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Cloud-based Home Appliances Automation System

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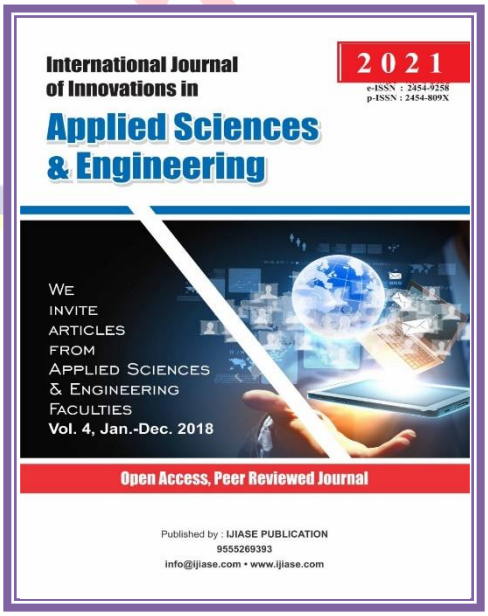

ABSTRACT

Owing to its many advantages, home automation has become preferred. In this research, a home automation system was proposed that aims to control and monitor all home appliances through the wireless network using the Blynk platform that provides an interface through which control is made from anywhere in the world at any time. The Internet of Things is used to monitor and control home sensors through various sensors (temperature, humidity, light, gas, doorbell, and camera) to provide the necessary information to change comfort automatically. Sending the owner notification in case of high or low temperature, humidity or if gas, smoke or the doorbell rang, and immediate care where the owner can see the person through a monitor and remotely open the door. Devices and sensors are connected via the microcontroller (Node MCU ESP8266). And complete control of home appliances, such as lighting and air conditioning, via the Blynk platform interface.

Keywords: Home-Automation, Wireless Control, Sensors, appliances, Blynk.

INTRODUCTION

In recent years, the IoT (Internet of Things) has become a human lifestyle with great potential. It also focuses on the various activities that human intelligence needs. In today's scenario, IoT has opened doors in their everyday lives that cover all human relationship requirements. Examples involve buying products, tracking resources, and managing them remotely from every corner of the globe. Via home automation, a unique address is allocated to household devices such as TV, light bulb, fan, etc, and linked through a standard home gateway. These can be accessed from any PC, smartphone, or laptop remotely and managed. This will significantly reduce energy consumption and improve the living atmosphere and improve indoor safety [2] [3]. Along with the quick developments in technology, the devices in the recent past are becoming smarter. The real-world appliances are being prepared with intellect and computing capability so that they can configure themselves accordingly. Sensors attached to embedded devices along with the low power wireless connectivity can facilitate remotely monitor and control the devices. This forms an integral component of the (IoT) network.

IoT also helps to move data from sensors via a wireless network, in an open computing network to achieve recognition

and knowledge sharing. Things use in our everyday lives are becoming smart with current technologies, but it is not enough until we link them to the complex world and build their inter-network, i.e. communication between machine and machine [3]. IoT also enables individuals and objects to be linked anywhere, with anybody, preferably using any network and service [4].

Another major application of IoT technologies reflects automation. In buildings, schools, offices, and museums, it is the monitoring and regulation of the atmosphere through the use of various types of sensors and actuators that control light, temperature and humidity, and so on. Automation is not Represent an efficient but also an economical use of electricity and water and reduces much of the wastage [5]. Wi-Fi is chosen as the mode of communication in the prototype, and the devices are controlled through the Blynk platform implemented using ESP8266.IoT home automation systems consist of three main components, as shown in Fig. 1 [6].

