

## **ABSTRACT**

This system integrates various sensors and IoT technology to monitor and control home appliances, enhancing safety and automation. It employs an AC voltage sensor to monitor voltage levels, ensuring they remain within safe operating limits, while a current sensor tracks the flow of electricity through appliances to detect any irregularities. A DHT11 sensor is used to measure ambient temperature, maintaining a comfortable and secure environment, and a gas sensor detects hazardous gas leaks, providing early warning for potential accidents. The system utilizes Python AI to analyze sensor data and predict anomalies, such as excessive current or faulty appliances, ensuring that any issue is promptly addressed. Upon detecting a fault, the system triggers a GSM module to send an immediate SMS alert to the user, notifying them of the problem. The system is equipped with a relay to control appliances like lights and fans, automatically disconnecting them if a fault is detected to prevent further damage. IoT technology is employed to store all sensor data for future analysis and enable real-time remote monitoring via a cloud platform. The ESP32 microcontroller functions as the central controller, processing data from the sensors and managing relay operations, while facilitating communication between the system components and the user interface. This solution improves home appliance safety by providing immediate fault detection and response, while allowing users to monitor and control their appliances remotely through IoT and GSM notifications, ensuring a secure and efficient home environment.

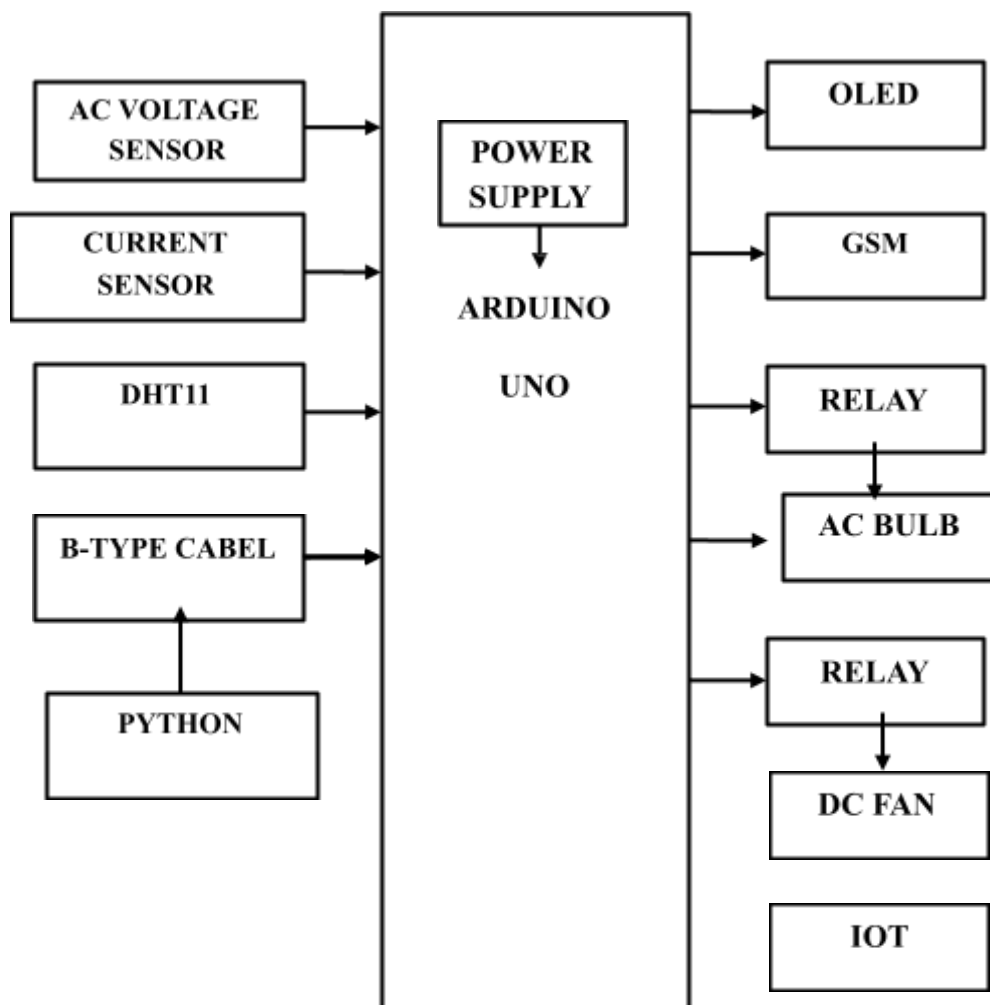
## **CHAPTER: 3**

### **PROJECT DESCRIPTION**

The system is an advanced home automation solution designed to monitor and control appliances through IoT integration and various sensors, ensuring safety and efficiency. It incorporates an AC voltage sensor to measure voltage levels, preventing potential electrical hazards, and a current sensor to track electricity consumption and detect anomalies such as overloads or faulty appliances. The DHT11 sensor monitors ambient temperature, maintaining a comfortable and safe environment, while a gas sensor detects hazardous gas leaks, providing early warnings to prevent accidents. Python-based AI analyzes sensor data to predict faults, such as excessive current flow, enhancing