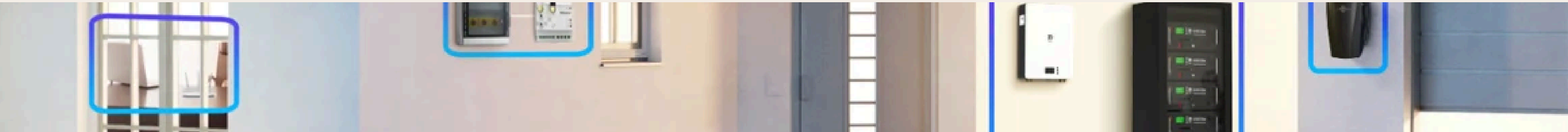
HOME ENERGY MANAGEMENT SYSTEM

24-25J-222

THE TEAM

PROF. SAMANTHA RAJAPAKSHA

MS. THAMALI KELEGAMA



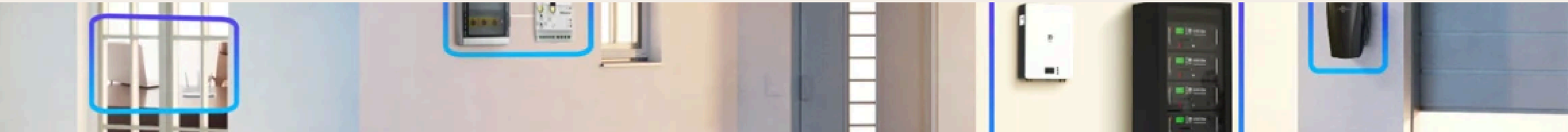
THE TEAM

SITHUMINI K.G.P

ADHIKARI A. M. S. S

KODITHUWAKKU K.M.J

MAHANAMA K.T.D

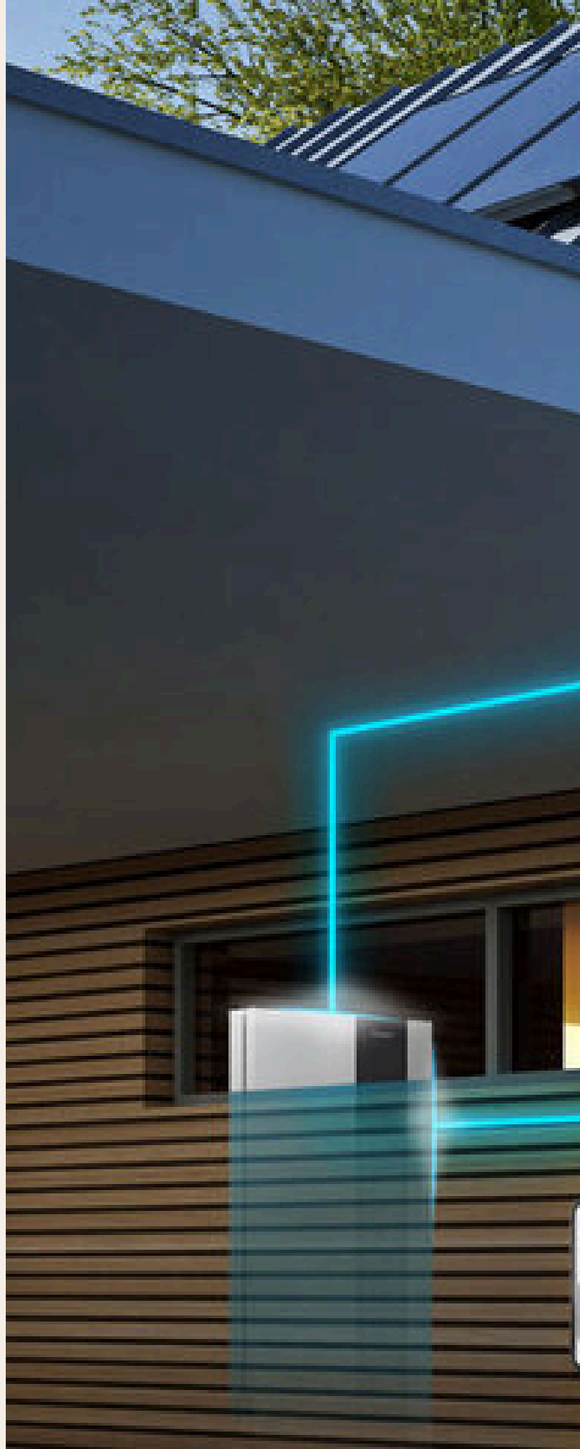


Points For Discussion

- Introduction
- System Diagram
- Flow Chart
- Tools & Technologies
- Components
- Commercialization
- Gantt Chart

INTRODUCTION

Home Energy Management is essential for reducing costs and improving sustainability. Inefficient energy use leads to waste and higher expenses. Our goal is to develop an AI and IoT-based solution that optimizes energy consumption, manages solar power, gas, and fire detection, and ensures smart energy use with minimal human input.



OBJECTIVES

- Develop an integrated home energy management system that addresses all components.
- Obtain a minimum 20% reduction in water and electricity consumption within six months by implementing the proposed system.
- Design and implement a prototype that is deployable in standard residential settings using cost-effective within one year.

