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Smart Cabin using ESP and IoT

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Abstract - *Home automation is an automation technology that makes work in all areas around the house easier. As we enter a new age of technology, home automation is becoming increasingly important as people move from traditional switching systems to centralized, remote controlled switching systems. Today, when the whole world is suffering from COVID and companies have adopted the concept of working from home, an automated "smart cabin" is one of the most pressing needs of the time, as it allows an employee working from home to be self-sufficient and focus on his/her work without any disturbance. Ultimately, this increases employee efficiency and productivity as they can contribute fully to their work and take the time to stay relaxed, refreshed and focused. In this project we resent the overall design and implementation of an IoT based home automation system "Smart Cabin Using ESP and IOT" capable of controlling various components within a cabin over WiFi via an app from any corner of the cabin.*

Key Words: **Arduino; ESP32; ESP8266; IoT; Home Automation; Wi-Fi; Blynk;**

1. INTRODUCTION

Due to the advancement of wireless technology, various types of connections have been introduced such as GSM, WIFI and Bluetooth. These technological developments, allowing the use of wireless control environments such as Bluetooth and WiFi, have allowed different devices to connect to each other. This project presents a low cost ESP based home automation system with WiFi that gives the user the ability to control any electronic or electrical component of the room with an app on their smartphone. The components are connected to different sensors that have different applications and all these sensors are connected to the user's smartphone via WiFi. The user uses an application on their smartphone to control these components by communicating with the installed sensors. Arduino IDE is used to program the microcontrollers and an Android app (Blynk) is used to control the microcontrollers.

2. RELATED WORK

This article by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra introduce a step-by-step guide of a smart home automation controller. It uses IoT to turn home appliances into smart devices with the help of design control [1]. This paper by Ravi Kishore Kodali, Vishal Jain, Suvadeep Bose, Lakshmi Boppana focuses on a system providing home automation functions based on IOT for easy operation including a camera module and home security [2]. This article by Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung proposes home energy consumption optimization based on PLC (Power Line Communication) for easily accessible home energy consumption [3]. This paper by Mandira Das, Pritam Das, Sandip Das, Esha Biswas describes a system that develops a model to reduce the computational effort in existing smart home solutions that use different encryption technologies such as AES, ECHD, Hybrid, etc. [4]. This article by Suraj, Ish Kool, Dharmendra Kumar, and Shovan Barma introduces a vision-based artificial intelligence system to detect the on/off status of common household appliances [5]. This article by N. Vikram, K.S. Harris, MS. Nihaal, Raksha Umesh, Shetty Aashik Ashok Kumar illustrate a method to deploy a low-cost home automation system (HASand#41; with Wireless Fidelity (WiFi) [6]. This article by Paul Jasmin Rani, Jason Bhakta Kumar, B. Praveen Kumaar, U. Praveen Kumaar, Santhosh Kumar focuses on building a fully functional speech-based home automation system using the Internet of Things, artificial intelligence and natural language processing (NLP).

3. MOTIVATION AND PROBLEM STATEMENT

The concept of automation has not yet penetrated in homes especially in India. If automation was to be used in homes then everyday life would be much easier. Simple example of use of automation at home can be seen in the transfer of water from the under-ground water tank to the overhead water tank, by sensing the level of water in both the tanks. In today's competitive corporate world, the efficiency of an employee is dependent on time for the slightest of seconds. A significant amount of time is wasted on unwanted activities while working in a home

environment which needs to be reduced for maximum output. So, we have decided to make a low cost "Smart Cabin" in which the smart phone can be used to help automate the entire room. In this system the user will have access and control over all the subsystems present in the cabin.

The main objective of this project is to design and develop a prototype of a Smart Cabin controllable from a mobile application designed to run on android device providing a variety of features which enables the user inside the cabin to control all the electrical appliances inside the room as well as other important factors such as safety, odor, sunlight etc. Considering its wide range of application, following are the scope of this prototype:

1. The system can be implemented in homes, small offices and malls as well, being in-charge of control of the electrical appliances.

