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## Home Automation System using IoT

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**Abstract:** *The advancement of the Internet of Things (IoT) has greatly improved home automation systems. In this project, we have developed a cost-effective home automation system that is designed to assist elderly people with disabilities. The system utilizes an Arduino microcontroller with Bluetooth communication capabilities and features an intuitive interface that can be controlled through an Android-based smartphone. The system allows for easy control of various home devices, including lighting, heating, cooling systems, and security devices, enabling elderly individuals to easily manage their home environment. The user-friendly interface and simple controls make the system accessible to people with disabilities, promoting their independence and enhancing their quality of life.*

**Keywords:** *Arduino, Automation, Cell phone.*

### I. INTRODUCTION

In recent years, home automation systems have become increasingly popular with the rise of the Internet of Things. While automation for commercial buildings has been in use for some time, home automation applications are a relatively new development that is gaining acceptance among consumers. Home automation involves the monitoring and control of various activities, including lighting, heating, ventilation, air conditioning (HVAC), electrical appliances, audio systems, surveillance cameras, door locks, and alarms. Home automation offers numerous benefits, including convenience, increased security, and energy efficiency.

In colder urban areas like Milwaukee, the widespread use of home automation can be observed, where people set their heating to turn off when they leave and switch on the heater 15 minutes before they return. The system is called HVAC and is a popular choice for home automation.

In an era of wireless technologies like Bluetooth, WiFi, Zigbee, and GSM, consumers expect home appliances to be connected wirelessly. Each of these wireless technologies has its own significance and specifications. This project effectively utilizes Bluetooth with an open frequency of 2400 Hz, a range of 100 meters, and a speed of around 3 Mbps. Several considerations need to be addressed while designing a home automation system. The system should be designed in a way that accommodates new devices so that they don't become an issue later on. On the host side, the system should be user-friendly so that devices can be easily monitored and controlled. In case of any issues in the future, the system interface should provide detailed troubleshooting. Finally, the system should be affordable and accessible so that it can be widely used by anyone in the market.

### II. IOT

The Internet of Things (IoT) refers to the interconnection of devices, appliances, and other physical objects through the internet. This technology enables the devices to share data with each other, automate tasks, and communicate with humans

through various interfaces such as smartphones and voice assistants. The IoT has the potential to revolutionize the way we live, work, and interact with the world around us.

One of the key benefits of the IoT is its ability to increase efficiency and productivity. For example, a smart factory equipped with IoT sensors and devices can automate many tasks, such as monitoring machine performance, tracking inventory levels, and adjusting production schedules in real-time. This can lead to faster production times, reduced waste, and improved quality control.

In the home, IoT devices can enhance comfort and convenience. Smart thermostats, lighting systems, and security cameras can be controlled remotely, and can adjust settings automatically based on the user's preferences and behavior.

Additionally, IoT devices can provide valuable data on energy usage, enabling homeowners to make informed decisions about their consumption and reduce their environmental footprint.

IoT technology also has important applications in healthcare, where it can be used to remotely monitor patients' vital signs, track medication usage, and detect potential health issues before they become serious. Wearable devices, such as fitness trackers and smartwatches, can also provide valuable data to both patients and healthcare providers, helping to improve outcomes and reduce costs.

Despite its many benefits, the IoT also presents some challenges. One of the main concerns is security, as the interconnectivity of devices creates potential vulnerabilities for cyberattacks. Additionally, the sheer volume of data generated by IoT devices can be overwhelming, and organizations must have robust systems in place to manage and analyze this information effectively.

Overall, the IoT is a rapidly-evolving technology with far-reaching implications for businesses, consumers, and society as a whole. As the number of connected devices continues to grow, it will be important for organizations and individuals to stay informed about the opportunities and challenges of this exciting new frontier.

### **III. NEED OF SMART HOMES**

An IoT-based smart home offers a wide range of benefits that can enhance comfort, convenience, and security. Some of the key advantages of an IoT smart home include:

**Convenience:** An IoT-based smart home allows you to control various devices and appliances in your home through a single interface, such as a smartphone or voice assistant. This can include adjusting lighting, temperature, and entertainment systems, among others. You can also automate certain tasks, such as turning on lights or unlocking doors, based on your schedule and preferences.

**Energy efficiency:** IoT sensors and devices can monitor energy consumption in your home and provide data on how to reduce usage. For example, a smart thermostat can learn your temperature preferences and adjust settings to optimize energy efficiency.