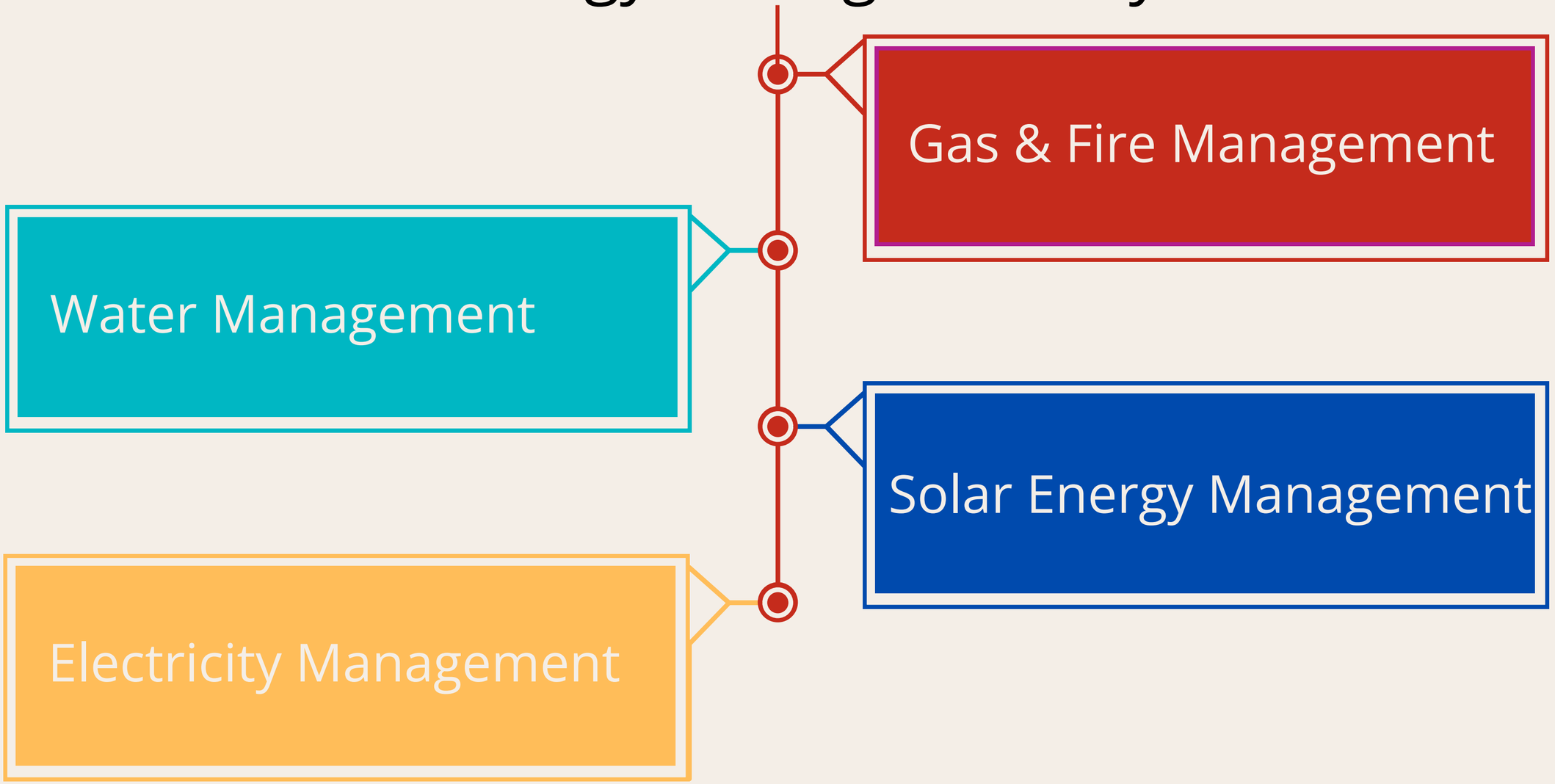
OBJECTIVES

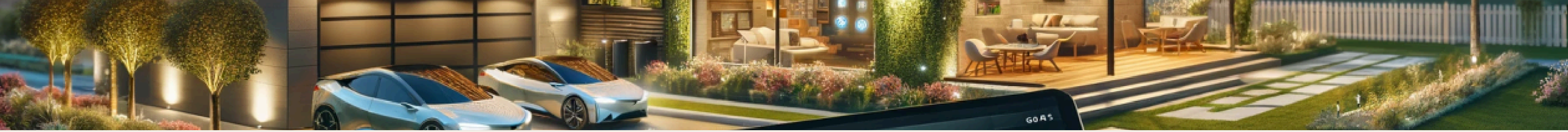
- Enhance household safety by incorporating real-time features relevant to each function, ensuring with international safety standards.

- Conduct a pilot study within the one year to evaluate system performance and user satisfaction, aiming for at least an 85% positive feedback rate from participants.

SUB OBJECTIVES

Home Energy Management System





TOOLS & TECHNOLOGIES

Technologies

- Python
- React
- Firebase
- Node Js

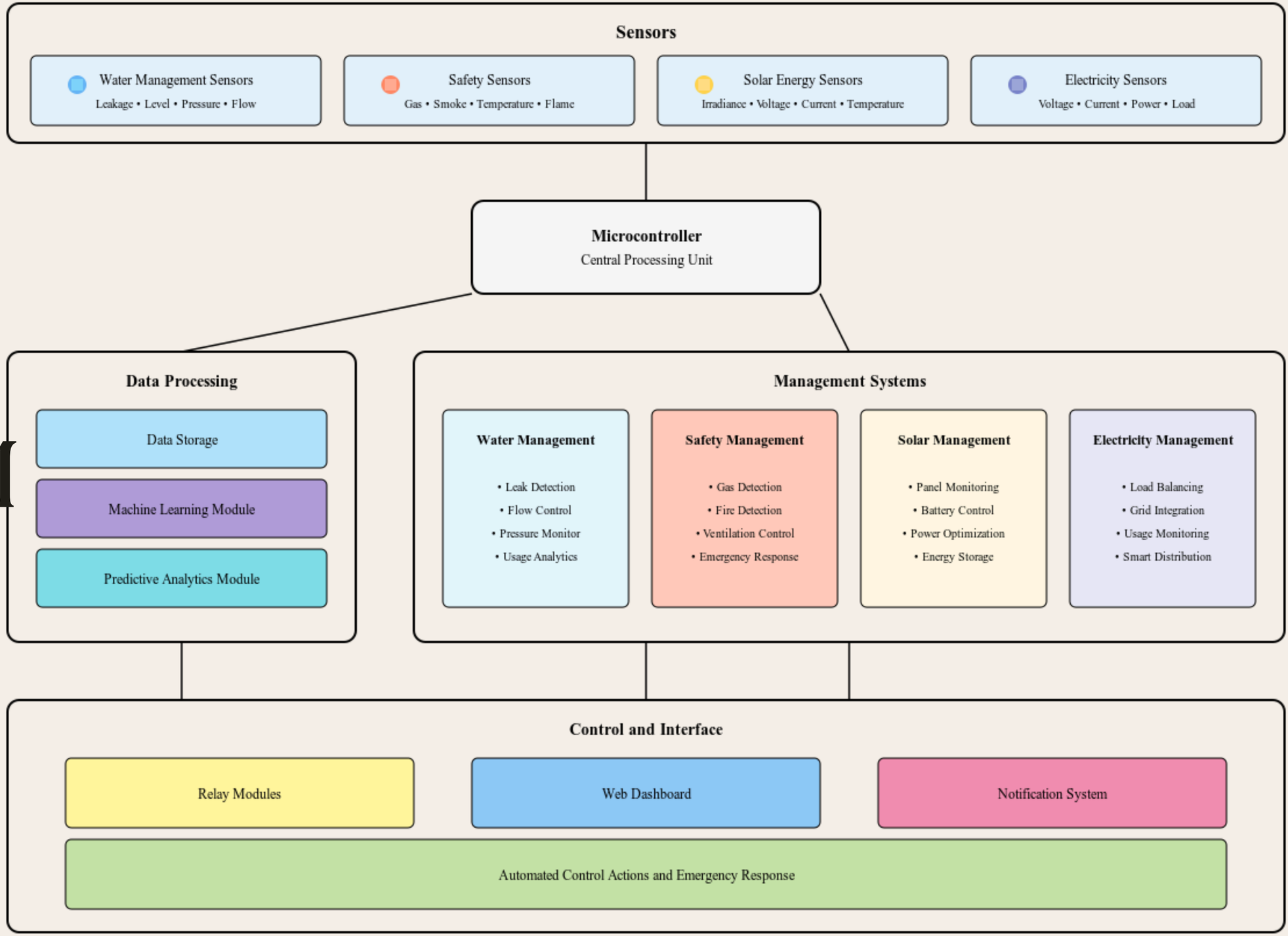
Algorithms

- Random Forest Learning
- Mixed-Integer Linear Programming

Tools

- GitHub
- MS Planner

SYSTEM DIAGRAM



IT21173318
ADHIKARI A. M. S. S

INTRODUCTION

System is designed to provide an optimized and user-friendly solution for managing gas and fire safety. It ensures that emergencies are handled efficiently without requiring human intervention.

- **Automatic Gas Control:** Gas flow can be controlled using voice commands. In case of a leak or emergency, the system promptly responds by shutting off the supply and notifying users.
- **Fire Detection and Response:** Sudden fires are detected using image processing and sensors. The system captures the event and initiates necessary safety measures.
- **Real-Time Monitoring:** It continuously monitors the system’s status, generates real-time reports, enables remote control of operations, and delivers optimal performance while prioritizing energy efficiency

OBJECTIVES

- Developing a Responsive Web application for detect the emergency situation of the fire and gas of the home energy management system.

- This system will enhance safety and energy optimization by integrating real-time monitoring, automation, voice commands, and emergency response capabilities in user friendly way.