proactive maintenance. In case of any detected irregularity, a GSM module sends an instant SMS alert to the user, notifying them of the issue. The system includes a relay mechanism to control appliances like lights and fans, automatically disconnecting faulty devices to prevent further damage. IoT is leveraged to store all sensor data for real-time remote monitoring and future analysis through a cloud platform, allowing users to track appliance performance and detect potential issues early. The ESP32 microcontroller acts as the central processing unit, managing communication between sensors, processing data, and executing control commands. This integration of sensors, AI, and IoT ensures seamless automation, enhances home safety by preventing electrical faults and gas leaks, and improves energy efficiency by monitoring power usage. Through its GSM notification system and cloud-based IoT platform, users can remotely monitor.

and control home appliances in real time, adding convenience and security. This intelligent automation system is a reliable solution for modern homes, reducing risks associated with electrical hazards and gas leaks while optimizing appliance functionality. By combining real-time monitoring, predictive maintenance, and automated controls, it significantly enhances household safety, energy management, and overall operational efficiency.

## BLOCK DIAGRAM



## **CHAPTER: 4**

### **MODULES USED IN A PROJECT**

#### **MODULES NAME:**

- Power Monitoring Module
- Safety & Anomaly Detection Module
- Communication & Control

#### **DESCRIPTION:**

The Power Monitoring Module is responsible for tracking voltage and current levels to ensure the safe operation of home appliances. It utilizes an AC voltage sensor to measure voltage fluctuations and a current sensor to monitor the flow of electricity through appliances. By continuously analyzing these parameters, the system can detect abnormalities such as voltage spikes, power surges, or excessive current flow, which may indicate a potential overload or faulty appliance. The collected data is processed using Python AI to identify patterns and predict anomalies. This module plays a crucial role in preventing electrical hazards, enhancing energy efficiency, and ensuring the longevity of household appliances.

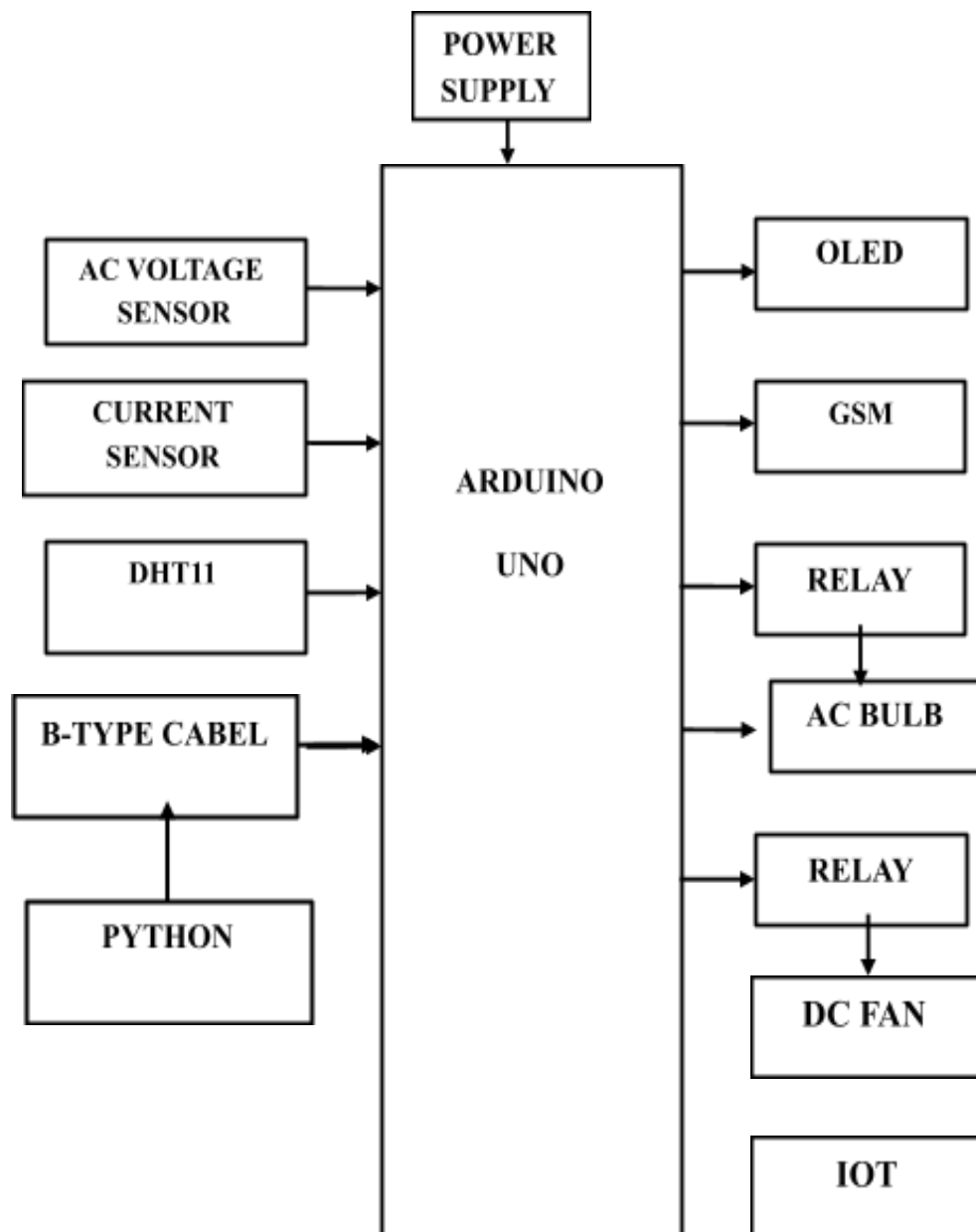
#### **SAFETY AND ANOMALY DETECTION MODULE:**

