Survey Paper on Smart Security and Home Automation System for IOT Application

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Abstract- Recent advances in smartphones and affordable open-source hardware platforms have enabled the development of low-cost architectures for Internet-of-Things (IoT)-enabled home automation and security systems. These systems usually consist of sensing and actuating layer that is made up of sensors such as passive infrared sensors, also known as motion sensors; temperature sensors; smoke sensors, and web cameras for security surveillance. These sensors, smart electrical appliances, and other IoT devices connect to the Internet through a home gateway. This project is based on implementation of an IoT based home security system, to be able to control entrance from anywhere in the world is the major aim of this project and at same time it should be secured, and this was achieved with the use of Internet of things and some other electronics components. An automatic door control system working through a mobile app and also through a keypad was achieved. IoT refers to the infrastructure of connected physical devices which is growing at a rapid rate as a huge number of devices and objects are getting associated with the Internet. Home security is a very useful application of IoT and we are using it to create an inexpensive security system for homes as well as industrial use.

Keywords— IOT, Arduino, Node MCU, WI-FI, Smart phone, Home automation system

I. INTRODUCTION

Security and safety are one of the major issue or challenges facing all human on earth today, we are now headed into the second decade of the 21st century, we are now witnessing more and more digital devices all around us in our daily life, they indeed influence our routine living and we cannot even Imagine one single day without using them, that is why IoT base home security system is indeed a timely project becomes an important issue in modern design [2]. The power dissipation that is tolerable in a given application context is always limited by some practical consideration, such as a requirement that a limited supply of available energy (such as in a battery) not be used up within a given time, or by the limited rate of heat removal in one's cooling system, or by a limited operating budget available for buying energy.

Technology has evolved over the years to present a very effective system these days which can turn some of the security agencies green with envy. In this time of increasing crime and theft, it has become imperative to safeguard your house with adequate safety devices.

Installing an IoT home security system can go a long way in providing protection against thieves and Intruders.

II. LITERATURE SURVEY

P. P. B. A. Uma Pujaria et al. [1], have clients frequently need to control and screen exercises inside the home from a distance, for older guardians, youngsters, or pets. This paper presents a multifunctional, minimal expense, and adaptable framework for shrewd home observing and control. The framework depends on hub MCU ESP32 with Web network that permits distant gadget control. The framework communicates sensor information to the Firebase data set and can get orders from the server, permitting programmed control. The android-based portable application is intended for correspondence with the Firebase data set and refreshing its qualities to screen and control the different home machines. For the showing of the possibility of the framework, different sensors like temperature, stickiness, light, LPG (MQ-6), and movement sensors were coordinated into a model of the home mechanization framework. For the verification and approval of the proposed framework, the presentation of the situation is concentrated thoroughly and is additionally assessed.

El-Hajj et al. [2], they IoT is the capacity to give regular gadgets a method of distinguishing proof and one more way for correspondence with one another. The range of IoT application areas is exceptionally huge including brilliant homes, shrewd urban communities, wearables, e-wellbeing, and so forth. Thusly, tens and even many billions of gadgets will be associated. Such gadgets will have savvy capacities to gather, examine and try and pursue choices with no human connection. Security is a preeminent prerequisite in such conditions, and specifically verification is of exorbitant interest given the harm that could occur from a vindictive unauthenticated gadget in an IoT framework. This paper gives a close to finish and modern perspective on the IoT verification field. It gives an outline of a huge scope of confirmation conventions proposed in the writing. Utilizing a multi-measures characterization recently presented in our work, it looks at and assesses the proposed confirmation conventions, showing their assets and shortcomings, which comprises a crucial initial step for specialists and engineers tending to this space.

Froiz-Míguez et al. [3], lately, the improvement of remote conventions, the improvement of cloud

administrations and the lower cost of equipment have begun another time for brilliant homes. One such empowering innovations is haze figuring, which stretches out distributed computing to the edge of an organization taking into consideration creating novel Web of Things (IoT) applications and administrations. Under the IoT haze processing worldview, IoT passages are generally used to trade messages with IoT hubs and a cloud. WiFi and ZigBee stand apart as favored correspondence innovations for savvy homes. WiFi has become extremely well known, however it has a restricted application because of its high energy utilization and the absence of standard cross section organizing capacities for low-power gadgets. For such reasons, ZigBee was chosen by numerous producers for creating remote home robotization gadgets. As an outcome, these advancements might coincide in the 2.4 GHz band, which prompts crashes, lower speed rates and expanded correspondences latencies. This article presents ZiWi, a dispersed mist registering Home Computerization Framework (HAS) that considers doing consistent interchanges among ZigBee and WiFi gadgets. This approach wanders from customary home computerization frameworks, which frequently depend on costly focal regulators. What's more, to facilitate the stage's structure interaction, whenever the situation allows, the framework utilizes open-source programming (all the code of the hubs is accessible on GitHub) and Business Off-The-Rack (Bunks) equipment. The underlying outcomes, which were gotten in various delegate home situations, show that the created haze administrations answer a few times quicker than the assessed cloud administrations, and that cross-impedance must be treated in a serious way to forestall impacts. What's more, the ongoing utilization of ZiWi's hubs was estimated, showing the effect of encryption instruments.