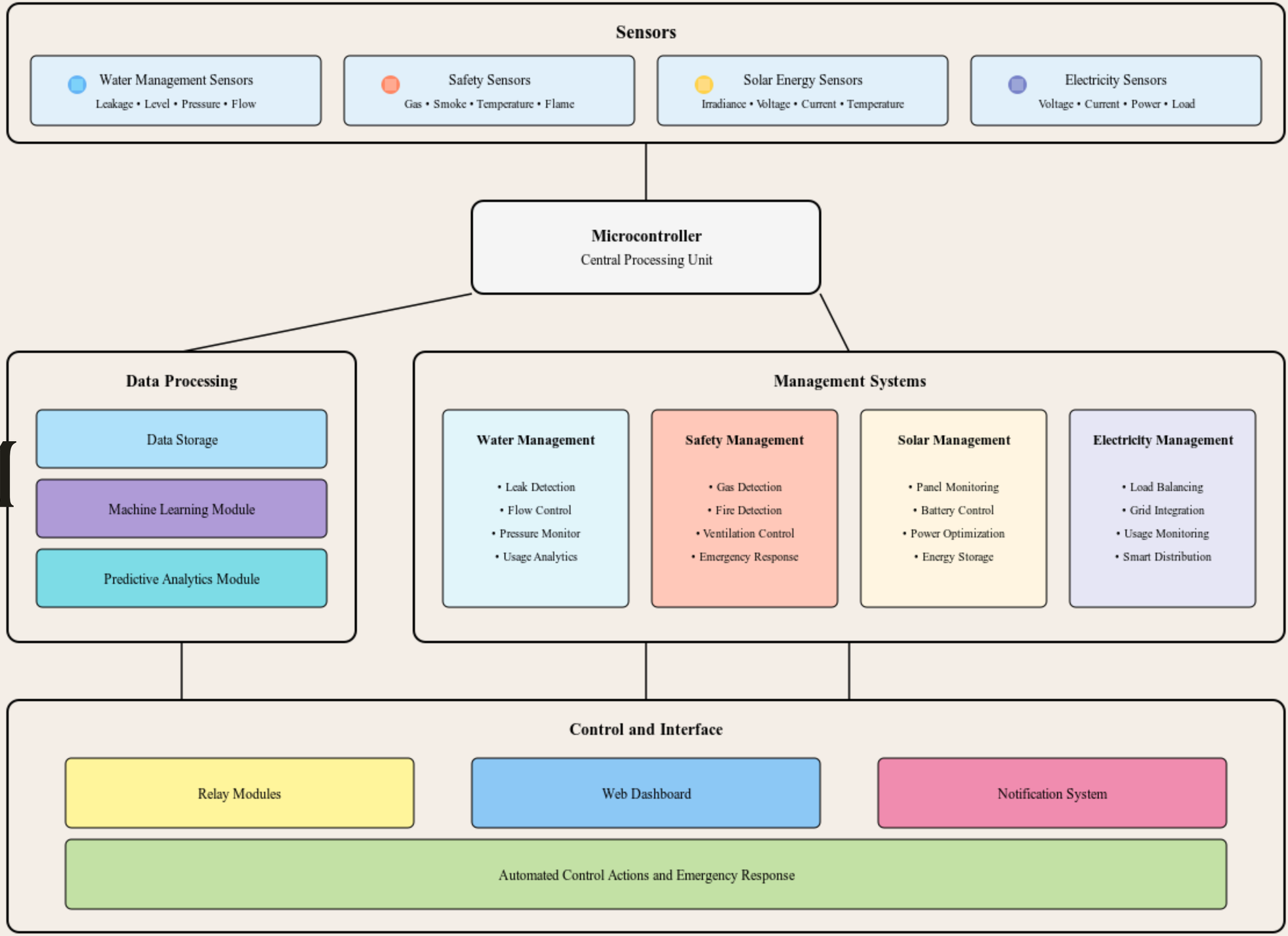
SUB OBJECTIVES

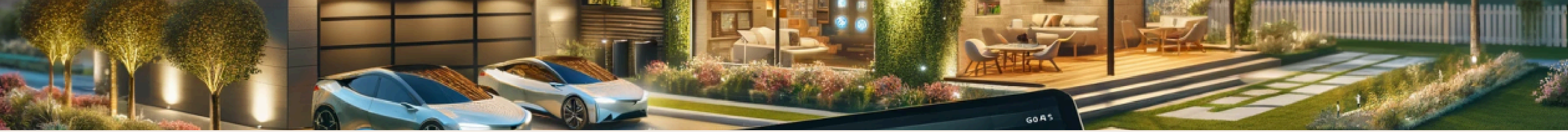
- Control the gas appliance using voice commands (on/off) for immediate response.
- Detect the fire flames by analyzing heat signatures and fire patterns.
- Sense the gas leakage using sensors identify the leakages and give emergency response.
- Monitor the real time status of the system and reduce unnecessary energy consumption by efficiently managing resources.

RESEARCH QUESTION

- How can an optimized system using voice commands, advanced sensors, and image processing improve gas and fire detection and management in smart homes?
- How can the system ensure reliable operation during power outages or hardware failures?
- How effective is image processing in accurately detecting and responding to fire hazards?
- What are the challenges in scaling the system for larger or multi-unit residential buildings?

