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RESEARCH ARTICLE OPEN ACCESS

Application Based Home Automation System Using IoT

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ABSTRACT:
Home automation has gained popularity in recent years as daily life has become easier as a result of the speedy development oftechnology. Nearly everything has been computerised and automated. In this study, a system for connecting sensors, actuators, and other data sources is suggested to support various house automations. The Application Programming Interface (API), the cornerstone of a simple and widely-accepted communication method, is the basis of the system, known as q Toggle. Sensors or actuators that support the qToggle API and have an upstream network connection are frequently used with qToggle. The majority of qToggle's products are constructed using ESP8266/ESP8285 or Raspberry Pi boards. Several home devices and sensors are now available to users of a smartphone application. The qToggle system is customizable, user-friendly, and can be enhanced by utilising a variety of add-ons and accessories.
Keywords: Smart houses, home automation, the Internet of Things, and sensors

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I.INTRODUCTION

A technology called the Internet of Things (IoT) makes it possible to link and remotely monitor gadgets. In recent years, the concept of the Internet of Things (IoT) has seen substantial development and is currently used in a number of contexts, such as smart homes, telemedicine, industrial settings, etc. [1]. Innovative smart gadgets with cutting-edge capabilities can be globally networked thanks to IoT integrated wireless sensor network technology. A wireless home automation network, which is made up of sensors and actuators that share resources and are connected to one another, is the primary technology for building intelligent houses. The "smart house" paradigm of theIoT incorporates home automation.

By enabling them to link to the Internet, userscan remotely operate and monitor furniture and other items in a home [2]. These include light switches that respond to voice commands or smartphone apps to turn on and off, thermostats that adjust the interior temperature and generate energy usage reports, or smart irrigation systems that begin at a specific time of day on a personalised monthly plan to reduce water waste. Smart home technologies have become very popular recently. Figure 1 shows an example of a smart home powered by multiple IoT-connected services.

The ease with which home automation systems may be managed and controlled by a number of devices, including voice assistants, tablets, laptops, and desktop computers, is one of its main advantages. Home automation systems offer a number of benefits, including increased safety through the control of lighting and appliances, increased security with automated door locks, increased awareness thanks to security cameras, increased comfort thanks to temperature control, and time and cost savings.

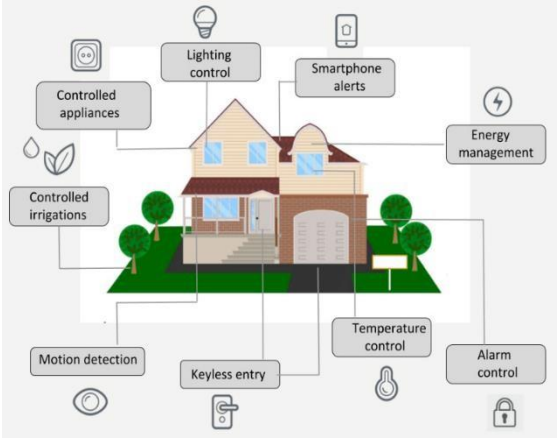


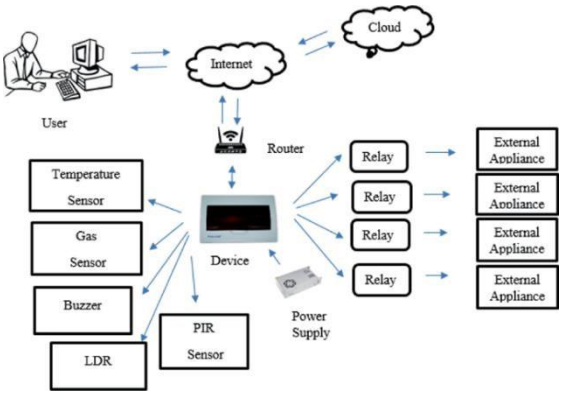
Figure 1. An IoT-based smart home depicting the use of smart sensing devices for different purposes.

II. LITERATURE REVIEW

How to utilise a smart home automation controller is thoroughly explained in Paper. It

makes use of IoT to turn common household appliances into smart devices by using design controls. a method that is both energy-efficient and employs IoT connectivity to allow remote access to smart homes. The key parts of the suggested system are the MCU microcontroller unit, the MQTT broker, the Adafruit library supporting MQTT, and the Arduino IDE microcontroller being programmed [3]. The article outlines a method for developing a cheap wireless fidelity home automation system (HAS) (Wi-Fi). It establishes the way in which the internet will work on smart devices.Wi-Fi-enabled wireless sensor networks (WSN) are designed to monitor and control a smart, connected home's electrical, environmental, and security aspects. Among the several sections of HAS are the temperature and humidity sensor, gas leak warning system, fire alarm system, burglar alarm system, rain sensing, switching and load, voltage and current sensing control, and other 11 | PA G E parts. Smartphone applications satisfy the necessary condition for HAS to monitor and manage devices [3].In order to provide home security and ease of use, the study focuses on a system that combines a camera module with IoT-based home automation. In essence, the Android software turns the smartphone into a remote control for all home appliances. If motion is detected at the home's entrance, motion sensors can increase security. When this happens, a notification was issued that included a live image of the home entry. The homeowner receives this notification online, which allows the app to start sending it. As a result, the owner can activate the alarm in the event of any intrusion or unlock the door if the visitor is a guest [2].

