PANIMALAR ENIGNEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE

CONNECTED HOME PROJECT

A COMPACT BASED IOT-DRIVED AUTOMATION SYSTEM

TEAM MEMBERS:

RITHISHAASHRI.T.S (211422104401)

REBECCA.M (211422104389)

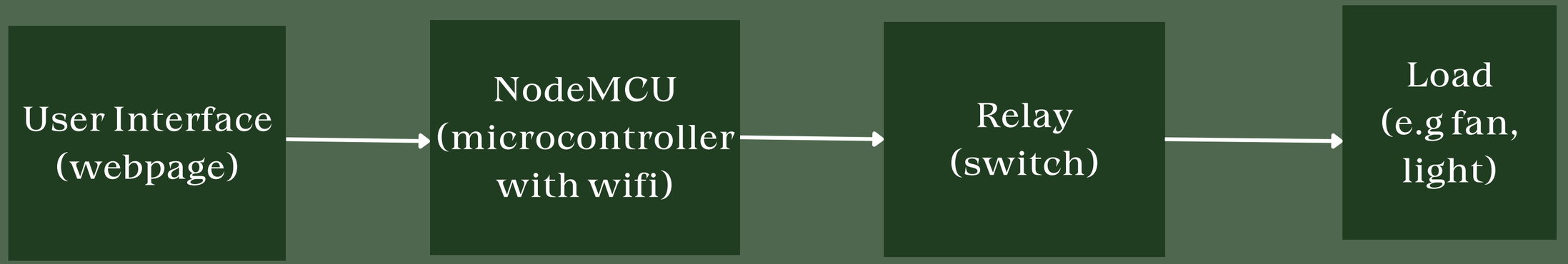
GUIDE:

SOPHANA JENNIFER

ABSTRACT

The main objective of this project is to develop a compact IoT device for smart home system using an NodeMCU board with Wi-Fi being remotely controlled by any Android OS smartphone. As technology is advancing, houses are also getting smarter. Modern houses are gradually shifting from conventional switches to a centralized control system, involving remote-controlled switches. Presently, conventional wall switches locatedin different parts ofthe house make it difficult for the user to go near them to operate. Even more, it becomes more difficult for the elderly or physically challenged people to do so. A remote- controlled smart home system provides the most modern solution with smartphones. To achieve this, a Relay module is interfaced to the NodeMCU board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. The loads can be turned ON/OFF remotely through this technology by touching the specifiedlocation on the GUI. The loads are operated by NodeMCU board.

ARCHITECTURE DIAGRAM:



EXISTING SYSTEM:

- Existing home automation systems include:
  - Traditional remote controls
  - Smart home systems
  - Wi-Fi-based smart home systems
- Traditional remote controls allow users to manage devices like TVs, fans, and lights from a distance using infrared (IR) signals, but they often:
  - Require separate remotes for different devices
  - Can be non-universal
  - May be lost or misplaced
- Smart home systems, such as Amazon Alexa and Google Home, use advanced technologies like voice commands to control a range of smart devices.

- Examples of smart devices include:
  - Philips Hue smart lighting systems
  - LIFX smart lighting systems
  - These systems can be managed via mobile apps and integrated with other smart devices.
- However, smart home systems can be:
  - Expensive
  - Require compatible devices
  - May need internet access for full functionality
- Wi-Fi-based smart home systems, like TP-Link Kasa Smart Plugs and Samsung SmartThings, utilize Wi-Fi to control appliances through:
  - Smartphone apps
  - Web interfaces
- While they offer convenience, Wi-Fi-based smart home systems can also be:
  - Costly
  - Often necessitate purchasing specific smart devices or hubs for comprehensive integration

PROPOSED SYSTEMS:

- The proposed NodeMCU-based home automation system leverages the NodeMCU (ESP8266) microcontroller as the central hub, connecting to the home Wi-Fi network to manage and control various appliances.
- Users can remotely operate devices such as lights and fans through a:
  - Smartphone app
  - Web interface
- The system offers a cost-effective, unified control solution that integrates with relay modules to switch appliances on or off.
- The system is:
  - Highly scalable
  - Customizable
  - Supports additional sensors and automation features

- Compared to existing systems, the proposed system:
  - Reduces costs by avoiding expensive hubs and proprietary devices
  - Consolidates control into a single interface
  - Offers ease of use with familiar Wi-Fi connectivity

- The implementation involves:
  - Setting up the NodeMCU
  - Integrating relay modules
  - Developing the control interface
  - Conducting thorough testing to ensure reliable operation.