2. The appliances in the above mentioned environment can be controlled in intra-network using WiFi technology for a wider range of accessibility.

3. It aims to provide an energy efficient and work efficient workspace to an employee/student/any other worker.

6. BLOCK DIAGRAM

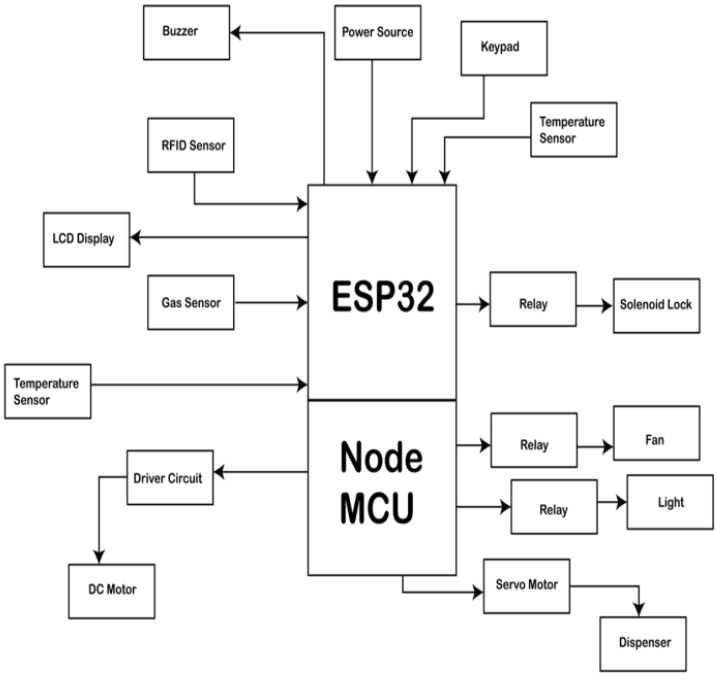

Fig.1 - Block diagram

7. METHODOLOGY

All the sensors are connected to the ESP32 Board, the remaining components are connected to NodeMCU, and the respective appliances are connected to them. Firstly, the ESP32 board is paired with the Android Device having an application to control all the sensors (Blynk). This "Smart Cabin" allows the user to set 3 Modes depending upon the mood of the user, namely: WORK, RECREATION and FREE. The modes can be controlled by the user from the app in the user's Android Device. A servo motor is installed on the fragrance dispenser and the user can control the room odor by the options present in the app. A light bulb and a fan are also connected to the NodeMCU and can directly be controlled by the user through respective circuits associated with them. A DC motor with a circuit is also connected with Curtains to control the inlet of sunlight in the room according to the user's preference. Smoke/gas leak detection sensors (MQ135) are connected with ESP32 to detect the gas leakage inside the room. Solenoid lock is installed for the movement of the door which works on the commands sent by the NodeMCU and the ESP boards. A regulator is added to tune (step-down) the 12 V supplied voltage and supply it to various components through relays as per requirements - Light Bulb: 220V AC, RFID: 3.3V, Solenoid Lock: 12V, DC Motor: 12V, Fan: 12V. A driver circuit is added to control the motor responsible for rotating the armature of curtains control to reduce any damage caused by excess current drawn.

8. HARDWARE CIRCUIT

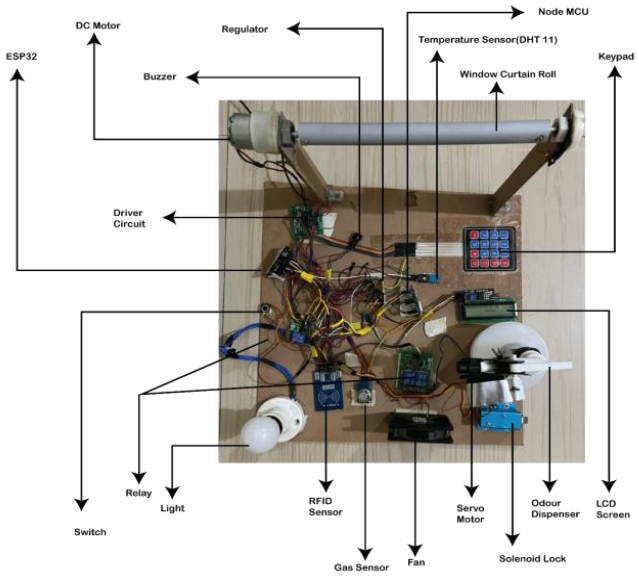

Fig. 2 - Working hardware circuit

8. RESULTS

The below figure represents the Blynk app interface used to control the components in the circuit.

