

A Conceptual AI-System Model for Home Automation and Smart Monitoring Based On Vision



Edwin S Soji, T.Kamalakaran

Abstract: Home automation is a rapidly increasing developmental area in the terribly present days attributable to the higher rate of affordability and ease. It provides the potential of controlling our homes and having the sides retort to events that are managed mechanically, it has become an extremely popular attribute due to its safety functions and reasons of value. We projected a model to introduce the whole automation of our house with a security system for our household. The ideal concept of this project is to ascertain an answer that can be achieved within a minimal budget. We got so used off shelf elements aspect that the amount reduced drastically. This study conjointly discusses the chosen literature, fashionable datasets, and concludes with the challenges within the domain at the side of a future direction. The main conceptual focus of this paper is to pose a system based design that demonstrates the interfacing between MATLAB with camera and Arduino board for observation and management of household instruments. In the projected system, Arduino board is interfaced with MATLAB victimization serial communication to regulate home appliances. Image acquisition device is interfaced to MATLAB which will ceaselessly show the status of the different type of household equipment on the Graphical computer program [GUI] designed in MATLAB. When the correct commands are dispatched from the MATLAB user interface, the corresponding household equipment is turned ON/OFF which are interfaced to Arduino through relay board. The system conjointly sends alert messages or signals if any abnormality is detected in the associate degree. The human motion recognition domain has been active for quite 20 years and has provided an oversized quantity of literature.

Keywords: Home automation, Household equipment, Human motion recognition, MATLAB, IoT.

I. INTRODUCTION

The Scheduling of Electrical Devices using the Internet of Things (IoT) is a systematical approach that uses a computer or a mobile device to control the essential electrical devices and its features spontaneously from around the world through the internet. The proposed system has a user-friendly interface along with a low-cost design and is easy to emplace in a home or multi-purpose establishment. By incorporating this design, the consumer can reduce electrical power by regular monitoring of home utilities. Over time The Scheduling Electrical Devices will become more self-controlled and automated as it learns and provides more comfort, especially when emplaced in a private home.

Manuscript published on 30 August 2019.

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Retrieval Number: J96280881019/19©BEIESP

DOI: 10.35940/ijitee.J9628.0881019

Journal Website: www.ijitee.org

A sensible automation system is an idea that allows a person to manipulate electric appliances of different kinds using various control system technique. The smart home system is used to control and schedule the electrical devices. It also offers to variant functionalities like controlling illuminations, fan, air conditioners, and other home appliances connected to the plotted system. A further feature of this system is the intruder detection which it offers using the motion sensor to alert the house owner, and all these can be managed from a smartphone app and web application. In this modernized age, automation in a home is becoming substantial for improving our lifestyle. Solace and appeasement of using home appliances are what home automation is offering as a courtesy. Home automation displays a futuristic way of living through in which the person gets to control their complete residence using a smartphone; like turning on a television, lock/unlock multi-doors. It also offers to manage the efficient use of electricity. However, to get or to acquire such system emplaced will cost a lot of monetary and that is one amongst the major reason why automation of house has not received much call and recognition, also not to overlook the intricacy of installing and configuring it. So, it's vital to make it cost-efficient and easier to manipulate, if these are grant-in-aid to the common individuals then they will be willing to remodel their homes, offices and schools.

A. Objective

The foremost objective of this scheme is to design a device with an intelligent system which can be used to manage and observe all the house equipment's via the internet. The home automation device can be associated with almost all the home appliances and can be used to control them remotely from any place around the world. The wireless connectivity with the system is provided through the Arduino which will be embedded with an internet module. This ensures the internet connection to the system and the entire home appliances are established which can in turn, be linked and manipulated by the net. A sensor can be additionally included with this design to make it turn ON the appliances automatically when an individual enters the room and to turn OFF the appliances whenever they exit the room.

B. Problem definition

❖ The existent and well-competent home automation systems are based on internet technologies which do not use the internet of things (IoT), which in-turn are lagging in speed, and coverage is for a very short range.



This was not an issue until the design is planned in advance and deployed during the initial construction of the house. However, in the existing fully constructed buildings the implementation price for the same design system is high.

- ❖ Glitches and major issues may develop in the smart home systems too. As the area in which IoT used is increasing. Handling of all the applications in the IoT environment has become a convoluted task. It reflects out as a problem that how to manipulate and guide these variant applications. The entire design may not be more comfy and secure if these accretional applications are not controlled proficiently and conveniently. The defense is lesser on the server-side as no special techniques for authentication is used.
- ❖ Connectivity is also a problem that could occur. It also comes into a challenge that how to achieve connectivity at any place any time. For communication towards the internet, 3G and 4G services are used. But it could experience signal ranging problem hence connections are not dependable every time.