Software Configuration:

1.Audrino IDE:

- Open-source software used to write and upload code to the NodeMCU.
- Compatible with Windows, macOS, and Linux.
- Supports programming in C/C++.

2.Audrino Libraries:

- ESP8266WiFi library: Allows the NodeMCU to connect to a Wi-Fi network and run a server to handle requests.

3.HTML/CSS for Web Interface:

- HTML (HyperText Markup Language) is used to create a simple webpage interface with buttons for controlling devices.
- CSS (Cascading Style Sheets) is used to style the webpage, ensuring the buttons look good and are user-friendly.
- The webpage allows users to send "on" or "off" commands to control appliances

4.Wifi Configuration:

5. Program Logic (Arduino Code):

Hardware Configuration:

1.NodeMCU:

- It is the main control unit of the project, receiving commands from the phone and sending signals to the relay module.

2.Relay Module:

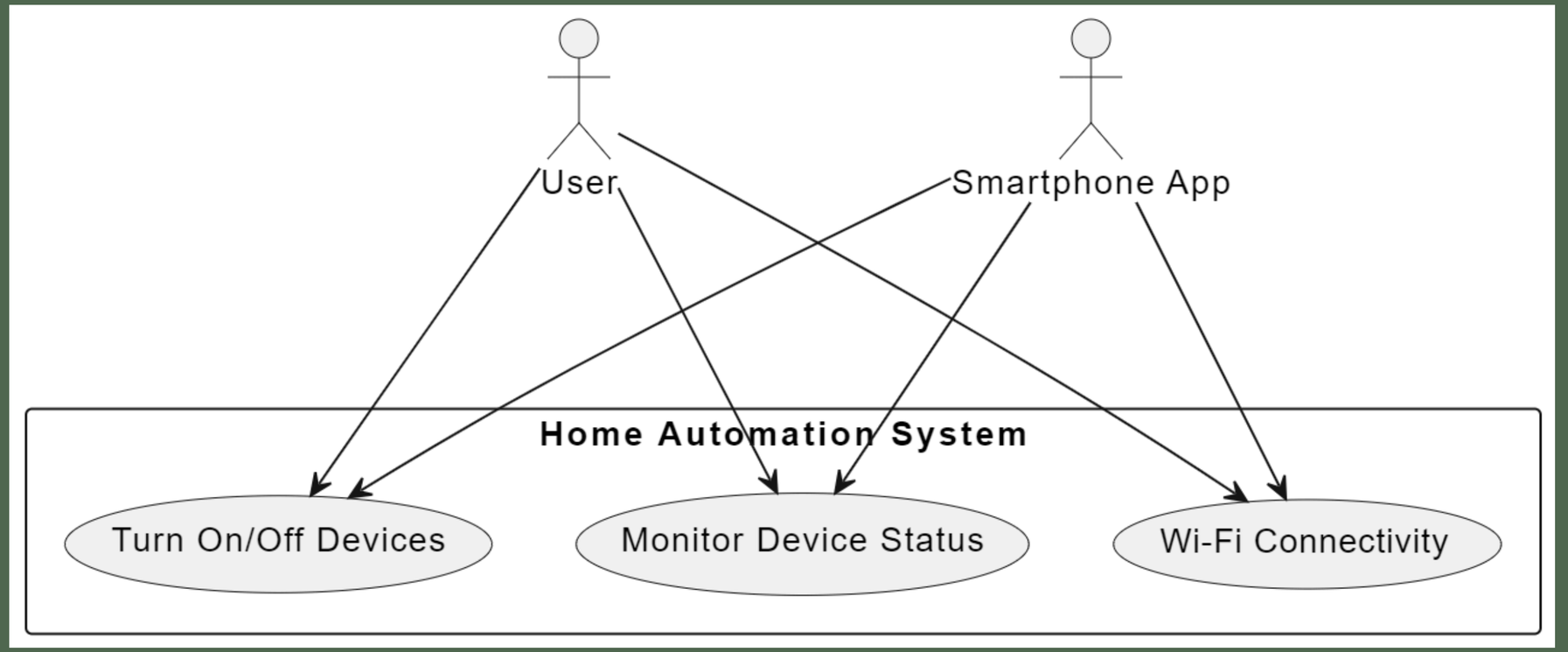
- Acts as a switch to turn on/off appliances like lights, fans, etc.