##### **DESCRIPTION:**

The Safety & Anomaly Detection Module ensures a secure home environment by monitoring temperature, detecting hazardous gases, and identifying electrical faults. It utilizes a DHT11 sensor to measure ambient temperature, preventing overheating risks. A gas sensor detects harmful leaks, providing early warnings to avoid potential accidents. Python AI analyzes sensor data to

identify anomalies such as excessive current flow, which may indicate appliance faults or overloads. When irregularities are detected, the system triggers alerts via a GSM module and takes preventive actions, such as disconnecting faulty appliances through relays. This module enhances safety by providing real-time monitoring and early fault detection.

#### **AUTOMATION AND CONTROL MODULE:**



## **DESCRIPTION:**

The Automation & Control Module is responsible for monitoring and managing home appliances using IoT and sensor integration to ensure safety and efficiency. It employs an AC voltage sensor to measure voltage levels, a current sensor to track electrical flow, a DHT11 sensor for ambient temperature monitoring, and a gas sensor for detecting hazardous leaks. Python AI analyzes sensor data to predict anomalies like excessive current flow, indicating potential faults. Upon detecting irregularities, the system triggers a GSM module to send SMS alerts and utilizes relays to disconnect faulty appliances, preventing further damage. IoT integration enables real-time remote monitoring and data storage for analysis, while the ESP32 microcontroller serves as the central processing unit, managing sensor inputs, relay control, and user communication. This module enhances home automation by ensuring appliance safety, providing early warnings, and allowing users to remotely monitor and control their home environment.

## **BLOCK DIAGRAM WORKING:**

The system is designed to monitor and control home appliances through various sensors and IoT integration. It utilizes an AC voltage sensor to measure the voltage levels, ensuring that they stay within safe operating limits, and a current sensor to track the flow of current through the appliances. The DHT11 sensor monitors the ambient temperature, ensuring that the environment remains comfortable and safe. A gas sensor is incorporated to detect any hazardous gas leaks, providing an early warning to prevent potential accidents. Python AI is used to analyze sensor data and predict anomalies, such as excessive current flow, which may indicate an overload or faulty appliance. When any fault or irregularity is detected, a GSM module sends an immediate SMS alert to the user, notifying them of the issue. The system includes a relay for controlling appliances like lights and fans; when a fault is detected, the relay disconnects the appliance to prevent further damage. IoT is leveraged to store all sensor data for future analysis and to provide real-time remote monitoring via a cloud platform. The

ESP32 microcontroller serves as the central unit, processing data from the various sensors and controlling the relays, while enabling communication between the sensors and the user interface. This system enhances home automation by ensuring that appliances operate safely, providing early alerts in case of any issues, and allowing users to monitor and control their home appliances remotely through IoT and GSM notifications.

