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Home Automation & Security Using IoT

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Abstract:- Home automation and security system pull off great acceptance in the last decades and it increases the comfort, quality, security and way of living for life. With the evolution of automation and security technology, life is getting simpler, smoother, secure and easier in all aspects. As technology is progressing and homes are going to work in smarter ways, recent house are steadily shifting from conventional switches to centralized control systems. Wireless Home Automation System using IoT is a system that uses computer systems or mobile devices to control or monitor basic home automation functions and features automatic through the internet from anywhere around the world, though an automated home can be called/defined asa smart home. On the other hand, Home Security is becoming necessary nowadays as the possibilities of intrusion is increasing day by day. Today, safety and security are just a click of the appropriate technology away, and with such advancements happening, the security of one's home must also not be left behind. Proposed system has analyzed two aspects automation and security which makes homes smarter.

Keywords:- *ESP8266 Microcontroller, Home automation System, Internet of Things (IoT), Image Processing, Raspberry Pi, Security System, Tesseract OCR.*

I. INTRODUCTION

What are smart homes? First general-purpose home automation technology named as X10 were introduced and developed in year 1975, so we can say that from that time till now home automation concept have a huge difference and in future homes of 21st century will become highly self-controlled automated and secure. Home automation system simply means that it allows users to control and monitor home appliances and devices remotely and that is defined as smart home.

Currently there are many home automation systems which are implemented with wired communication as it doesn't create a problem as the planning of the wiring and setup is already doneat the time of construction. However, the installation & setup for already existing construction becomes costly. Replacing to this wireless system would be great for implementing automation systems as with the advancement of wireless technologies such as Wi-Fi, Bluetooth, Cloud technology which are used every day and everywhere. In variance, Wireless systems are of great help for automation systems and for future also. With the extension of these wireless technologies in recentpast, wireless systems are used on daily basis and universally.

A smart home security system is a collection of security components connected and controlled by a smartphone app using the internet or other connections. Using technology-driven security innovations encourage higher levels of protection and system availability, as well as increased peace ofmind for property owners that they can monitor their home from anywhere. As a part of security systems Automatic number- plate recognition (ANPR) can also be included as it is a technology that uses optical character recognition on images toread vehicle registration plates to check if a vehicle is registeredor not.

II. RELATED WORK

Kavita Agarwal et al [1] describes all about the approach on smart home automation using the concept of IoT that can be controlled wirelessly. In this research paper devices such as mobile or computers are used to control basic home appliances wirelessly through web page over LAN or internet connection. This paper also explains that how IoT provides the feasibility of operating the home automation system from anywhere where around the world over simple internet. [1]

Dr. Sumitra Sangwan et al [2] explains all about the working model of smart home automation. The proposed model is the cheapest ways to avail automated system in home and transform it into the smart homes using ESP8266 microcontroller and provides a mechanism to monitor and control the devices remotely by using the interface linked to amazon elastic compute cloud (EC2). The paper concludes byproviding the result of implementation and its challenges. [2]

S. P. Makhanya et al [3] explains all about developed system as an SSCS which uses opensource software used to automatically minimize energy consumption. It contains an android application and a unit containing Arduino board, ESP8266 Wi-Fi module, socket and SD cards. In this android application is used to remotely control switches using Wi-Fi. This system concludes the test which is carried out with system that how much it is effective, quick and easy. [3]

Gajendra Kumar et al [4] showcased home automation system with fault detection and monitoring with the help of some of the hardware devices like nodeMCU board as brain of this system which established connection with Wi-Fi/Internet, another oneisACS712 current sensor for fault detection and monitoring the activity of the appliances, relay board is also there for regulating the appliances. Thus, this system concludes the final result as displaying the current status of the appliances that it is on or off and also provides way to interact with various relays with IoT based automation techniques. [4]

Ms. Margret Sharmila et al [5] concluded the IoT based smart window using DHT 11 which displays the Realtime temperature and humidity through DHT 11 which is the sensor for detecting temperature and humidity. It can be used in hospitals, smart buildings, smart homes. It is also responsible for maintaining the room temperature normal as we have both manual operation through mobile devices and automatic operation as pre-set value and auto sensing. [5]

Sneha S. Mane et al [6] stated that the Internet of Things is a working of several physical instruments, structures and different other things over the internet that are being installed by using electricity, programming, detecting devices, controllers and world wide web network that enables the entire project to integrate, control and share the data. Experts used a movement identification instrument for a modification in the location of a protest with respect to its surroundings. This movement identification technique is very feasible process in security frameworks that can be enhance the measures which are taken to develop security and can be program with several gadgets and can be observed and control. They survey on different safety methods on movement discovery and improvement of framework in view of Raspberry Pi hardware after motion detection calculation programmed in python programming. The calculation for movement recognition is being updated on Raspberry pi, which enables live camera with discovery of motion. This survey is accomplished to determine calculation of a particular section of the location of human activity that had been developed, formed or investigated in the past.[6]