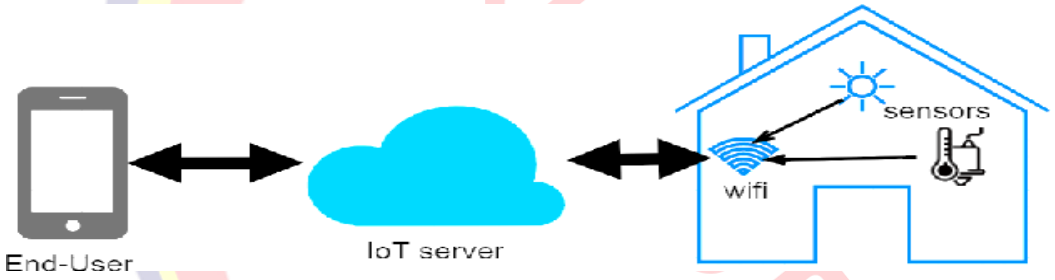

Fig.1 .IoT home monitoring system illustrative diagram

The sensing and data acquisition part is the first part. This is achieved by positioning sensors or instruments, often called stuff, to measure and collect at many locations in the house. The second part of the process is the collecting of data. Sensors have provided data. Via transmission mode, wired or wireless communication, such information is sent to the processor. Then the data is translated by the processor into understandable values [9]. These values are automatically transmitted to a computer to be monitored and controlled and the processing process is rapid and/or to a user interface. The last part of IoT automation is the internet. A server is used by most systems to upload data after processing so that the user can access it. The internet also allows data to be monitored remotely and devices to be manually managed [10]. By performing multiple orders automatically, automation systems can help

save time providing a better quality of life in homes.

LITERATURE REVIEW

This section discussed different Home Automation systems with their technology with features, benefits, and limitations they have. The project paper [11] worked to build an application for Iot, It provides the concept of the small smart community architecture that presents two smart home apps capable of monitoring temperature, light intensity, door condition, and fan/AC power, some lamps, and providing some safety warning. To provide interconnection between device systems and the database system using a smartphone or computer/laptop via Wi-Fi, a website based on a TCP/IP protocol web server is used.

The aim of the project [12] is to remote monitoring and control electrical devices at home via Wi-Fi and to receive status updates via SMS using a GSM modem whenever necessary. The communication mechanism between the consumer and the microcontroller device is provided by the GSM modem via SMS. By sending a suitably formatted SMS to the microcontroller-based control system, users can monitor the status and also control multiple electrical devices. These SMS commands are interpreted and validated through the microcontroller system.

One work [13] is the entire system is controlled by voice, so that nothing needs to be typed at all. The device can also use certain sensors to provide automation for certain appliances, in addition to voice-operated commands. The primary goal for this work is to make a user's daily life simple and to ensure the optimal use of electricity. This is done with the use of Iot technology and devices such as lights that the consumer turns off without any particular instruction.

This paper [14] introduced managed and controlled the home remotely which saves the physical effort involved. two methods are being used one is to develop an embedded web server using dedicated hardware, the other is to use cloud-based services (Application server) and develop your application on it without the need for hardware, The proposed system consists of an Arduino board acting as the main controller with a Wi-Fi shield to allow internet connectivity, a relay circuit was interfaced with the Arduino to perform the desired actuation upon home appliances. An HTML web page was created to act as the interface between the user/client and the appliances which will be remotely controlled using a

browser of a PC/Tablet/Smartphone via the Wi-Fi module.

This paper [15] suggested protocol for smart homes called the Home Automation System Protocol. The potential of home automation systems across multiple platforms is targeted. The IFTTT service used here to describe a collection of protocols and actions for system communication is combined to generate and manage interactions through a central node, Through using the minimum data packets to cause an operation on a home automation computer, However, the limitations of this research are the use of the IFTTT platform, which enables only to send a limited number of messages. Through this paper, it is bypassed by sending an unlimited number of messages using the Blynk platform, which enables to send the unlimited number of notification to the homeowner.