SYSTEM DIAGRAM





PROGRESS OF THE SYSTEM

Current work

- Python
- React
- Firebase
- Node Js

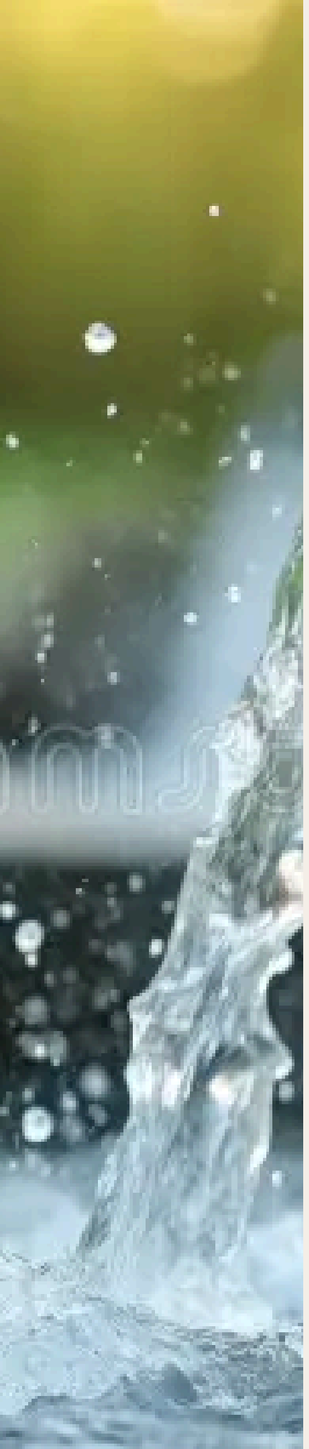
Future work

- GitHub
- MS Planner

IT21173936
KODITHUWAKKU
K.G.K.M.J

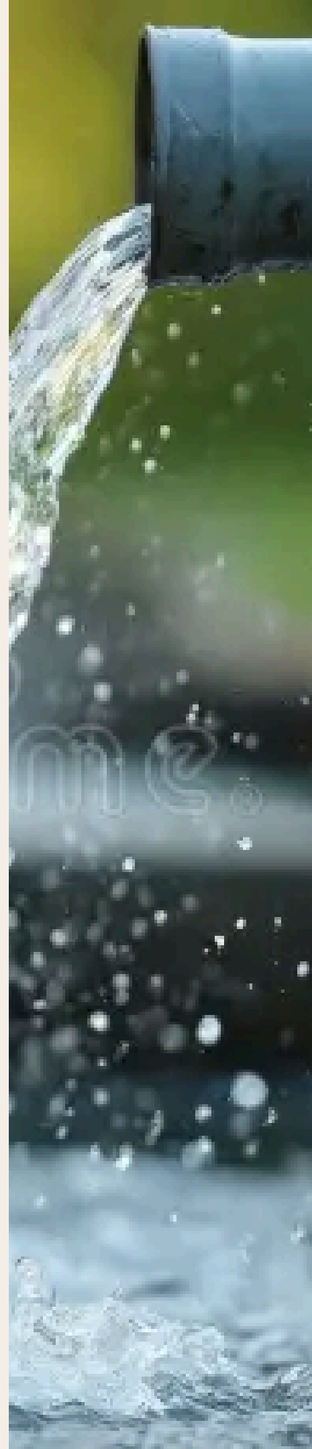
INTRODUCTION

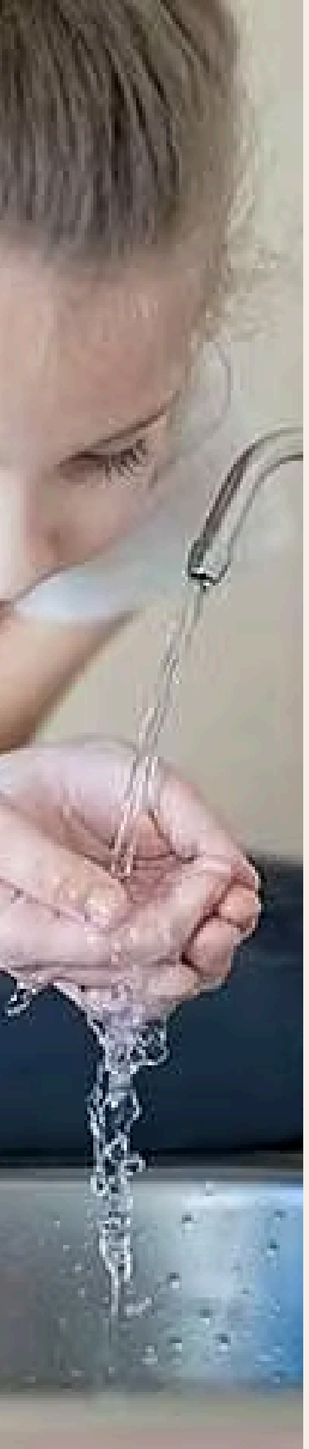
- Energy and water management are critical in modern buildings and industry due to increasing environmental concerns and rising operational costs.
- IoT systems offer predictive analytics, fault detection, and remote management improving efficiency and response times.
- Smart sensors and connected devices provide actionable insights into consumption patterns and anomalies.
- Cost savings from reduced water wastage and efficient energy usage are significant, improving the bottom line for businesses.



OBJECTIVES

- To develop an IoT-enabled water management system as part of a home energy management solution.
- To enhance water conservation and safety by detecting leaks, monitoring water levels, and identifying pipeline blockages in real-time.
- To integrate automation features such as automatic tank refilling and pressure monitoring to ensure optimal water usage.

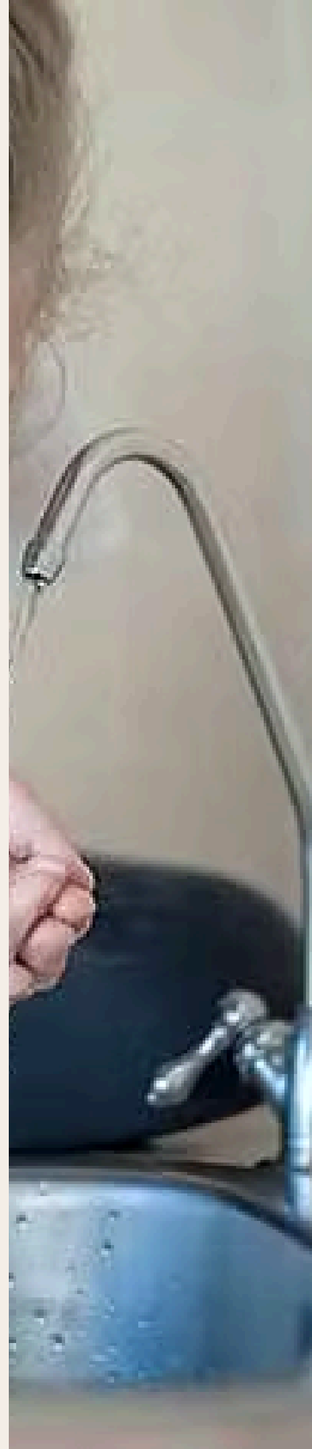




OBJECTIVES

- To provide users with a responsive web application for real-time monitoring, alerts, and actionable insights in a user-friendly manner.

- To contribute to sustainable resource management by preventing water wastage and reducing manual intervention.



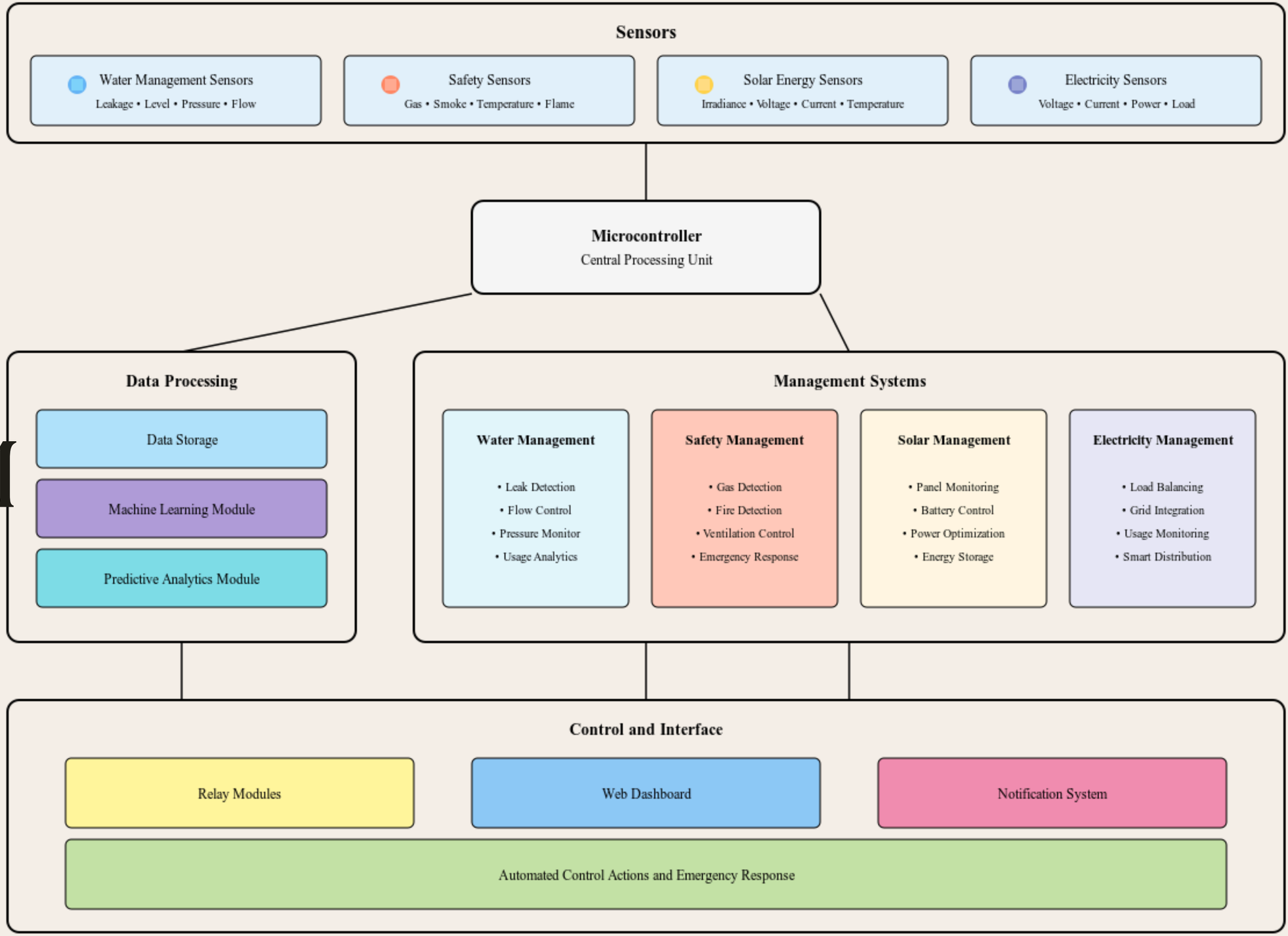
SUB OBJECTIVES

- Real-time Water Monitoring
- Leak Detection in water values
- Energy Management and Monitor the status
- Monitor the Real-time Status