II. LITERATURE SURVEY

The system design reduces the peak-to-average ratio of the system and its cost by employing a genetic algorithm. This device does not use any constraint on peak power; instead, they think that if the power is greater than a pre-determined threshold, the value becomes high. [1] It use delay time rate, which indicates that an application should work on time as possible. They presume an individual constraint for meeting the length of operating time of the amenities. In the output section, the amenities are used. The energy cost is reduced beneath the energy- price uncertainty, wherever the costs arbitrarily vary around nominal values with a well-known underlying distribution. The author reflects upon the energy-storage devices and uses the simulated values of the appliances active level in a certain range. [2]They have no consideration of any leveling and assume appliances to have continuous energy intake. In the days-ahead costs and schedule residential load are collected and the price is adjusted in real-time. The utility maximize the company's product with in-mind to the distribution grid constraints and minimize the user's electricity bill also the disutility function. Within the system, the author thinks about the uniform supply of power for each appliance and reduces the cost using the random behavior of wind power. The objective of this proposed project is to create a smart sensible home device which can be used to manage the home appliances via the internet. [3]The suggested system has 2 jobs such as observation and controlling of the appliances through the smart permission system. The appliances of the house may be monitored and controlled by completely different strategies like Graphical user interface (GUI) and also the World Wide Web (WWW). This automation system will send and receive information from the remote user via the web. The user can peer the ON/OFF conditions and control the appliances of the home either by online or offline. People can watch their relations, security guards etc., from any place and anytime by using smartphone or desktop/laptop. The entry permission system

of the doors gives a versatile choice to both the visitor and also the homeowner for simple and secure interaction.

[4]The home automation system is one amongst the foremost crucial parts of a palatial home. This technology provides reliability, security and user-friendly environment. Nowadays, one and all desire a secure and comfy life at home. Various analysis works in home automation technology are done. This paper presents a low-priced and versatile answer to the smart home idea. Raspberry Pi analyze the noise and picture of the visitant, which transfers the inputs from the Pi camera, the push-button and the I-ball mic and passes the output/result to the digital display screen and the speaker. It reserves the voice and image on the digital display monitor with date and time. [5]Power security and contribute to an overall cost reduction is the primary aim of the designed system. GSM based home automation utilizing Arduino. The status (turn ON or OFF) of the associated gadgets can be changed by sending an SMS from your mobile phone. After getting SMS directions through a GSM module, Arduino will change the status (turn ON/OFF) of the gadget that is referenced in the SMS. The projected system comprises of a Base and Satellite Stations. The Base is an associate degree Arduino Mega microcontroller board linked to a Wi-Fi module and is so capable of accessing the net. It encases an RF transceiver module through that it communicates with the Satellite stations (or conjointly called as remote nodes). The Satellite stations are the Arduino Uno microcontroller boards enclosed with sensors. This system involves the controlling of electrical devices by using various sensors.

III. PROPOSED SOLUTION

The main aim of the system is to schedule the electrical device to control and monitor the home appliances. Setbacks and key challenges may arise within the sensible home system because the application of IoT is increasing at a fast pace it is strenuous to handle all the applications in IoT area. It emerges as a problem that how to manage and control these diversely increasing applications and some are modified to facilitate the specifications. The whole system could not be more convenient since security is lesser on the server-side as no special techniques for authentication are accustomed. The system is designed for power and security purpose. The methodology implemented are-

1. Vision-based secure hashing algorithm (SHA) & hierarchically semi-separable (HSS) area unit designed in MATLAB which facilitate the computing process. MATLAB is the main heart of this method. AI area unit accustomed counts the number of persons within the area; supporting that the MATLAB will activate the lights and fan. If the user is not interested to use any of the actual devices they can activate/deactivate it.
2. MATLAB will switch the fan and air conditioner, on or off based on the climatic condition or the body temperature.

3. This method conjointly helps the aged folks. If an aged person meets with an accident or suffers any emergency situation within the house, it sends an alert message to the corresponding user. An AI camera continuously tracks the movement of the person based on the CNN algorithm, any abnormal movement triggers the CNN algorithm which in-turn changes the priority and sends an alert signal.

