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Introduction

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Chapter 2

Functional Requirements

2.1 High-level functionality

The high level functionality of this system can be broken down into several major sections. Sensors play a major role in interfacing the real world with the several other sections of the controller. Physical security, both inside and outside of the home is important. This goes hand in hand with family security once family members have left the premises of the household. Finally, green energy management can be easily integrated with the other systems to ensure prudent usage of resources.

2.1.1 Sensors

The most crucial part of the system that ties all of the other parts together is the sensor network. They are the interface between the real world and the controllers. They detect if the house has been intruded upon by outsiders through sensors on the windows and doors. They can alert the family if somebody left the stove top on. Living patterns can be established and monitored to warn of health problems or to control the HVAC so that energy is not wasted when nobody is home or they are all asleep. Cameras, motion detectors, hall effect sensors, and other miscellaneous sensors comprise the majority of this network.

Cameras play multiple roles in the sensor network. Facial recognition can be used to detect family members entering and leaving the house to track their activities. They can be used to alert when strangers are approaching the door or are on the premises in either a friendly manner or in a more cautious one depending on the family members currently at home.

Motion detectors

Temperature sensors and hall effect sensors are two other major components. Temperature sensors can be used by both physical security, to ensure that the oven has not been on for an extended period of time without user interaction as well as for green energy management to control the overall temperature of the house or each room. Hall effect sensors can be used with temperature sensors

to detect if windows or doors have been left open when they should be closed in order to prevent wasting energy. These sensors can also be used to detect intruders attempting to break in through windows or doors.

2.1.2 Family Safety

2.1.3 Security System

2.1.4 Green Energy Management

2.2 Scenarios

2.3 Use case model

Use case name	`NFCDisarmSystem`
Participating Actors	Initiated by `Resident`
Flow of Events	1. The `Resident` enters the home while in possession of an NFC device. 2. The system begins the disarm countdown. 3. The `Resident` approaches the console and holds the NFC within 0.2 meters of the console. 4. The data on the NFC device is read and validated by the system. 5. The system enters the disarmed state and the disarm countdown is halted.
Entry Condition	The system is in the armed state and the Resident enters the home in possession an NFC device.
Exit Condition	The system is disarmed.
Quality requirements	TODO

Use case name	`KeyPadDisarmSystem`
Participating Actors	Initiated by `Resident`
Flow of Events	1. The `Resident` enters the home. 2. The system begins the disarm countdown. 3. The `Resident` approaches the console and enters their code using the keypad on the console. 4. The entered code is validated by the system. 5. The system enters the disarmed state and the disarm countdown is halted.
Entry Condition	The system is in the armed state and the Resident enters the home.
Exit Condition	The system is disarmed.
Quality requirements	TODO

Use case name	`NFCArmSystem`
Participating Actors	Initiated by `Resident`
Flow of Events	1. The `Resident` approaches the console and holds the NFC within 0.2 meters of the console. 2. The data on the NFC device is read and validated by the system. 3. The system begins the arm countdown. 4. The `Resident` leaves the home. 5. The system arm countdown completes and the system enters the armed state.
Entry Condition	The system is in the disarmed state and the `Resident` wishes to arm it using an NFC device.
Exit Condition	The system is armed.
Quality requirements	TODO

Use case name	`KeyPadArmSystem`
Participating Actors	Initiated by `Resident`
Flow of Events	1. The `Resident` approaches the console and enters their code. 2. The entered code is validated by the system. 3. The system begins the arm countdown. 4. The `Resident` leaves the home. 5. The system arm countdown completes and the system enters the armed state.
Entry Condition	The system is in the disarmed state and the `Resident` wishes to arm it using the keypad.
Exit Condition	The system is armed.
Quality requirements	TODO

2.4 Object model

2.5 Dynamic model

2.6 Interfaces

Chapter 3

Non-Functional Requirements

Chapter 4

User Interfaces

The main user interface for this system is the user's smart phone device. Paired with near-field communication it will

4.1 Smartphone Application

A smartphone application will allow the user to monitor their residence as well as turn on or off various components of the system. If the device has near-field communication built into it, then it will be able to be used to arm and disarm the system upon entry or when leaving the premises.

The application will have three main purposes. The first is to display data and statistics over time in a easily understood manner. The second is to allow fine control over various sub-systems such as the state of the security system, thermostat, and lights – both interior and exterior.

4.2 Near-field Communication Keypad

4.3 Web Portal