PROPOSED SYSTEM

The system consists of three isolated subsystems: The first subsystem consists of a Blynk cloud module to obtain the hardware state by providing an interface that displays the status of each sensor and through this interface, all household appliances are monitored and controlled manually. Second subsystem You can connect several sensors such as DHT22 (temperature and humidity sensor) to sense the temperature and humidity in the house, the gas and smoke sensor MQ2, (the Bosch button switch) is a simple electrical mechanism used to operate the doorbell when the button is pressed, the message is sent to The homeowner to notify him of the home visitor, and when the notice arrives, the homeowner can open the door through the Blynk platform. Servo motor programmed to open and close the door. Also in this system was used (Esp32Cam) which is a low cost development board equipped with WiFi camera. It allows creating IP camera projects to stream video with different resolution. It displays the video streams in real time and in high quality. By viewing the video stream, the homeowner can monitor the house in real time at any time and any where, when the doorbell rings, the alarm will reach the homeowner through the Blink application and through this application, the home owner can also see the video stream and in the event that the person is Visitor ID. The owner of the house can manually open the door of the house through the servo motor that is linked to the door lock. “A global (mobile) GSM system is a modem or device unit that uses mobile phone technology to provide a data link to a remote network. From a mobile network point of view, it is basically identical to a regular mobile phone, including the need

for a SIM card to identify itself with a modem GSM network, usually provides TTL level serial interfaces to its host, and is usually used as part of an embedded system, which has been used in this system. To send alert messages to the homeowner and emergency services in case the temperature rises above the minimum or smoke or gas is detected in the Home - using the GSM module in the event of an outage or malfunction in the Internet for any reason The third subsystem consists of the main control unit (Esp8266)[16] that acts as a central coordinator that communicates with other subsystems via Wi-Fi. Home devices equipped with a relay unit to control the Devices via the interface provided by the Blynk platform. Sensor data is brought into the user interface that is facilitated by smartphones or tablets from various sensors that use ESP8266 as a private server. An overview flow diagram of the proposed general system is shown in Fig 2, mainly the control of starting or stopping the entire system is in the hands of the owner. When the system turns on, it looks for the preset SSID (Service Set Identifier) and automatically connects to the Internet, and it performs an automatic control task that does not require commands from the owner. Sensors collect contrasting ambient conditions and transmit them to a microcontroller that processes the data sent by each sensor separately. The system can operate in two modes: automatic mode and manual mode. The system usually works in automatic mode depending on the system's programming, where all household appliances such as fans, heaters, heaters, and home lights are automatically triggered to work according to the environmental conditions surrounding the sensors. The sensors are programmed through the Arduino IDE, where a threshold value is placed for each sensor, for example when the temperature rises above the threshold values the van is turned on and at the same time an alert is sent to the homeowner and when it is less than the threshold value the heater is turned on automatically and when you feel the presence of smoke or gas in the house higher From the threshold value, you send an alert to the homeowner about the environmental status inside his home and continue to send alert messages until sensors reading reach the normal value. Fig 3 show the algorithms of proposed system. And the user can monitor and control all home appliances locally or remotely via the smartphone interface represented by the Blynk platform. Monitor and fully control your home appliances with the touch of a button fig 4 show the circuit diagram and connection to proposed system.