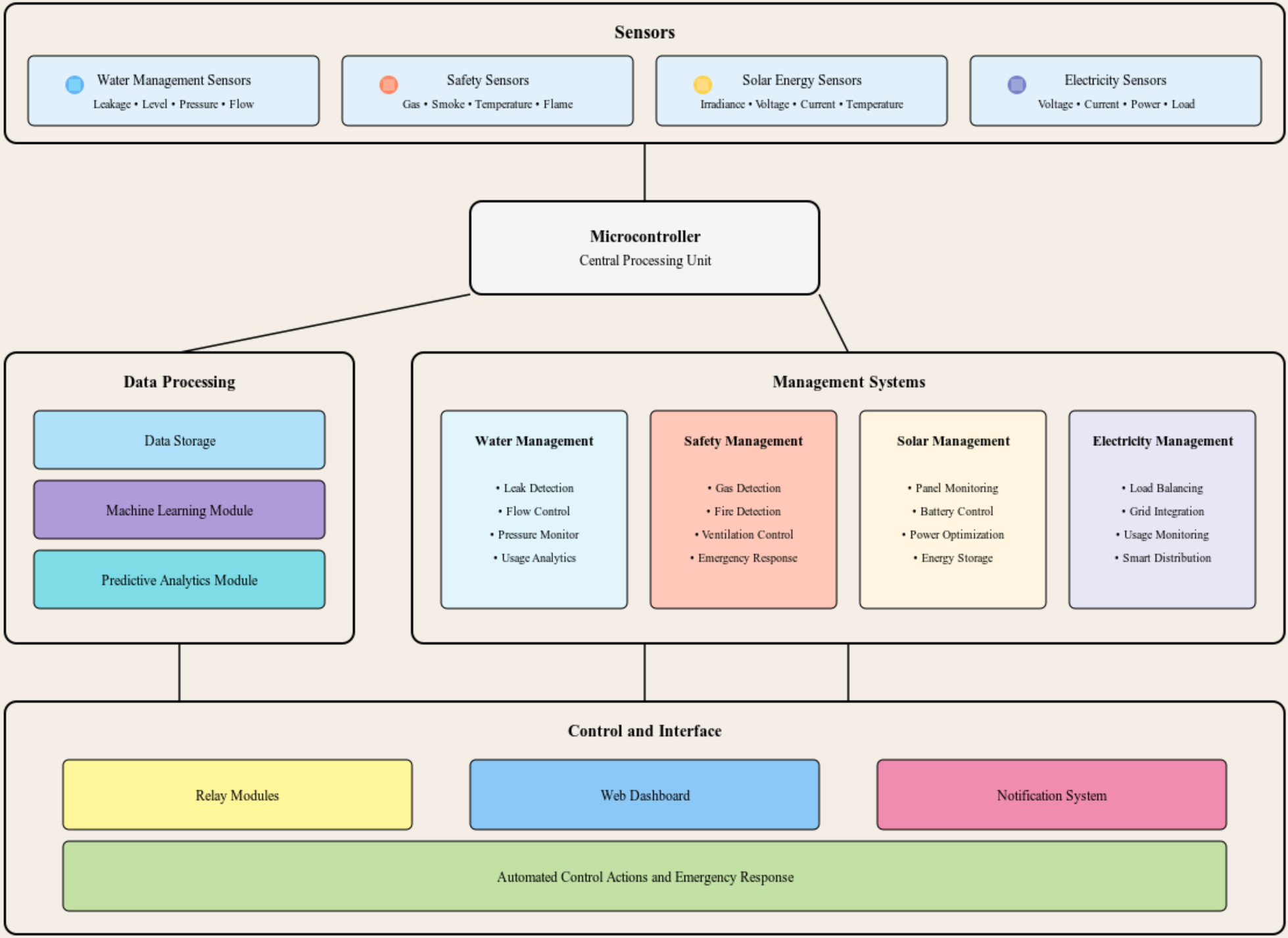
RESEARCH QUESTION

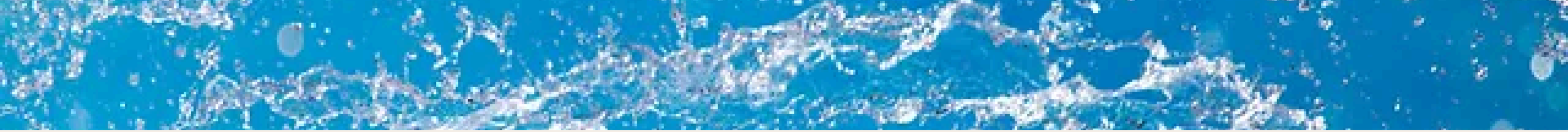
- How can IoT be used to optimize water use and management in energy systems?
- How effective are IoT-based leak detection systems in reducing water wastage compared to traditional methods?
- How can IoT technologies be leveraged to enhance the efficiency of water management systems in industrial settings?

SYSTEM DIAGRAM



FLOW CHART


Sensors
Water Management Sensors
Leakage • Level • Pressure • Flow
Safety Sensors
Gas • Smoke • Temperature • Flame
Solar Energy Sensors
Irradiance • Voltage • Current • Temperature
Electricity Sensors
Voltage • Current • Power • Load
Microcontroller
Central Processing Unit
Data Processing
Data Storage
Machine Learning Module
Predictive Analytics Module
Management Systems
Water Management
• Leak Detection
• Flow Control
• Pressure Monitor
• Usage Analytics
Safety Management
• Gas Detection
• Fire Detection
• Ventilation Control
• Emergency Response
Solar Management
• Panel Monitoring
• Battery Control
• Power Optimization
• Energy Storage
Electricity Management
• Load Balancing
• Grid Integration
• Usage Monitoring
• Smart Distribution
Control and Interface
Relay Modules
Web Dashboard
Notification System
Automated Control Actions and Emergency Response



