technique is suggested for detecting driver fatigue. This determines if the eye is drowsy or not, alert, and sounds an alarm when the eye is drowsy. Using the Predict and Detection method, the face and eye region are located. To extract features, stacked deep convolution neural networks are created. This is used to categorise the driver as either sleeping or not. The proposed system's accuracy was (95%>). The suggested technology efficiently detects the driver's alertness by sounding an alarm. when the model consistently predicts a sleepy output state. By doing this, the number of accidents will be decreased and driver and vehicle safety will be improved. The presentation of a system for vehicle and driver safety. Drowsiness detecting systems can be used to improve driver safety.

7. REFERENCES

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