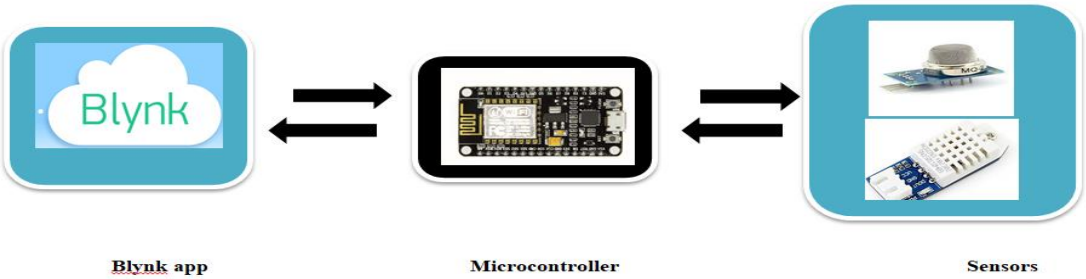

Fig.2 General Proposed System

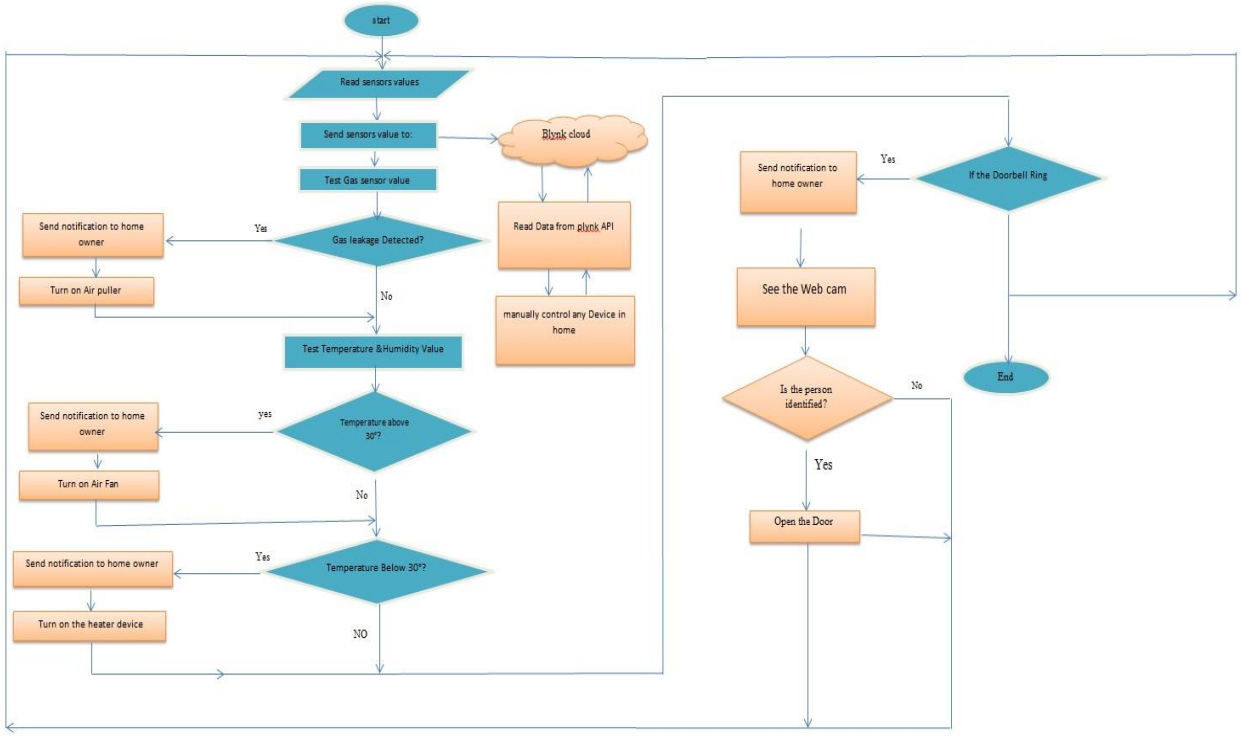

Fig.3 System Algorithm

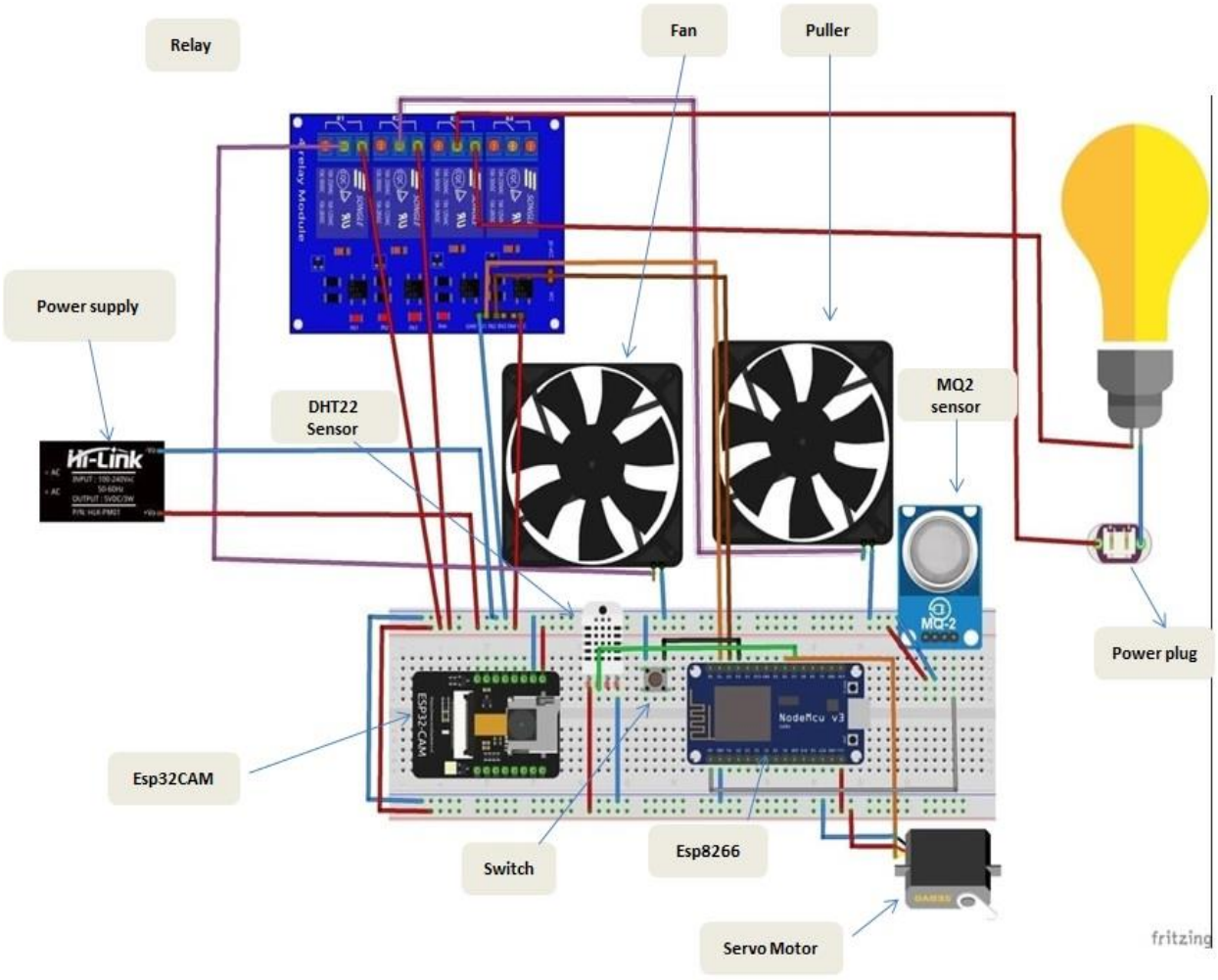

Fig.4 Circuit diagram of proposed system

RESULT AND DISCUSSION

Figure 5 shows the user interface where the Blynk application was used in a way that the buttons and the Gage video appear, where the values of temperature, humidity and gas level are displayed in the home, which through these buttons can be controlled and monitored by home appliances easily from a remote, and Fi 6 shows the video Stream Through the Blink app. This application is characterized by that it can be shared by all family members by entering the authentication code. When someone turns on or off any device, it will be clear to all individuals. This system can be used in all places and industries to make devices run smarter.

Fig.5 Botton and Gage

Fig.6 Video stream

CONCLUSION

A simple and scalable design for house monitoring, control, and automation was presented in this paper. It uses a cloud to gather data using the IoT concept from sensor nodes. It is possible to view, process, and use collected data to monitor devices in the building. The ESP2866 was used as the main processing unit, which collects, processes, and then uploads the data from the sensors to the BLYNK cloud. Also, the ESP2866 controller can read and manipulate data and commands from the same cloud, processing the devices.

This constitutes a full IoT technology-based smart-home control and automation system. The suggested design of the smart home is very versatile and can be easily extended and applied to larger buildings by raising the number of sensors, calculated parameters, and control devices. It also allows the elderly, who cannot travel, and differently able individuals to control the appliances in their home in a better and easier way. More flexibility and smartness could also be applied to the current framework for increasing, adapting, and improving the house automation system on its own using advanced artificial intelligence.

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