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Home Automation Using Genetic Mean Algorithm

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ABSTRACT: There are so many monitoring systems available in market. But this controller based system has one limitation; the sensor detection is real time and not predetermined that means in summer season the cooling system on only when user interfere either by physically switching the system or by some wireless means (like Android App) therefore we proposed machine learning (ML) technique to predetermine some repetitive activities. Data of the person's activities (like when he when needs to switch on different appliances) is stored in MySQL as datasets and this data is used as input for the Geometric Mean algorithm. User control Appliances by means of Android App interfaced with Node MCU via firebase server.

KEYWORDS: Machine Learning, Firebase server, MySQL, Genetic Mean Algorithm

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. To better understand this try doing a geometric mean calculation compared with an arithmetic mean calculation using two numbers. Make one number be chosen from 0 to 5 and the other number from 0 to 100. Vary the two numbers to see how each affects the average. Practical Uses of Geometric Mean:

- Proportional growth – When growth is proportional, exponential or varied, a geometric mean is more appropriate to calculate average growth because of how this method handles difference in number ranges. Arithmetic mean would describe a linear growth generally resulting in higher-than-true average.
- Aspect ratios – The geometric mean was used to choose a compromise aspect ratio between film and digital video, a major influence in the design of modern movie theaters.

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 propose 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 figuring's. 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 SYSTEM

Home automation is becoming popular due to its numerous benefits. Home automation refers to the control of home appliances and domestic features by local networking or by remote control. User will control output devices through mobile App. if a user wants to Switch ON/OFF output appliances, then simply he/she has to press button associated with that appliance. Android App updates this new value of button on firebase server and Node MCU (inbuilt Wi-Fi enabled, ESP8266 based Module) continuously fetches data from firebase server. According to command from user, Node MCU switches status of appliances.

Python fetches data from firebase and stores in MySQL database. Geometric Mean uses this data to study behavior of user. After some fix time, there is no need of human interference in switching of appliances. Python based system automatically switches status of appliances.

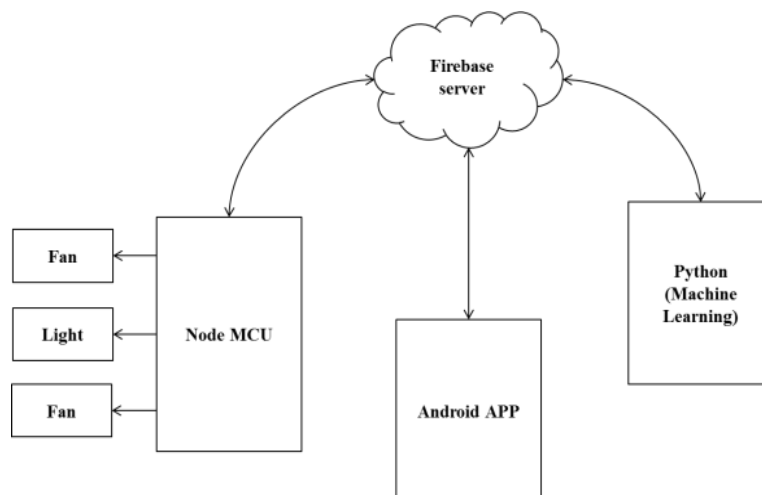


Fig 1 block diagram of proposed system

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Machine Learning is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that which makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect.

The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

IV. CONCLUSION

The prime objective of our project is to use the Smartphone to control the home appliances effectively. A Mobile App is designed to ON/OFF appliances; receiver will be a Node MCU which is connected to home appliances. A pair of switch is interfaced with appliances each to ON and OFF a particular appliance. Geometric Mean is used to train algorithm and after studying user's behavior automatically switch output appliances. The design principles are to minimize network bandwidth and device resource requirements while trying to ensure reliability and a certain degree of security of delivery. The user interface would be created for desktops or laptops and applications for mobiles. Our system would also provide the predication of the information. We use the machine learning algorithm for provide the accuracy of the system.

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