Jabbar et al. [4], home robotization frameworks stand out with the progression of interchanges innovation. A brilliant home (SH) is a Web of Things (IoT) application that uses the Web to screen and control machines utilizing a home robotization framework. Absence of IoT innovation utilization, threatening UI, restricted remote transmission reach, and significant expenses are the impediments of existing home computerization frameworks. Thusly, this study presents a savvy and crossover (nearby and remote) IoT-based home robotization framework with an easy to understand interface for cell phones and workstations. A model called IoT@HoMe is created with a calculation to empower the checking of home circumstances and computerize the control of home machines over the Web whenever and anyplace. This framework uses a hub microcontroller unit (NodeMCU) as a Wi-Fi-based door to interface various sensors and updates their information to Adafruit IO cloud server. The gathered information from a few sensors (radio-recurrence recognizable proof, ultrasonic, temperature, dampness, gas, and movement sensors) can be gotten to through In the event that This, That (IFTTT) on clients' gadgets (cell phones or potentially workstations) over the Web no matter what their area. A bunch of transfers is utilized

to interface the NodeMCU to homes under controlled machines. The planned framework is organized in a versatile way as a control box that can be joined for checking and controlling a genuine house. The proposed IoT-based framework for home computerization can undoubtedly and proficiently control apparatuses over the Web and backing home wellbeing with independent activity. IoT@HoMe is a minimal expense and solid computerization framework that diminishes energy utilization and can eminently give comfort, wellbeing, and security for SH occupants.

Ozeer et al. [5], haze processing expands the limits of the cloud to the edge of the organization, close to the actual world, so Web of Things (IoT) applications can profit from properties like brief pauses, continuous and protection. Gadgets in the Mist IoT climate are normally unsound and inclined to disappointments. In this unique circumstance, the results of disappointments might affect the actual world and can, consequently, be basic. This paper reports a system for start to finish strength of Mist IoT applications. The system was carried out and investigated a savvy home testbed.

Syafa'Ah, L. et al. [6], a brilliant home framework is usually characterized as an implanted framework in the house which helps occupants in doing schedules at home. In this paper we propose to estimating most extreme distance and reaction season of ESP8266 modules in brilliant home framework which incorporate on the web and continuous controls of: entryway lock, lighting dimmer, programmed switches furnished with energy sensors, infrared furnishings and camera frameworks. The framework modules depend on an ESP8266 Wi-Fi microcontroller. The modules are associated with a focal server by means of Wi-Fi media by utilizing information correspondence in view of JSON on HTTP convention, utilizing an IP camera. Programs in modules are intended to be essentially as basic as conceivable to save assets and to accomplish the most limited conceivable reaction time. Modules on this brilliant home framework have been tried and have demonstrated to work canny home frameworks in giving controls of: power, programmed entryway lock, power utilization measurements, infrared-based furnishings, and cameras to straightforwardly screen a room. In light of examination the most extreme distance between Wi-Fi passages and ESP8266 modules in LOS conditions is 190 meters, and the typical reaction season of the module is 1.62 seconds.

Jabbar et al. [7], home computerization has accomplished a ton of notoriety as of late, as everyday life is getting less difficult because of the quick development of innovation. Nearly everything has become digitalized and programmed. In this paper, a framework for interconnecting sensors, actuators, and different information sources with the motivation behind various home mechanizations is proposed. The framework is called qToggle and works by utilizing the force of an adaptable and strong Application Programming Point of interaction (Programming interface), which addresses the groundwork of a

straightforward and normal correspondence plot. The gadgets utilized by qToggle are typically sensors or actuators with an upstream organization association executing the qToggle Programming interface. Most gadgets utilized by qToggle depend on ESP8266/ESP8285 chips as well as on Raspberry Pi sheets. A cell phone application has been fostered that permits clients to control a progression of home machines and sensors. The qToggle framework is easy to use, adaptable, and can be additionally evolved by utilizing various gadgets and additional items.

