Smart Home Automation System Using Arduino

Abstract:

The project presents a Smart Home Automation System leveraging Arduino for an Internet of Things (IoT) application, aimed at enhancing home security and comfort. Integrating 16 different sensors, including Button Sensor, Photocell Sensor, and PIR Motion Sensor, the system allows for comprehensive monitoring and control of home environments. The control interface is a mobile application connected via a Bluetooth HM-10 Module, providing remote access and alert notifications.

Key Features:

- **Sensors**: 16 sensors for various functionalities such as security (PIR Motion Sensor, Door/Window Sensor), environmental monitoring (Temperature Sensor, Humidity Sensor, Soil Humidity Sensor), and safety (MQ-2 Gas Sensor, Smoke Sensor).
- **Mobile Application**: Central control hub for managing home devices and receiving alerts, enhancing usability through remote access.
- **Security**: Password-protected electronic lock and real-time notifications for security breaches, gas leaks, and other anomalies.
- **Automation**: Intelligent logic programming for automated control of devices like air conditioners, water heaters, LED lights, and smart curtains based on preset preferences.
- **Communication**: Bluetooth Low Energy (BLE) ensures secure and efficient communication between Arduino and the mobile app.

Objectives:

1. **Develop a Comprehensive Sensor Network**: Integrate multiple sensors to monitor and control various home aspects.
2. **Create a User-Friendly Mobile Application**: Ensure intuitive control and real-time data visualization.
3. **Enhance Home Security and Comfort**: Implement features for real-time monitoring and automated routines.
4. **Ensure System Security**: Utilize secure communication protocols and user authentication to protect data.

Conclusion:

The Smart Home Automation System exemplifies the transformative potential of IoT technologies in modern homes. By utilizing Arduino, the project demonstrates how accessible and versatile platforms can be used to create a connected, secure, and comfortable living environment, aligning with the vision of future smart homes.

This project not only provides a practical learning experience in embedded systems and IoT applications but also contributes to the growing trend of smart home automation, highlighting the relevance and importance of such technologies in today's technological landscape.