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ANDRIOD-CONTROLLED HOME AUTOMATION WITH HC-05 BLUETOOTH AND ARDUINO FOR ENERGY - EFFICENT OPERATION

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Abstract: Technology is an ever-evolving process. Designing products using current technology that improve people's lives is a valuable contribution to society. This paper presents the design and implementation of a low-cost, flexible, and secure mobile phone-based home automation system. The system is built using a standalone Arduino BT board, with home appliances connected to its input/output ports through relays.

Communication between the mobile phone and the Arduino BT board is carried out wirelessly. The system is designed to be cost-effective and scalable, allowing multiple devices to be controlled with minimal modifications to the core structure. To ensure security, password authentication is implemented so that only authorized users can access and control the home appliances.

Keywords: Home Automation; Smartphone; Arduino; Bluetooth; Home Appliances

I. INTRODUCTION

A home automation system involves the use of information technology and control systems to reduce human effort. The rapid advancement of technology has encouraged the use of smartphones to remotely control household appliances. Automated devices are capable of operating with versatility, accuracy, and minimal error. The concept of home automation has become a significant area of interest for researchers and home appliance companies.

Automation systems not only reduce human effort but also save time and energy. In the early stages, home automation systems were mainly used in labor-saving machines; however, today their primary objective is to assist elderly and physically challenged individuals in performing daily tasks and controlling appliances remotely.

A Bluetooth-based wireless home automation system can be implemented at a low cost and is easy to install in existing homes. Research indicates that Bluetooth systems can be faster than other wireless and GSM-based systems in certain applications. Bluetooth technology is capable of transmitting data serially at speeds of up to 3 Mbps within a range of 10 to 100 meters, depending on the type of device.

The proposed system is designed using an Arduino board, a Bluetooth module, sensors, and a smartphone application. The HC-05 Bluetooth module is interfaced with the Arduino board, while home appliances are connected through relays. A smartphone application enables serial communication between the smartphone and the Bluetooth module, which in turn communicates with the Arduino board

II. SYSTEM DESIGN

The main components used in this project are:

- Arduino Uno
- HC-05 Bluetooth Module
- IR Sensor
- L298N Motor Driver
- 12V DC Geared Motor
- Elevator Car

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- Guide Rails
- 12V Adapter
- DF Player
- Speaker

The system is designed around the Arduino Uno, which acts as the central controller. The HC-05 Bluetooth module enables wireless communication between the user and the system. The motor driver controls the movement of the elevator motor, while IR sensors are used for floor detection. Additional components such as the DF Player and speaker provide audio feedback.

Fig. 1: Block Diagram

III. WORKING

The IoT-assisted elevator automation system operates in three modes: manual control, mobile application (MIT App) control, and voice command control.

The Arduino Uno serves as the central processing unit, managing all system operations. When a user provides input through any control mode, the command is transmitted via the HC-05 Bluetooth module to the controller. The Arduino processes the command and activates the L298N motor driver to move the elevator either upward or downward.

IR sensors are installed at each floor to detect the position of the elevator. Once the elevator reaches the desired floor, the corresponding sensor sends a signal to stop the motor automatically.

An LCD display shows the real-time status of the elevator, including its current position. In voice control mode, the user gives commands through the MIT App, which converts speech into text and sends it to the system via Bluetooth.

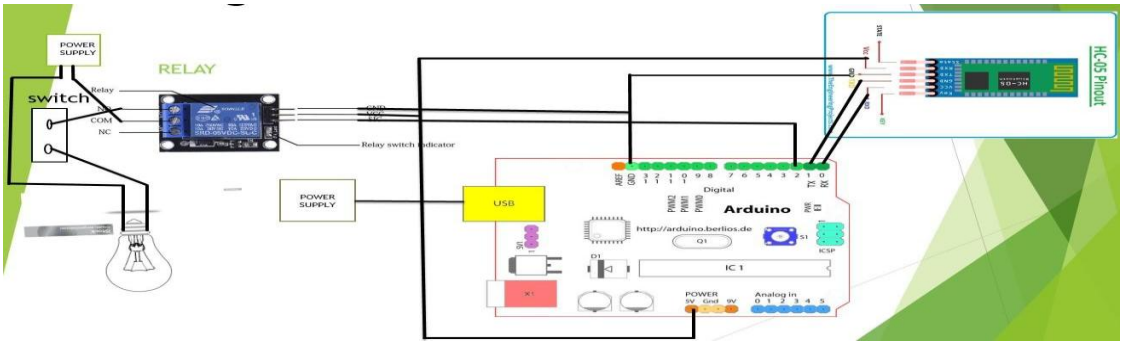

Fig 2: Circuit Diagram

IV. RESULT

The IoT-assisted elevator automation system was successfully designed and tested. The elevator functioned efficiently across all three control modes: manual buttons, mobile application, and voice commands.
Bluetooth communication ensured stable and reliable data transfer between the smartphone and the controller. The system accurately moved the elevator to selected floors, and IR sensors enabled precise stopping at each level.

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The LCD display provided real-time updates without noticeable delay. Voice control via the MIT App also performed effectively, enhancing user convenience.
Overall, the system demonstrated smooth operation, quick response time, and reliable performance.

V. CONCLUSION

The IoT-assisted elevator automation system with real-time status monitoring was successfully developed and implemented. The integration of manual, mobile app, and voice control provides flexibility and ease of use.
Bluetooth communication ensures efficient and reliable interaction between the user and the system. The project achieved accurate floor detection, smooth elevator movement, and real-time status visualization.
This system enhances user convenience and can be further improved by integrating Wi-Fi connectivity and cloud-based monitoring for advanced automation and remote access.

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