PROGRESS OF THE SYSTEM

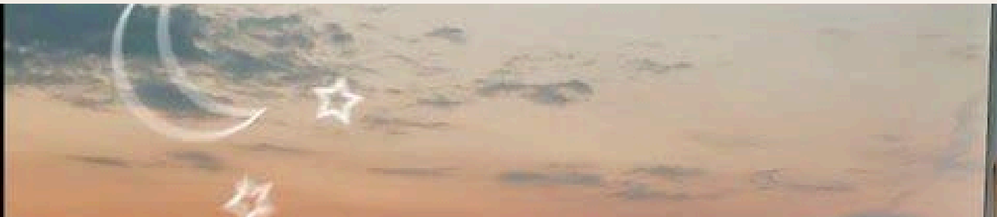
Current work

- Python
- React
- Firebase
- Node Js

Future work

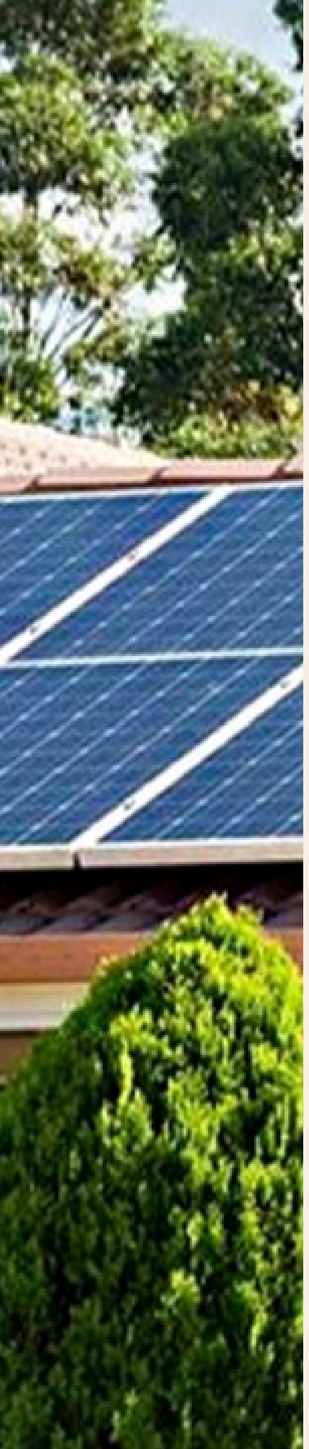
- GitHub
- MS Planner

IT21170584
SITHUMINI K.G.P



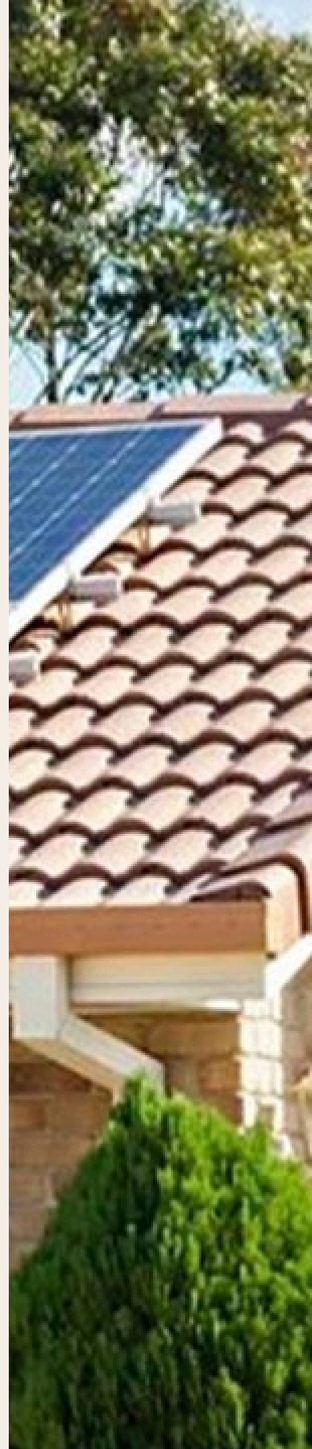
INTRODUCTION

Monitoring, managing, maintaining, and optimizing energy usage while integrating predictive weather insights. Provide users with a summary of the power usage and generation based on an analysis of the power.



OBJECTIVES

Implement an efficient solar energy management system that monitors, manages, maintains, and optimizes energy usage while integrating predictive weather insights, enabling users to analyze power usage and generation for informed decision-making with user friendly interface



SUB OBJECTIVES

- Monitoring and Data Collection
- Energy Usage Optimization
- Integration of Predictive Weather Insights
- User Interface and Reporting
- System Scalability

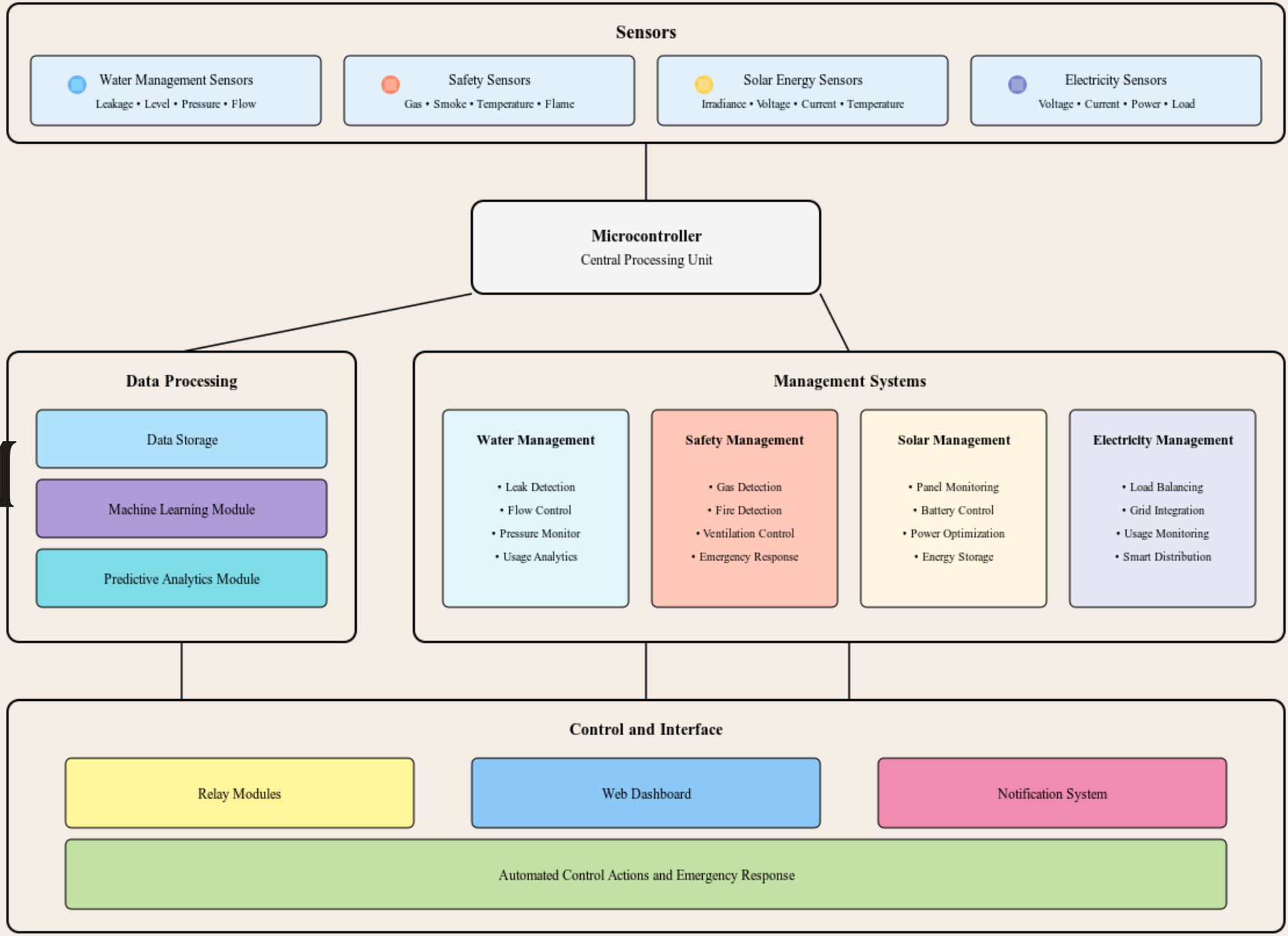
RESEARCH GAP

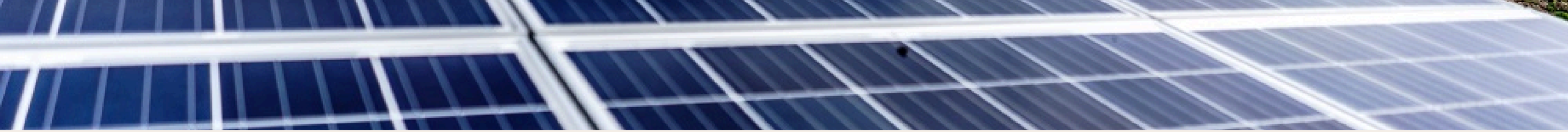
- Real-Time Monitoring and Integration
- Integration of Multiple Energy Components
- Poor user requirements
- Limited Optimization for Dynamic Environments
- Scalability Issues