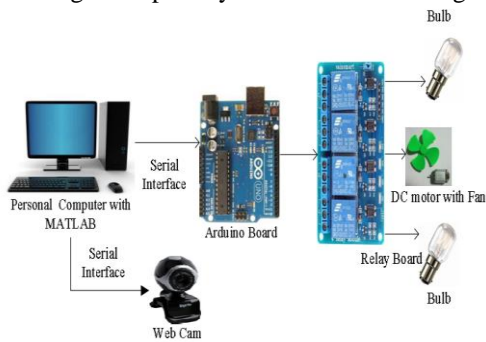


Figure 1: Architecture Diagram

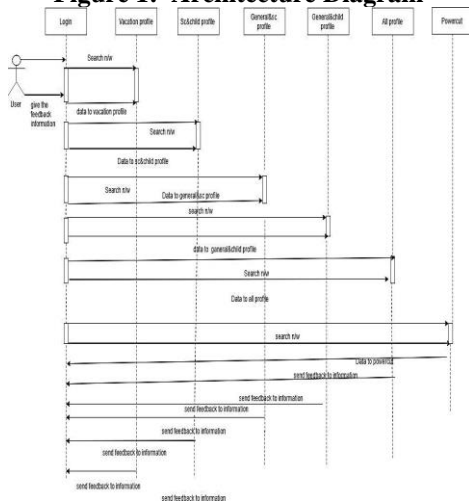


Figure 2: Sequence Diagram

IV. RESULT

The system is composed of six profiles which are given below

TYPE	PROFILE
1	Vacation Profile
2	Senior Citizen and Child Profile
3	General and Senior Citizen Profile
4	General and Child Profile
5	All Profile
6	Power Cut Profile

4.1. Vacation Profile

The user schedules the vacation profile when they are going on vacation in which the timings are set for home appliances beforehand. For example, schedule the time (6 am to 6 pm) for all home appliances, at the specified time the selected appliances automatically initiate on/off process.

4.2. Senior Citizen and Child Profile

The system is to implement the smart function plan based on the RTC. Analyzing the time of day, the smart function plan is implemented automatically like food alarm, TV on/off, LED Light on/off and fan speed. The kitchen and room light are on when food alarm is activated on the scheduled time.

4.3. General and Senior Citizen Profile

The general profile has functions like gardening motor, gardening light on/off. Senior citizen functions are light on/off, fan on/off.

4.4. General and Child Profile

The general profile has functions like gardening motor, gardening light is on. Based on the time entire function are done automatically like food alarm, TV on/off, LED Light on/off, fan.

4.5. All Profile

It involves both the scheduling and controlling of the electrical devices when the persons are in/out of station. It is an effective use of electric power by developing a system to monitor and schedule power utilization of all the appliances.

4.6. Power Cut Profile

The solar LED light system as the name suggests converts energy from the sun into electricity and is easy to install, it gives high intensity LED output. It is not necessary to switch on/off the solar LED's light manually. These lights automatically operate during a power-cut. The LED light has low energy consumption. An individual LED will emit less radiance than compact fluorescent or incandescent. But a set of LED's gives brighter light than other lamps.

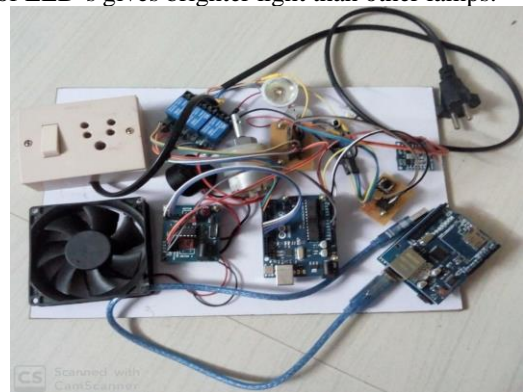


Figure 3: Proposed design

V. CONCLUSION AND FUTURE ENHANCEMENTS

This prospective system model presents a new electrical usage scheduling and controlling device for smart home appliances. This device monitors the daily power consumption and its scheduling. Here we present a system consisting of a cell phone app with server-side support and some smart appliances. And the intermediary agent between them is the internet which signifies that you can control the whole system from far and wide. It also uses some less sophisticated machine learning and statistical methods. Home automation system should verily be based on the real requirements of the consumer. So the initial step is to do a survey to collect and understand the genuine needs of people's daily necessity.

Thus in-turn we can form more different and efficient intellect elements to face the necessity of the common people. Since this system is a wired setup, the future scope would be a wireless initiative that is very much user-friendly and can also be implemented to all appliances that use electricity as well as battery operated.



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