Prof. Kumthekar A.V. et al [7] proposed a project to identify the number plate of any automobile that passes through the system and capture an image of the number plate by camera by itself with the use of raspberry pi board. When the number plate is identified properly at the same time the gate will be opened and whenever it does not identify by the system the gate will remain shut down. In this system experts used several required platforms such as openCV and OCR (Optical character recognition). they have to install ultrasonic sensor tocapture vehicle number plate on a gate so it will be helpful to determining the distance between the camera and the vehicle. They also used LCD device for the acknowledgement and E- mail notification technique. The main purpose of these experts is to inspect licensed number plate of the vehicle automatically according to the existing techniques.[7]

III. SYSTEM ANALYSIS

The Proposed system is a multiple featured home automation system which consist of hardware drivers/devices, sensors, Wi-Fi router which can control various home appliances and monitor the temperature and humidity through mobileapplication and webpage and can also get the readings of current flow. The model includes different sensors like ESP8266 nodeMCU Wi-Fi Module, Relay Module, DHT11, Current Sensor. Initially we have to configure ESP8266 nodeMCU with the home Wi-Fi, so in that we pair through Wi-If's SSID and Password and after that all the other devices/microcontroller such as relay module, current sensor ACS712 and DHT11 are physically connected with the ESP8266 nodeMCU with connector wires (Male to Male, Female to Female, Male to Female). On the other side the device that we use should be connected to the same Wi-Fi network through which ESP8266 nodeMCU is connected. When the connection is created successfully it will start reading input which we provide either from app or web page as we click On or OFF button so that particular device responds as per users input and that's how device control system works as a part of home automation. Another device is DHT11 which displays the real-time temperature and humidity readings and current sensor ACS712 which displays the current value so that we can measure current flow and we can also know about the presence of electricity is there or not. If the lights or any electrical appliances are left on in hurry so user can see it and can turn off remotely and can also take actions according to the conditions monitored, if the readings of temperature, humidity and current sensor are abnormal.

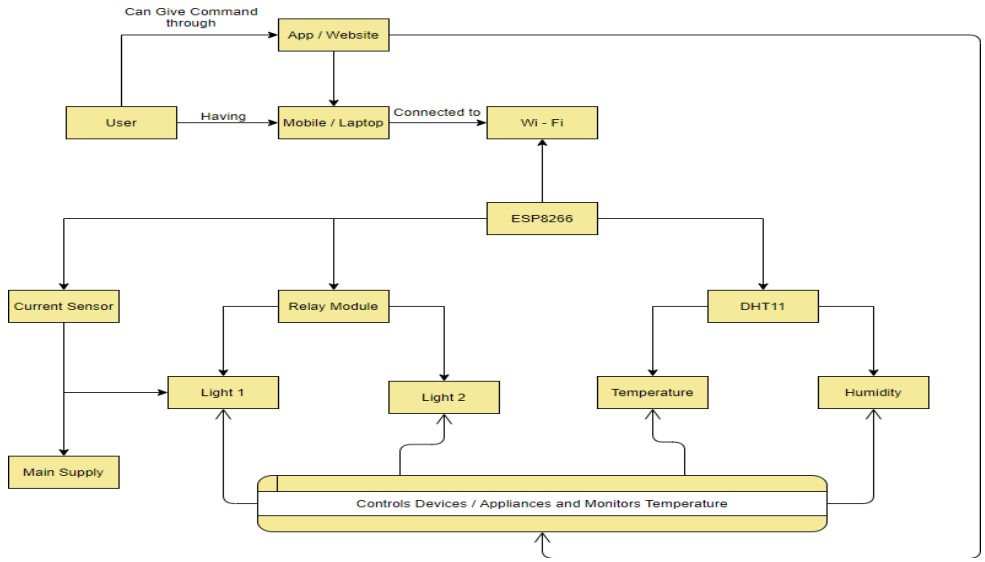

Fig -1: Process Flow

The Proposed Home Automation System has the abilities to control/operate or monitor the following component in user's home: Lights and Fan On/Off, Other Appliances On/Off, Temperature Monitoring, Humidity Monitoring, Presence ofElectricity.

On the contrary of the security side, we have installed a Pi camera outside premises and it is connected with Raspberry Pi which uses Tesseract OCR to detect number plate as image and convert it into text format, so that if any vehicle has registered its number plate, then only it will be allowed to enter the premises or else if it is not registered then it will send photo to a telegram bot.

IV. RESULTS

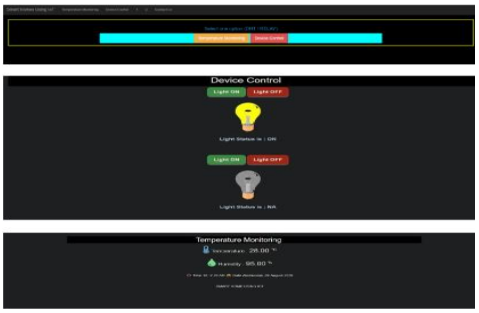

Fig -2: Results - Home Automation Website

Fig -3: Results - Home Automation Application

Fig -4: Results – Implementation of ANPR

Fig -5: Results – Telegram Bot for ANPR

V. CONCLUSION

The project has proposed the idea of implementation of home automation and home security features such as device control, temperature and humidity monitoring, monitoring current flow and on the security side features included are numberplate plate detection using tesseract OCR. This project is composition of both home automation and security which are today's prime requirement.

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