This article suggests maximising household electricity use based on PLC to enable simple access to household electricity use (Power Line Communication). It also recommends a ZigBee and PLC-based Renewable Energy Gateway to control the production of renewable energy. The ACS and DDEM algorithms have been proposed for intelligent distribution design of power management systems to ensure the current power supply of home networks. Power supply models for home sensor networks are incorporated to provide efficient power control. Batteries that are rechargeable and non-rechargeable, the primary supply alone, the primary supply and a backup battery, and so on [4].



Existing smart home systems use a variety of encryption techniques, including AES, ECHD, and Hybrid. In order to reduce computational overhead, the paper proposes a system that builds models. These techniques employ intermediary gateways to link several sensor devices. The proposed paradigm provides a method for automating sensor-based learning. Temperature sensors are used in the system's development, while other sensors might be used as needed. These sensor-equipped smart home equipment can self-configure and operate without human intervention. The main goals of this work, which facilitates encryption decryption, are standardisation and automation of smart home devices with learning [5].

The paper shows a focus-based artificial intelligence system for the on/off status of a typical home appliance. The proposed device status sensing approach would result in a breakthrough home automation system. IoT's IP addressing methods enable access to the home device suite across a distant network. The project calls for the utilisation of two boards. Intel's Galileo Gen 2 and the Raspberry Pi. User devices can talk to one another via wireless networks, Raspberry Pi, and Intel Galileo boards. The UDP protocol has been created to allow wireless communication between nodes in the home automation network. A USB Logitech camera and a Pi camera are each attached to two spinning shafts of two different servo motors. Snapshots are captured and supplied as data to as to input to the machine learning model using dlib-c [6].

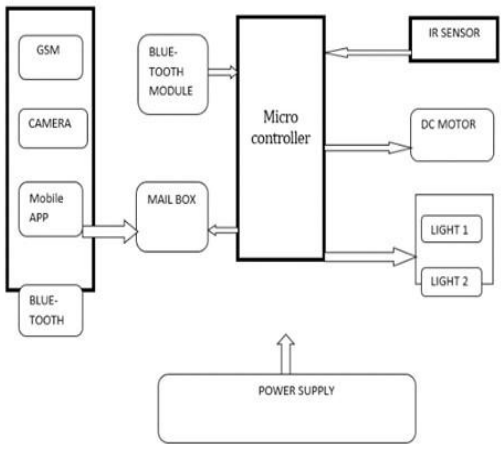
The article's main goal is to create a voice-based home automation system that is completely functional and uses a variety of technologies, including the Internet of Things, artificial intelligence, and natural language processing, to provide a useful, affordable way to communicate with home appliances. NLP is used. GSM, NFC, etc. On a mobile device, it implements seamless device integration across all platforms.

The prototype makes use of the Arduino MK1000, also known as the Genuino MK1000. In this research, NLP enables the user to interact freely with home appliances by speaking and using natural language rather than complex computer commands [7].

In this age of digitalization and automation, the Internet of Things (IoT) is a framework that enables objects to remotely connect to, comprehend, and change network infrastructure. As a company grows every year, it encounters new management and energy issues. A big restriction is not being able to manage and keep track of electrical devices that are off when no one is around. In addition, it is challenging to organise the people taking part in the laboratory's everyday activities when the population of persons occupying space surpasses the reasonable range. The mission's goal is to transform the campus into a smart laboratory with better security, energy efficiency, and amenities by developing a smart laboratory system based on IoT and mobile application technologies to control the laboratory's overall operations, including energy use. [8].

Over time, doctors have become increasingly aware of the importance of self-confidence and self-care. The Internet of Things is a result of the development of technology, and when it is used intelligently and effectively, it may improve everyone's quality of life. contemporary home automation systems.

III.BLOCKDIAGRAM



Recently, remote solutions like Remote Control have become more and more popular in home systems administration. Similar to computerization systems, the use of remote technologies provides some benefits that couldn't be achieved with the use of a wired system as they were. Given the current state of affairs, why the brilliant expansion in clever merchandise? Advances in artificial intelligence and voice control, which together provide a reasonable control environment for a consistently associated house, only partially decide it. Another element that suggests this innovation is no longer startlingly off-putting is its widespread acknowledgment with cell phones and other multi-functional devices. Additionally, there is a real need for energyefficient equipment that can monitor and computerise their own usage in order to conserve energy.

IV. CONCLUSION AND FUTURE SCOPE

In this project, we offered a straightforward approach to home automation using Raspberry Pi boards and ESP8266 chips. Both options are reasonable in price, portable, and simple to use. The proposed qToggle system also makes use of a very simple core API, enabling a more adaptable network architecture. The qToggle system is intended to be a fully functional smart home prototype. It has many functionalities, including automation, control, monitoring, and security.In order for the study to be called a survey, one contribution of this one is the review of recent (past 10 years) publications published in the literature, commercial solutions, and open source home automation systems . In contrast to other articles in the literature, the suggested study describes how the solution was implemented (both hardware and software). It is underlined that the majority of smart home systems described in the literature [4-34] have been created with less functionalities employing various technologies, controllers, types of communication, user interfaces, etc.

It is evident from this project's work that a personal control home automation system can be constructed for a reasonable price using inexpensive locally available components, and it can be used to manage a variety of devices, including air conditioning systems, televisions, and safety lighting. Appliances may be controlled using this. lighting installed throughout the home. Even better, the required materials are so little and insignificant that they can be contained in a tiny, inconspicuous container. The numerous home appliances used in lighting systems, air conditioning systems, home entertainment systems, and other systems have been tested repeatedly and certified to be controlled by designed home automation systems. As a result, this system is adaptable and scalable.

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