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A Survey on Home Automation System

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ABSTRACT: This project presents the overall design of Home Automation System with low cost and wireless system. It specifically focuses on the development of an IOT based home automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions. In this project, we design the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the home. We used Node MCU, a popular open source IOT platform, to execute the process of automation. Different components of the system will use different transmission mode that will be implemented to communicate the control of the devices by the user through Node MCU to the actual appliance. The main control system implements wireless technology to provide remote access from smart phone. We are using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. We provided a data transmission network to create a stronger automation. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation. The status of the appliance would be available, along with the control on an android platform. This system is designed to assist and provide support in order to fulfil the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home.

KEYWORDS: Automation System, Node MCU, IOT, Project, Home, Design, Development, Wireless, Automation, User, Smart, Project, Control.

I. INTRODUCTION

The Internet of Things (IoT) is a concept that has gained widespread attention in recent years, and for good reason. It involves assigning an IP address to each device, allowing it to be identified on the internet, and providing mechanical and digital machines with unique identifiers (UIDs) that can transfer data over a network without human intervention. Originally known as the "Internet of Computers," this idea has expanded to include a variety of devices that are connected to the internet, such as home appliances, wearable technology, and even vehicles. Research studies have shown that the number of connected devices will continue to grow exponentially, leading to the creation of a vast network of interconnected devices, known as the IoT.

This growth has been made possible by recent advancements in technology, which have enabled the use of wireless controlling environments like Bluetooth and Wi-Fi. These wireless connections have allowed different devices to connect with each other seamlessly, making it possible to create complex IoT systems that can be controlled remotely. One of the key technologies that have enabled the development of the IoT is the use of Wi-Fi shields. These shields can act as micro web servers for devices like the Arduino, eliminating the need for wired connections between the Arduino board and the computer. This not only reduces costs but also enables the device to work as a standalone device. To connect the Wi-Fi shield to the internet, a wireless router or hotspot is needed, which acts as a gateway for the Arduino to communicate with the internet. With this in mind, an internet-based home automation system has been



designed that allows users to remotely control and monitor the status of their home appliances. This system is based on the use of Wi-Fi technology, which is one of the most widely used wireless connections for IoT devices.

Despite the availability of other wireless connections, such as GSM and BT, Wi-Fi has been chosen for this system due to its superior capabilities. Among the four popular wireless connections that are often implemented in home automation systems, Wi-Fi offers the best combination of speed, range, and reliability. Additionally, most current laptops, notebooks, and smartphones come with built-in Wi-Fi adapters, reducing the cost of implementing this system. In conclusion, the IoT is a revolutionary concept that is changing the way we interact with machines and devices. It has been made possible by recent advancements in technology, including the use of wireless connections like Wi-Fi. With the development of Wi-Fi shields, it is now possible to create complex IoT systems that can be controlled remotely, enabling users to monitor and control their home appliances from anywhere in the world. As the number of connected devices continues to grow, it is clear that the IoT will continue to play a significant role in our daily lives.

II.LITERATURE SURVEY

The concept of a smart home has been gaining popularity in recent years due to the increasing use of internet-connected devices and the Internet of Things (IoT). An efficient implementation of IoT for monitoring and automation system has been proposed in a survey on an efficient IoT-based smart home. This system uses portable devices as a user interface to communicate with the home automation network through an internet gate using low-power communication protocols like Wi-Fi. The project aims to control home appliances through a smartphone using Wi-Fi as the communication protocol and an Arduino Uno as the controller.

The system uses two graphical user interfaces (GUIs), one on the personal computer and the other on the smartphone. The user can interact with the system through a web-based interface over the web. Home appliances like lights, fans, and others are remotely controlled through this system. Any changes in the status of the appliances are immediately displayed on the GUI. The window GUI acts as a server to transmit data to and from the smartphone and the main control board after the smartphone's Bluetooth is connected to the computer's Bluetooth. If the Bluetooth connection between the PC or laptop and the control board fails, the connection can be re-established using a USB cable. The user can monitor and control the devices from any remote location at any time using IoT. The paper describes the Smart Home Automation using IoT in detail.

The system hardware is divided into three parts, namely, PCB, relay, LPT port, transistor, diode, resistor, and Arduino controller. Two devices, fan, and light are connected to the PCB and are connected to the Arduino website. This system can be easily implemented in any home, and it provides an efficient way of controlling home appliances remotely. In conclusion, the proposed system is an efficient and convenient way of controlling home appliances remotely using IoT. It provides a user-friendly interface for controlling home appliances through smartphones and computers. With the increasing use of internet-connected devices and the IoT, the concept of a smart home is becoming a reality, and the proposed system provides an efficient and practical way of implementing it.

