Smart Lighting and Device Control Integration for Existing Houses with Conventional Switch System

Project Idea:

Develop a smart device controlling system(lights, fans and other devices(< 200W)) to install over the existing conventional switch system with minimum to no deconstruction of walls and wiring.

Brief Description:

There will be two types modules, sensor modules(mmWave radar, luminescence sensor, temperature and humidity sensor, speaker, microphone and indicators, Wi-Fi module) and controller modules(Wi-Fi module, switch controllers, speaker, microphone and indicators) in this system. Sensor modules are powered by batteries while controller module has an ac supply. Sensor modules can be placed according to the house architecture and controller modules are installed near the existing switches. A connection is made for each switch in the controller module to detect the toggling actions of the mechanical switch. All the sensor and controller modules are connected with each other(Many-to-Many) over Wi-Fi. A mobile and a desktop app is made to configure the settings for controllers and the sensors.

Analysis:

For houses with conventional switches for lights, fans and other devices, installing smart lighting systems that switch on when there is a person, adjust brightness and fan speed according to room conditions can be quite difficult and may need to deconstruct walls and require rewiring as well. This can be costly, can hinder the daily activities while installing and may not be as effective as smart home integrations that are planned in advance before construction of the house. This project aims to address these issues by introduction a smart house integration that can be installed over the existing switch system.

Feasibility:

- The hardware for the sensor and controller modules is available for low prices when buying in bulk.
- The initial version of the software can be made simply by one person effort minimizing the cost for complex software engineering project.
- This system can be used by newly building houses as well making the market for this product wide.

Advantages:

- Due to the mesh communication among the sensors and controllers, can program complex conditions.
- Can be used as a home security system.
- By connecting a computer to the network for heavy processing tasks, can leverage complex AI algorithms using the data from sensors to improve the electricity bill and the comfortableness of the residences.
- The cost for the sensor and controller module will not be as high as high-end existing home automation systems.

Disadvantages:

- Need to replace the batteries for the sensor modules.
- May not be the first choice when it comes to a house that is still on planning stage.

Conclusion:

In conclusion, the Smart Lighting and Device Control Integration project offers a cost-effective solution for upgrading existing homes with smart technology. Through Wi-Fi-connected modules, it enables seamless automation of lighting and devices, enhancing convenience and energy efficiency without extensive rewiring.