III. PROBLEM STATEMENT

Home is the place where people live and individuals invest their most of the time at home. Walking along with the revolution industry, smart home is an emerging innovation, which has changed the way individuals live. Currently, there are various design of smart home which consist of multiple control system can be choose from. However this smart home can be categorized into two main categories which is local control and remotely controlled systems. The different between local control and remotely control systems is the way for operation. Basically, the remotely control can use internet connection by using their electronic devices for long distance while the local control using in-home controller with a stationary or wireless communication technology to connect to the central hub or gateway. Home automation refers to control the home appliances by using computer technology. Computer Systems enables From remote control of lighting through to complex micro-controller or computer based networks with various degrees of intelligence and automation. Home automation provides security, energy efficiency and ease of use hence, it is adopted more. It also provides remote interface to home appliances to provide control and monitoring on a web browser.

IV. PROPOSED METHODOLOGY

The proposed system is implemented using Node MCU by overcoming all the drawbacks of previous existing methods In this project all the sensors are connected to the Node MCU board and the results can be seen in Smart phone. For every second it shows new value. If any gas leakage happens the value of air purity sensor shows the high value at that time we can turn on the fan to send the gas out.
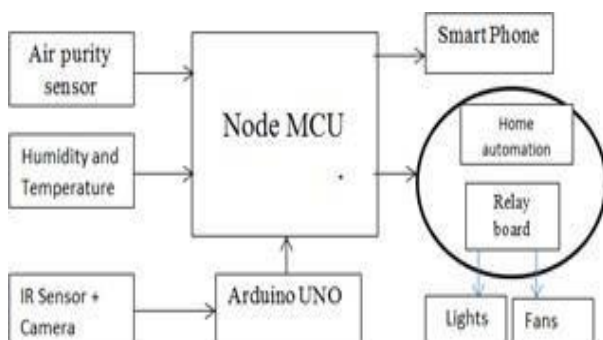
The camera module is connected to the Arduino UNO board because in Node MCU board we have only one analog pin For camera module we will use more analog pins, so we are connecting camera module to Arduino UNO. When IR sensor detects the motion, the camera module will be turned on. The captured images will be stored in folder of our PC and, it sends Captured images to the user email.

The main operational block diagram of this project is provide below Fig 2. To control home appliance from any remote place with sending command to the internet. The load can be controlled and checked utilizing a website page with user configurable front end. The complete block diagram is shown in Fig 2 where, the ESP Wi-Fi module plays the role of main controlling unit. The user can send command through the assigned IP and these command are nourished to the Wi-Fi module. This module is designed to access internet using any nearby wireless connection. The commands received by a Wi- Fi module are executed by a program within the Wi-Fi module. The Wi-Fi module is interfaced to TRIAC and Opt coupler through which the loads are turned ON and OFF based on the command. The load status (ON or OFF) will be shown on the page.
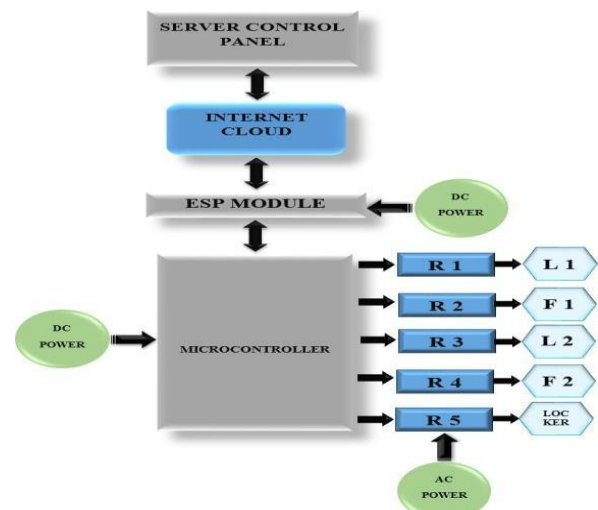

Fig. 2: Block diagram for IOT based home automation system
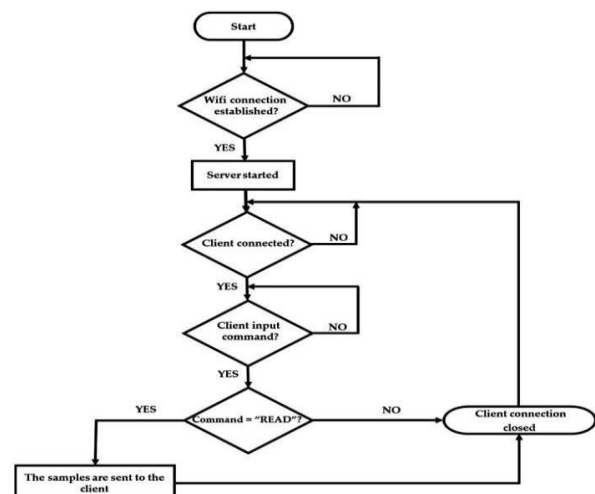