RESEARCH QUESTION

- Implement solar management project within 1 year
- Can a user-friendly interface significantly influence the adoption and usability of solar energy management systems?
- What is the impact of real-time monitoring on reducing energy waste in solar-powered homes?
- How does the inclusion of predictive weather analytics improve energy savings compared to system

SYSTEM DIAGRAM





PROGRESS OF THE SYSTEM

Model Creation & Train

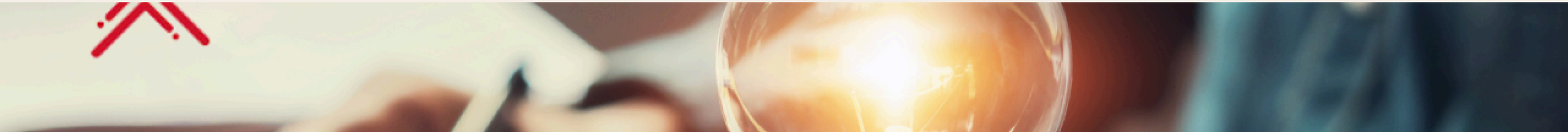
- Python
- React
- Firebase
- Node Js

IOT

Interface

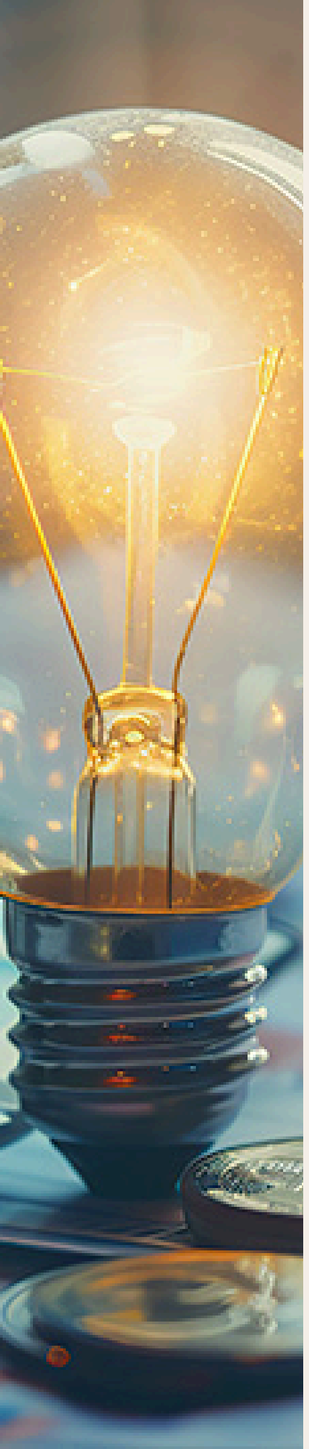
- GitHub
- MS Planner

IT21301490
MAHANAMA K.T.D



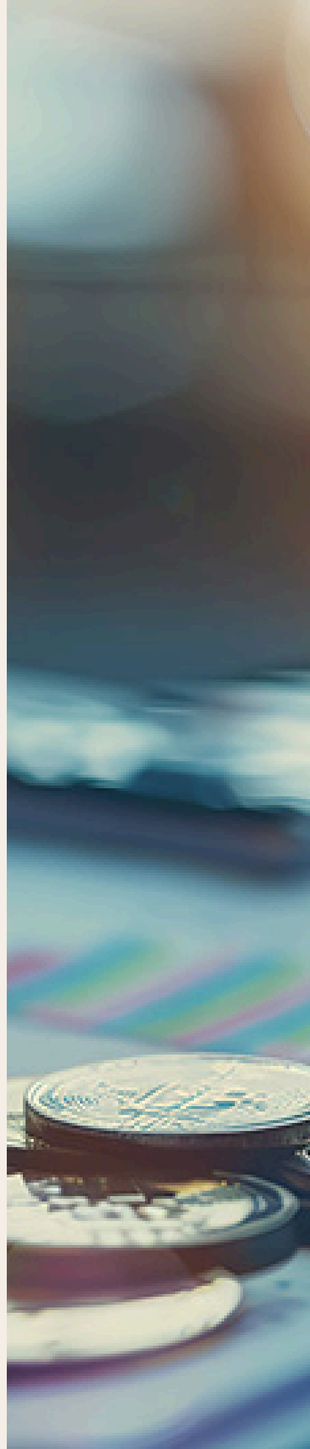
INTRODUCTION

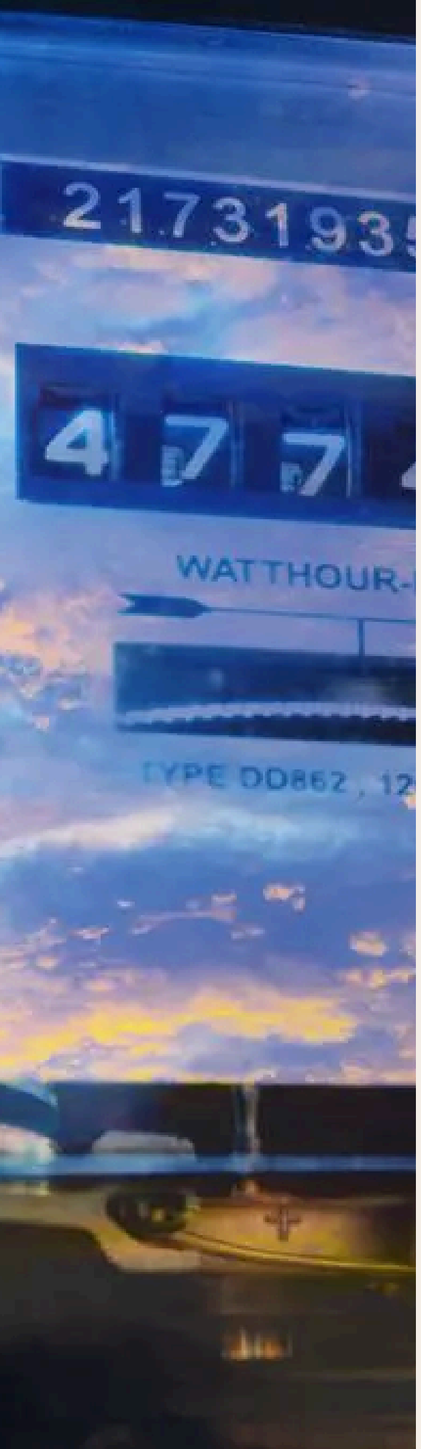
The project focuses on creating a smart system to manage energy use in homes. It will automatically control devices based on real-time data to reduce energy waste and lower bills. This smart management will not only lower energy bills but also contribute to more sustainable living.