3.Power Supply:

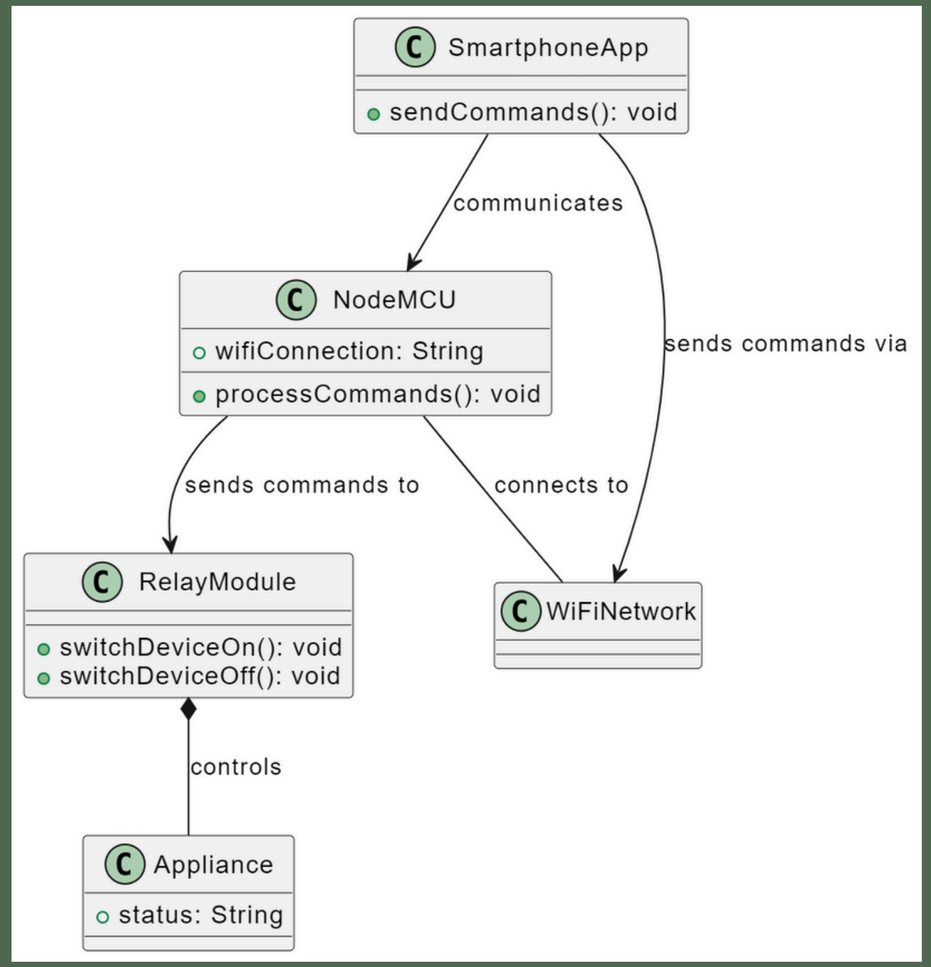
4.Wifi Router:

5.Applicances:

USECASE DIAGRAM:



CLASS DIAGRAM:



Conclusion:

This project successfully implemented a cost-effective home automation system using NodeMCU and IoT. It allows users to control appliances remotely via a mobile phone and Wi-Fi, providing convenience, especially for the elderly or disabled. The system demonstrates how IoT can simplify home automation, making it easy to operate and expand in the future.

Future Enhancement:

1. Integration with Voice Assistants
2. Smart Sensors
3. Energy Monitoring
4. Security Features
5. Mobile App Integration

Thank you!