EasyHome- An IoT-Based Smart Home Automation System

Energy wastage and security concerns are common challenges in modern households. Many users leave appliances running unnecessarily, leading to excessive power consumption, while home security requires constant vigilance, as intrusions can go unnoticed without real-time monitoring. This project addresses these issues by providing an efficient, automated solution for smarter energy management and home security through IoT technology.

Key Features -

Our project will have the hardware sensors part and an app to monitor and provide easy user access.

- We will use a PIR sensor to detect motion in every room, which will act as an intruder alert system.
- Send a notification to your phone via Firebase when motion is detected.
- The ACS712 sensor(current sensor) would be used in every room to measure the power consumption and to see which room uses the most current and also to detect unusual spikes. This will be an efficient and practical application.
- PIR would also detect human presence. If no person is detected but appliances are turned on, after 10 minutes of no detection, the devices will automatically be turned off. (using PIR, ACS712, and relay module).
- All of this data, such as motion detected, current usage, and current fluctuation, would be displayed on a web dashboard. (Real-time data)

Technological resources -

- An ESP32 sensor to connect all the components together. We use ESP32 instead of Arduino, because it has an inbuilt wi-fi and Bluetooth mechanism.
- PIR Sensor, Relay Module, ACS712 current sensor, DHT22 sensor, ESP32-CAM, breadboard. These will be the sensors or the hardware components used to develop the model.
- For a user-friendly usage and interface, a basic web app (HTML/CSS/JavaScript) or MIT App Inventor.
- The cloud component of the project would be Firebase (free tier) for data storage & alerts.

What? -

-> EasyHome is a **smart home automation system** designed to improve **energy efficiency and home security** using **ESP32-based IoT technology**. It monitors energy usage, detects motion, and automates appliances to reduce wastage and enhance safety.

Why? -

-> Many households **waste electricity due to unattended appliances** and **lack real-time security monitoring**. This project aims to solve these issues by **automating energy management** and **providing security alerts**, making homes smarter and more efficient.

Who? -

-> EasyHome benefits **homeowners** by reducing electricity costs and improving security. **Renters and students** can manage shared spaces efficiently, while the **elderly and disabled** gain easier control over appliances. It's also useful for **smart home enthusiasts** looking for an affordable automation solution.

Where? -

-> EasyHome is ideal for **homes, apartments, and rental spaces** to cut energy wastage. It can also be used in **offices, small businesses, and dormitories** to improve security and monitor power consumption efficiently.

Expected Outcomes -

- Reduction in unnecessary energy consumption through automated device control.
- Enhanced home security with motion-based intrusion detection.
- A user-friendly interface for real-time monitoring and control of home appliances.

Conclusion -

EasyHome offers an efficient, low-cost IoT solution for smart home automation, addressing energy management and security concerns effectively. With its scalable architecture, it provides a foundation for future enhancements such as AI-based automation and voice assistant integration.

Team Members -

1) S.Sruthi - 22BD1A12B6
2) B.Ramalaxmi- 22BD1A1273
3) Ch.Keerthi - 22BD1A1276
4) Ch.Maanvith - 22BD1A1275
5) A. Harini - 22BD1A1268