OBJECTIVES

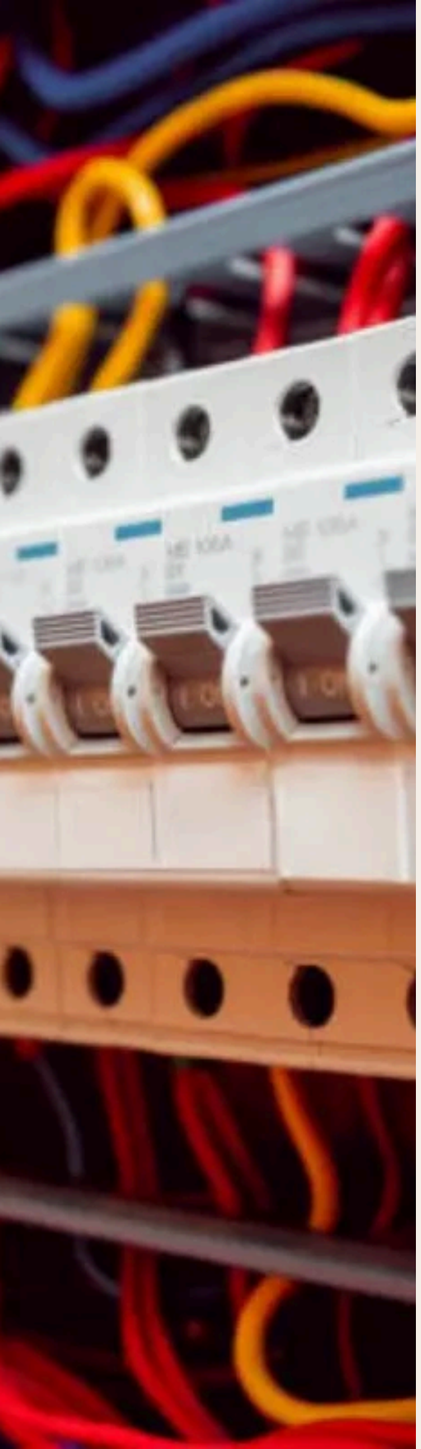
develop an AI-based system for managing electricity consumption in homes. The system will monitor electricity usage through sensors, analyze data, and automatically adjust devices to reduce energy wastage and lower costs.





SUB OBJECTIVES

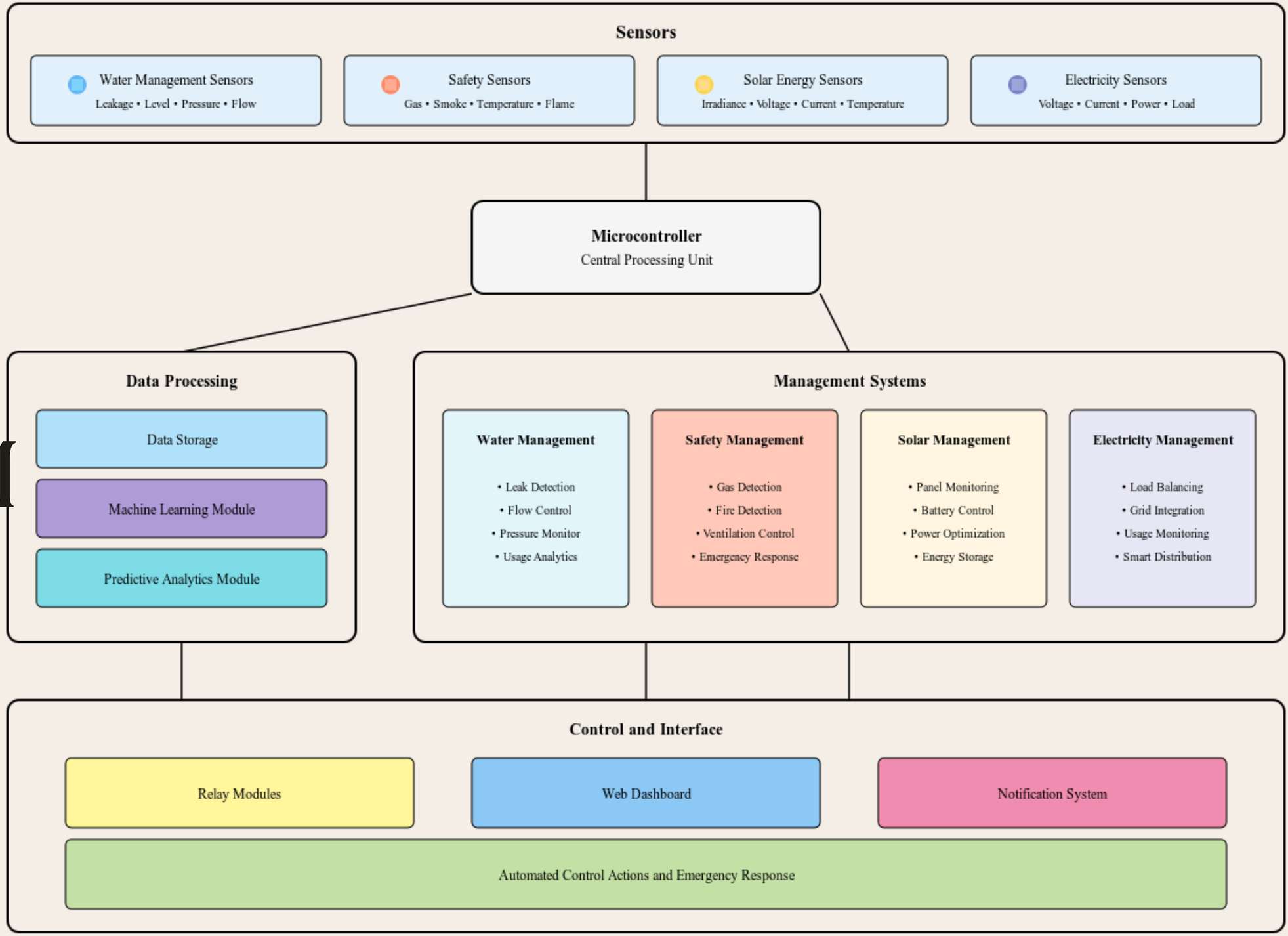
- Energy Usage Monitoring
- Automated Energy Optimization
- Energy-Saving Recommendations
- Cost Reduction
- User Customization

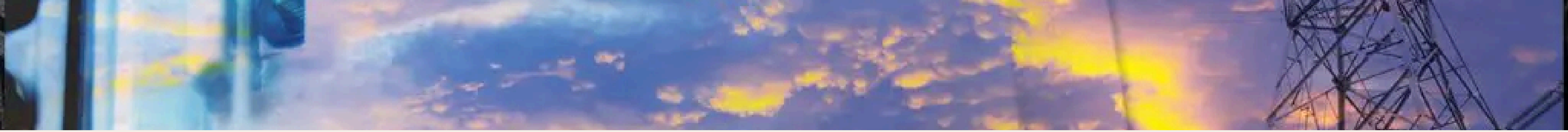


RESEARCH QUESTION

- How can AI be used to optimize electricity usage in residential homes?
- What are the most effective ways to reduce energy waste in homes?
- How can user preferences be integrated into an energy management system?
- How can real-time electricity consumption data be utilized to lower energy costs?

SYSTEM DIAGRAM





PROGRESS OF THE SYSTEM

Current work

- Python
- React
- Firebase
- Node Js

Future work

- GitHub
- MS Planner

COMMERCIALIZATION

How to Sell

- Find Audience
- Create good advertisement
- Seminars

Target Audience

- Homeowners
- Property Managers
- Utility Companies

Version

- Basic
- Industrial
- Premium

Marketplace

- Direct Sales
- E-commerce platforms
- Utility Company Partnerships

WORK BREAKDOWN STRUCTURE

Weakness

The creative idea often originates from a spark of inspiration that can come from a variety of sources.

Threats

The creative idea often originates from a spark of inspiration that can come from a variety of sources.

Strengths

The creative idea often originates from a spark of inspiration that can come from a variety of sources.

Opportunities

The creative idea often originates from a spark of inspiration that can come from a variety of sources.

GANTT CHART

ANY QUESTION?

THANK YOU...!

24-25J-222