Fig. 1: Block Diagram

Fig.3: Flowchart of smart controlling system

In fig 3, The above flowchart is showing how a controlling system would work here. The system is connected to the Wi-Fi. Then the user will log in to the web page and send a command to the server. This command is processed in the ESP module. The command is then read by the microcontroller. Both ESP module and microcontroller runs on DC. The relays are turned on and off accordingly by the microcontroller. Since the output devices run on AC, the relays act like channels which provides AC power when the command is ON and turns OFF supply when it is OFF (according to fig 2). The coding and simulation has been done based on the flowchart shown in fig 3.

V. EXISTING METHODOLOGIES

A. Low-Cost Wi-Fi Based Automation System

Arduino Mega microcontroller along with WI-FI module ESP8266 in HAS is specially used for controlling the home appliances. A local control system over Wi-Fi and a remote control is established based on IoT. A suitable Wi-Fi-based android application which is Virtuino is utilized because it has a user-friendly interface and it can work efficiently with Arduino Mega to control and monitor via smart phone. The Wi-Fi module, buzzer, temperature and humidity sensor is connected directly to Arduino Mega microcontroller. The relay board receives its input signals from Arduino Mega, while the bulbs and fan which are only samples for real home appliances are connected to the relay outputs.

$$Xt+1 = rx_t \, (1-x_t)$$

$$C = {}_j(A\|T)+ \ k^{(i)}$$

B. By symmetric encryption scheme

The proposed architecture of the SHS consists of four groups of entities: 1) appliance group 2) monitor group 3) central controller 4) user interfaces

Appliance group contains the home appliances including TV set, stove, oven, thermostat, etc. Each member of the group has individual ID so that it can be uniquely identified by the central controller. The entities in appliance group can perform particular operations, such as switching on/off, turning up/down, reporting status, etc.

Monitor group is formed by sensors and detectors, such as smoke sensor, motion sensor, electricity meter, and home security monitoring sensor. The sensors always sens the data andperiodically send the data to the central controller.

$$G_k + C_E + G_M$$
$$G_k + V_M + C_D + R_W$$

C. Home automation using set of sensors

The TI CC3200 Launchpad consists of Applications Microcontroller, Wi-Fi Network Processor, and Power-Management subsystems. It performs with the ARM Cortex M4 Core Processor at 80 MHz. It has embedded memory including RAM (256 KB). The dedicated ARM micro-controller also has a network processing subsystem in it.

$$V_0 = V_s (R \frac{R}{RLDR + R})$$

D. Ethernet based system

The Ethernet based system connected to the app is android based which is connected to the internet through either Wi-Fi or mobile data. It is make connection to the Intel Galileo based server over the internet and lets the users to monitor with the help of an internalmobile timer and toggles the switching by tap-to-touch or voice using Google API speech recognition tool.

$$S=\{S, E, U, I, O, send (), receive ()\}$$

E. Via World Wide Web

The Raspberry Pi is a lower cost credit card sized single board computer which is developed by raspberry pi foundation. Raspberry pi is controlled by a revised version of Debian Linux optimized for the ARM architecture. The setting up of raspberry pi consists of selecting raspbian OS from prebuilt SD card.

$$V_{out} = (0.0062*Humidity_{reletive}+0.16)V_{in}$$

VI. EXPECTED OUTCOMES

Home automation is Automation technology which makes the work easier in all aspects related to home. This method proposes a low cost solution and Home automation System done using IOT Smart Security system which uses mobile devices to control and analyses the basic home functions and features automatically through internet from any corner within short span of time.

From observations of the proposed method the future work will include the implementation of the home automation system using IOT. The system will result in controlling the devices using mobile phone and Internet.

VII. CONCLUSION

Home automation has taken us too far from traditional ways and increased advancement has led us to use our homes and devices to the optimum level. Future homes will most likely offer practical and advanced security to its owners and revolution in smart homes is made possible through IOT Digital code lock security is provided as an advanced feature. If the Gas leakage detected then exhaust fan started automatically.

According to the results from the simulation and hardware implementation and based on the study about this project, a new automation system with online features is done for home automation. The IOT based home automation as stated can provide solution to the difficulties of traditional home automation. With the execution of the IOT network system which is as of now accessible it is en route to eventually achieving the advantages of remote automation and control of an electrical system. The system has been tried and observed to be solid and dependable. In future, with advanced AI systems, it will permit automatic judgment and secure the home. Therefore it avoids human intervention, reduce

wasting electricity, provide an efficient controlling system and also helps to decrease the maintenance cost.

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