Fig. 3 - Blynk app interface

The below figure represents the working circuit of the project.

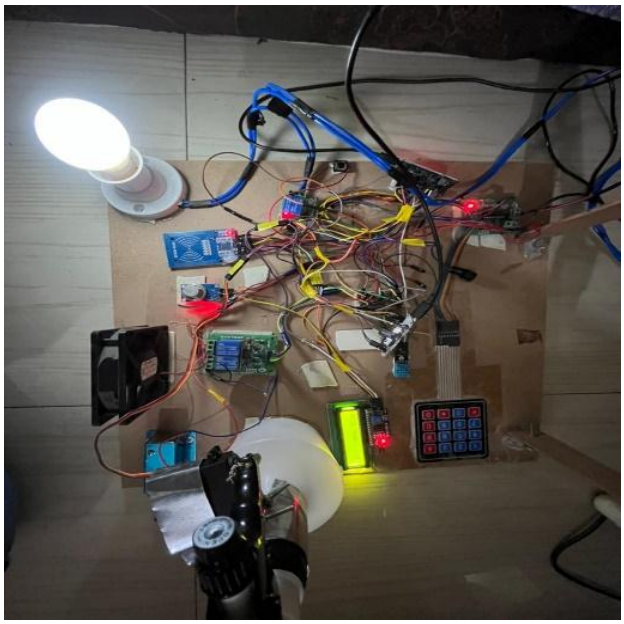

Fig. 4 - Working hardware circuit

10. CONCLUSION

It is evident from this project work that a Smart Cabin system can be cheaply made from low-cost locally available components and can be used to control multifarious appliances ranging from fan, lighting system, odor control and even security systems thus enhancing security and maximizing the efficiency of people. The sensors, associated with different appliances in various areas of the room, are connected to the Board which is programmed and then controlled by the user through an application (Blynk App) on his phone. This reduces the wastage of time and energy by a significant amount and reinforces the idea of smart workspace using complete automation in homes. Hence, this system is user-friendly, scalable and flexible.

11. REFERENCES

[1] Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra "Smart Energy Efficient Home Automation System Using IoT," 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU), July 2019.

[2] Ravi Kishore Kodali, Vishal Jain, Suvadeep Bose, Lakshmi Boppana, "IoT based smart security and home automation system," International Conference on Computing, Communication and Automation (ICCCA), April 2016.

[3] Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung "A Dynamic Distributed Energy Management Algorithm of Home Sensor Network for Home Automation System" Third International Conference on Computing Measurement Control and Sensor Network (CMCSN), May 2016.

[4] Mandira Das, Pritam Das, Sandip Das, Esha Biswas, "Iot Based Home Automation System," Unpublished.

[5] Suraj, Ish Kool, Dharmendra Kumar, Shovan Barma, "Visual Machine Intelligence for Home Automation," 3rd International Conference On Internet of Things: Smart Innovation and Usages (IoT-SIU), Feb 2018.

[6] N. Vikram, K.S. Harish, M.S. Nihaal, Raksha Umesh, Shetty Aashik Ashok Kumar, "A Low Cost Home Automation System Using Wi-Fi Based Wireless Sensor Network Incorporating Internet of Things (IoT)," IEEE 7th International Advance Computing Conference (IACC), July 2017.

[7] Paul Jasmin Rani, Jason Bhakta Kumar, B. Praveen Kumaar, U. Praveen Kumaar, Santhosh Kumar "Voice controlled home automation system using Natural Language Processing (NLP) and Internet of Things (IoT)," Third International Conference on Science Technology Engineering & Management (ICONSTEM),March 2017.