Who: Mitchell Klein, Ryan Talley

Title: Smart House

Description: The purpose of this project is to build a house that can function automatically based on parameters given by a user. All aspects of the house such as lighting, temperature, security, resource management, etc. will be managed by a central processing device. This device will manage these aspects based on user preferences. The device will support multiple users and will be easily interfaced with through Bluetooth. The Bluetooth module will pair with a phone application to allow users to set their personal preferences. Once these preferences are set the device will operate autonomously until the user resets their preferences or a different user runs their preferences instead.

Vision Statement: To design a house that functions electronically and autonomously based on the homeowner's personal preferences.

Motivation: The motivation behind this project is to show that it is possible to control different features of an entire house through a single interface that uses electronic sensors. This includes the lighting, the temperature control, security, resource management, etc. This will allow for more personalization, efficiency, and autonomy when it comes to running the subsystems found in a house.

Risks: The following are a few risks we could run into while trying to complete the project:

- There are only two team members who are in contact.
- The project requires both technical knowledge as well as software expertise.
- The project will be operating on a limited embedded microprocessor.
- Team members have very little experience with SQL.
- Team members do not have experience with Java.
- The project will require analog as well as digital electronic components.
- Some systems of the project will require mechanical components.
- The user interface will need to be user friendly.

Ways in which we can deal with these risks include:

- Continue to maintain close contact and communication between team members
- We will make sure to split the time needed to understand both the technical as well as the software sides of the project.
- Analyze different processors and choose the processor that best fits the project.
- We will devote both in class and out of class time to hone our skills with SQL.
- We will devote time to learning Java programming.
- Ryan is an electrical and computer engineer so we will use his knowledge of analog electronics to develop the analog and digital electronic components.
- Mitchell is a mechanical engineer so we will use his insight to develop mechanical solutions.
- We will use focus groups and product testing to develop a user friendly interface.

VCS: The repository we will be using is Github. The following is the link to the shared Github repository that we will be using:

https://github.com/mikl1844/CSCI_3308_Project.git

List of Requirements:

User Requirements

ID	Description	Agile Size	Priority
UR-001	As a user, I want to access the Smart Home from a smartphone application so that I can customize my settings for my house.	3	High
UR-002	As a user, I want my settings to be only able to be accessed by and viewed by me so that others can not view or change my settings.	2	Medium
UR-003	As a user, I want the smart home to run autonomously so that I do not have to worry about managing the system personally	5	High
UR-004	As a user, I want the smart home to provide me with feedback on my resource usage, so that I can track my resource usage.	3	Medium
UR-005	As a user, I want the user interface to be simple so that I can quickly and easily set or update my settings.	5	High
UR-006	As a user, I want to be able to receive status reports from my home when I am not home so that I can monitor my home while I am away.	2	Medium
UR-007	As a user, I want to be able to have different sets of settings so that I can have multiple configurations to choose from.	1	Low
UR-008	As a user, I want to be able to have multiple accounts on the smart home so that I can have different configurations for different members of the household.	2	Medium

Functional Requirements

ID	Description	Agile Size	Priority
FR-001	The system should be able to pair with a smartphone through Bluetooth so that the user can interface with the system from their phone.	3	High
FR-002	The smartphone application must connect to the system automatically so that the user only needs to open the application to in order to change their preferences.	5	Medium
FR-003	The smartphone application must be able to send and receive data over bluetooth so that the user can configure the system settings.	3	High
FR-004	The system must be able to interface with multiple sensors so different aspects of the house can be monitored.	5	High
FR-005	The system must be able to operate autonomously once the user has configured it and selected which account settings are to be applied.	5	High
FR-006	The system must be able to control various aspects of the house based on feedback from the sensors and from the user's settings.	5	High
FR-007	The system must be able to provide feedback to the user so that the monitor their home.	3	Medium
FR-008	The system must be able to communicate to the user through e-mail so that the user can monitor their home when they are away.	3	Medium
FR-009	The system must be able to interface with mechanical both electrical and mechanical subsystems in order to control various aspects of the home.	2	High
FR-010	The system should be able to support multiple store settings from multiple users so that different household members can save their settings.	2	Medium
FR-011	The system should require users to have a username and password so that the users can securely save and configure their settings.	3	High
FR-012	The system should only allow one configuration to be run at a time.	1	High
FR-013	The smartphone application should be menu based to simplify the configuration process for the user.	2	Medium
FR-014	The system should store the data that was last inputted so that the settings do not reset back to a default setting.	2	High
FR-015	The smartphone application must not crash when inputting new settings so that the data can be completely transferred to the system.	8	High

FR-016	The system must use a password when connecting to the smartphone so the user can connect the system, only if they are near the system.	2	High
FR-017	The system must be able to handle multiple connections at a single time so that multiple users can change their preferences at the same time.	8	Low

Non-Functional Requirements

ID	Description	Agile Size	Priority
NR-001	The system should be power efficient so that the user is not affected by running it.	5	Medium
NR-002	The sensors should be visually discrete so they do not stand out to the user.	2	Low
NR-003	The system and its subsystems should have a small footprint so that they are not intrusive in the user's home.	3	Medium
NR-004	The system should be able to physically interface with different types of home plumbing, electrical, mechanical equipment so that it is portable to many different types of homes.	5	High

Methodology: The methodology we plan on using to complete the project is a mash up of waterfall and agile. We will use waterfall to develop the core components of the system such as the control software, database software, and sensors. We will use agile to develop the user interface. We will develop new releases after receiving feedback from our product testers.

Project Tracking Software: The project tracking software that we will be using is Trello. The following is the link to the Trello that we will be using:

https://trello.com/b/L3aPW5Xw/smart-house-project

Project Plan: *see following pages*

Smart House Project

CSCI-3308 Final Project ☆ Public

Research

- Research and Analyze Microcontrollers
- Improve Knowledge of SQL
- Learn Java Programming Basics
- Learn Java Android Application Basics
- Learn Android Studio Basics

Hardware Components

- Integrate Temperature Sensor
- Integrate Power Sensor
- Integrate Humidity Sensor
- Integrate CO sensor
- Integrate Smoke sensor
- Build Smart Lock
- Integrate Smart Lock
- Build Power Relay
- Implement Power Relay

Software For Hardware

- Temperature sensor Software
- Power sensor Software

- Humidity sensor Software
- CO sensor Software
- Smoke sensor Software
- Smart Lock Software
- Power Relay Software
- Sensor Testing

Control Software

- Sensor Data Management
- Sensor Control
- Sensor Data Processing
- Data Response
- Bluetooth Interfacing
- E-mail Interfacing
- Control Software Testing

Database Software

- Storing User Profiles
- Storing User Settings
- Run Settings Retrieval
- Database Software Testing

User Interface

- User Interface Design

User Interface Devolopment

Android Studio Implementation

User Interface Testing

User Interface Feedback/Resolution