**Security:** IoT-enabled security cameras, door locks, and motion sensors can be monitored remotely, allowing you to keep tabs on your home from anywhere in the world. Smart home security systems can also be integrated with other devices, such as lighting systems, to create a more comprehensive security solution.

**Health and wellness:** IoT-based devices such as wearable health monitors and smart scales can help you track your physical activity and overall health. These devices can provide personalized feedback on your fitness goals, sleep patterns, and nutrition.

Entertainment: An IoT-based smart home can provide seamless access to a wide range of entertainment options, such as streaming video and audio content. You can also create customized playlists and adjust volume levels based on your preferences.

Overall, an IoT-based smart home can make your life easier, more comfortable, and more secure. With the ability to control various devices and appliances through a single interface, you can save time and improve your overall quality of life.



Fig. 1 IoT based Smart home

Additionally, the ability to monitor energy consumption and optimize usage can lead to significant cost savings over time.

#### IV. PROPOSED SMART HOMES

The proposed home automation system allows users to remotely control various devices in their homes using their mobile phones or computers. The system includes a verification process to ensure that the device is authorized and turned on before allowing the user to send control signals.

Once authenticated, the user can send commands to the device through the SL intention power program, which sends signals to the circuit. The system also includes a web server and database to store the device status information, which is updated every 10 seconds through the use of temporary web files or cookies.

The home automation system can control various devices, including lights, fans, and other appliances. Users can turn lights on/off or adjust their brightness levels, turn fans on/off, and control the power of other appliances. The system can also monitor alerts and provide notifications to the user when necessary.

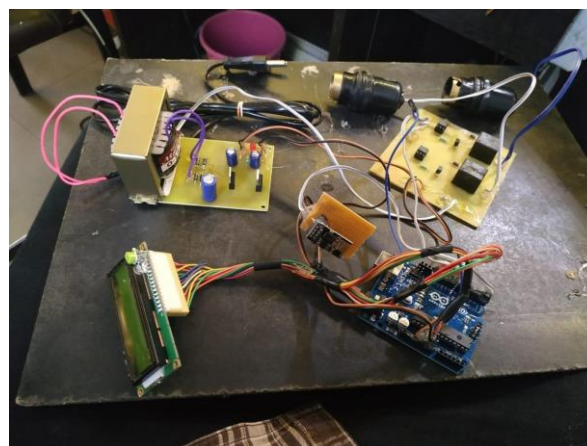


Fig.2 Proposed model Hardware

In our home automation system we have shown how we can control two devices using internet of things (IOT). The Arduino uno R3 is the microcontroller. There are two sorts of correspondence engaged with this venture: wired and remote correspondence. We have used remote communication to operate the device using internet of things. Fig.2 depicts the picture of

our model.

This section provides with a general overview of how to design an IoT-based home using these hardware components. Firstly, you will need an Arduino Uno R3, which will be the brain of your IoT home system. You can program the Arduino using Arduino IDE to control and monitor the devices in your home. You will also need a Wi-Fi or Ethernet shield for the Arduino to connect it to the internet. Next, you will need a transformer to power the system.

The transformer will convert the AC voltage from the power outlet to a lower DC voltage that can be used by the Arduino and other components. For displaying information, you can use an LED display connected to the Arduino. You can use this display to show the status of different devices or sensors in your home.

To control your lights, you can use light bulbs connected to a relay module, which can be controlled by the Arduino. The relay module allows the Arduino to switch on and off the power supply to the light bulbs, enabling you to turn them on or off remotely. Finally, to make the system truly IoT-based, you will need to connect it to the internet. This can be done using a Wi-Fi or Ethernet shield. Once connected, you can use a web or mobile app to remotely monitor and control the devices in your home. Overall, designing an IoT-based home using these hardware components will require some programming and electronics knowledge. But with the right resources and guidance, it is possible to create a smart home that can be controlled and monitored remotely using the internet.

## V. CONCLUSION

The IoT-based home that can be designed using the Arduino Uno R3, transformer, LED display, light bulbs, and relay module can provide a convenient and efficient way to control and monitor devices in your home. With the help of this system, you can remotely turn on and off your lights, monitor the status of your devices, and even control them using web or mobile app.

This system requires some programming and electronics knowledge, but it can be a fun and rewarding project for those interested in home automation and IoT. Additionally, this system can be expanded by adding more sensors, actuators, and devices to monitor and control other aspects of your home, such as temperature, humidity, or security. Overall, an IoT-based home can provide a more comfortable and convenient living experience by automating routine tasks and improving energy efficiency.

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