III.PROBLEM STATEMENT

Currently, our country is facing a severe energy crisis, worsened by the careless utilization of available energy resources. Often, people forget to turn off lights and appliances when leaving home, resulting in wastage of energy. However, with the implementation of a home automation system, controlling appliances from a remote location using smartphones becomes effortless. In today's fast-paced lifestyle, people are constantly on the move, striving to complete their never-ending tasks. The home automation system eliminates the need to worry about mundane tasks such as opening doors or switching off appliances, thereby saving valuable time and increasing productivity. Additionally, this system serves as a boon to physically challenged and elderly individuals who may find it challenging to perform such tasks manually.

IV.PROPOSED ALGORITHM

The home automation system being proposed utilizes various components such as Arduino microcontroller, sensors, and electrical devices commonly found in homes. The system is designed to be easily configurable to handle additional hardware interface modules or sensors. To connect to the internet, a Wi-Fi module is used. The system can be accessed locally through a web browser using the server IP or remotely through any device connected to the internet with a

compatible web browser via the server's real IP address. By using Wi-Fi as the network infrastructure, the system's security is improved, and it becomes more scalable and mobile. The system has the capability to control several appliances including lights, fans, doors, televisions, refrigerators, and air conditioners. These appliances can be switched on/off or have their brightness adjusted. The system can also open and close doors.

•**Arduino:**The ESP8266 is a pocket-friendly and compact microcontroller that has a built-in Wi-Fi module and the capability to operate as both a TCP/IP stack and a microcontroller. This microcontroller is produced by a Chinese company situated in Shanghai. Its cost-effectiveness, small size, and integrated Wi-Fi module make it a perfect option for linking an Arduino board to the internet, cloud server, and mobile apps.



Fig. 1.1 Arduino

•**Node MCU ESP8266:**The ESP8266 is a budget-friendly and small-sized microcontroller that comes with a built-in Wi-Fi module and the ability to function as both a TCP/IP stack and a microcontroller. This microcontroller is manufactured by a company based in Shanghai, China. Its affordability, compactness, and integrated Wi-Fi module make it an ideal choice for connecting an Arduino board to the internet, cloud server, and mobile applications.

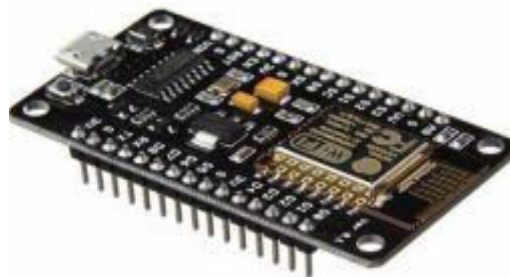


Fig. 1.2 Node MCU ESP8266

V.PROJECT PURPOSE

Even though there are a number of quick access options for the hand and mouse gesture for laptops in the current system, with our project, we could use the laptop or webcam and by recognising the hand gesture, we could control the mouse and perform basic operations like mouse pointer control, select and deselect using the left click, and a quick access feature for file transfer between the systems connected via network LAN cable. A "Zero Cost" hand identification system for computers was developed. It employs straightforward methods to identify the hand, track hand motions, and give a response to each movement. However, we have primarily focused on mouse aiming and clicking actions as well as a file transmission action. movement and physical motion between interconnected devices. Since Python is a basic language, platform autonomous with freedom, and adaptable, the system we are developing will be



much more flexible and easier to implement. This is desirable in creating a programme that is concentrated in such a goal for making a Virtual Mouse and Hand Recognition system. By specifying actions for the hand movement for carrying out a particular action, the system can be expanded much further. By using such actions for the collection of hand motions, it could be altered to any further degree; your creativity is the only limit.

VI. FUTURE ENHANCEMENT

- a) Several additional sensors can be utilized to enhance the security and management of a home, such as a pressure sensor positioned outside the house to detect an incoming person.
- b) To enhance the professionalism of the system, the automated notifications can be modified by incorporating a GSM module.
- c) An intelligent garage that can measure a car's length and direct it to a suitable parking spot, thereby making parking easy for the homeowner in their garage. The garage will guide the car through the parking process.

VII. CONCLUSION

The paper explores the use of Arduino, Node MCU, and Android-based techniques to create a user-friendly platform that allows individuals to control their home appliances via their mobile phone applications. The study concludes that wireless technology is a fundamental component of all home automation systems. The research paper provides detailed designs, implementations, and flowcharts of various techniques that are utilized to identify the strengths and weaknesses of each approach. The main objective of home automation systems is to simplify the management of household appliances and conserve resources such as time, money, and electricity. Additionally, these systems are utilized to secure homes from break-ins by triggering alarms and sending alerts to the owner's mobile phone when unauthorized individuals attempt to enter the house. The system can also display the number of people entering the house on an LCD screen, which adds an extra layer of security.

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