GROUP8 SMART HOME

A home assistant for an easy life

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Group members

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Description

In this project, we are trying to implement a smart home center, which can be used to control several devices under the user commands and operations. The user would be able to check the weather, search and play the music through Bluetooth as well as to get a notification when your house has been broken into. This smart home center can also open or close the light automatically based on your location. The management system contains several subsystems, such as Media module, security module, light module and the web module. We will be interacting with additional sensors to accomplish some of the functionality. Acoustic wave sensor would be connected to Raspberry Pi for measuring the distance from the door, and once the numeric data falls under a particular warning line that we pre-set, we will send an alarm through the web module informing that the status of the door been changed and it's very likely someone broke into your house. Meanwhile, the system will send signals to the LED and light it up. Additionally, the web module would be quite flexible and namely connected to the web for fetching useful data like the weather report as well as being implemented as middleware for another subsystem. For example, the user may upload their music or search keywords, and then the system will fetch music data from the web and send it to the phone via Bluetooth.

Above all, our system will combine different modules in a very efficient way to provide security and media service for the user. It is not only for connecting several devices at home but also to make life more fantastic.

Features

Required features:

Detect the status of the door (open/close) with a sensor, update this status to security module and the alarm will on / off depending on this status

Control the lights on or off for every room base on the sensors

A simple user interface that user can get information from it

Search the web for weather report and display it

Search the music with keyword locally, and it will send this music to your device

Features:

Search the music on the internet, and play the music on all compatible devices through Bluetooth (should be an automated process)

Make an alarm in Google home when a status changes

When detect an emergency, it can send message to relative department and call for help

Wish-list features

User can use the Raspberry Pi to control all devices (PC, iPad or phone) that under the same WIFI

It can adjust the A/C automatically base on the temperature setting.

It can track GPS signal, which can estimate the time that user arrives home and open the A/C, lights and music in advance

Risks

The main difficulty of this project for us lies in the setup of hardware and making a connection of it with raspberry pi. We would test several solutions for the equipment. For the door status detection, for example, sensors that we can use include standard raspberry door sensor， the in-built infrared sensor or ultrasonic sensor. The LED, on the other hand, would need to be light up with C++ command. For all of this hardware, We would need to assess the difficulty as well as the accuracy of the solutions, which would be quite time-consuming. The other potential risk would be the web module. In our project, there's a series of task that relies heavily on the web module to perform. The setup of Google home, for example, can only be achieved by calling HTTP request to official API from Google. At this stage, we are not 100% sure that it can be done via C++; we would very likely have the help of some other web framework.

Other Notes

As is discussed in section 3, our project relies on the web module to perform some of the main features like the display of data and connection to Google home. Indeed, most of them would be implemented with C++ natively. We would use Node.JS as a complement for accomplishing the web module, and all data will be stored securely online in MongoDB. Also, a simple UI would be built with React or Angular, deployed with GitHub page. The required additional hardware, on the other hand, would depend on which solution of door detection we finally come up with. Potential choices would be standard raspberry door sensor or ultrasonic sensor. Also, we would need a LED for a light module.