Smart Home System

Vision

Version <1.1>

ReVision document History

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| --- | --- | --- | --- |
| **Date** | **Version** | **Description** | **Author** |
| 08/27/2017 | 1.0 | Outline project description, schedule, est cost and possible risks | Jared Huber |
| 09/03/2017 | 1.0 | Populate user manual with a glossary to include acronyms, definitions & abbreviations. | Jared Huber |
| 09/07/2017 | 1.0 | Complete positioning, begin on users and stakeholders as well as the product overview. | Jared Huber |
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Vision

# Introduction

The purpose of this document is to collect, analyze, and define high-level needs and features of the Smart Home System. It focuses on the capabilities needed by the stakeholders, and the target users, and **why** these needs exist. The details of how the Smart Home System fulfils these needs are detailed in the use-case and supplementary specifications.

## Purpose

Outline the scope, design, risks, estimated costs and schedules to implement a Smart Home System.

* 1. **Scope**

Design a smart home system to increase convenience, efficiency and promote security for the homeowner and any occupant to the house to adjust features based on preference and need incorporating a mobile application feature to access from a remote location.

## Definitions, Acronyms and Abbreviations

See 10.1.1 Glossary

* 1. **Overview**

This document will overview the company’s position and define the problem. Stakeholder and users will be discussed followed by the product description and its accompanying features. Constraint will be laid out with priorities given where applicable.

# Positioning

## Business Opportunity

Many homeowners are looking for a way to make menial tasks more convenient. With the integration of a smart personal assistant with other devices such as light, plugs, doorbells and more, the homeowner can maximize convenience.

## Problem Statement

The problem of menial tasks and the average forgetful mind affects many american homeowners and renters. The impact of which is the waste of energy and general inconvenience. A successful solution would put a user’s mind at ease as to whether they forgot to lock the doors, turn the lights off, or set the thermostat.

## Product Position Statement

For homeowners/renters who wish to create convenience in their living space, HOMEplus is a smart home system that learns a user’s preferences and is able to make their home life more convenient including automatically adjusting zone temperatures, lights, outlet energy use and locking said living space. Unlike NEST, ALEXA, and RING, our product is one fluid system that has a solution for every aspect of home convenience so the user does not have to collect technology from many different sources.

# Stakeholder and User Descriptions

## Market Demographics

* *What is your organization’s reputation in these markets?* 
  + HOMEplus is a new and emerging company in the smart home market. The company is hardworking and fast paced with a drive to provide a better smart home solution.
* *What would you like it to be?* 
  + HOMEplus has one goal, to be the leading provider of smart home solutions.
* *How does this product or service support your goals?*
  + With the implementation of each of our smart home devices interfaces with the main HOMEplus hub, we have the most complete suite of smart home solutions.

## Stakeholder Summary

|  |  |  |
| --- | --- | --- |
| **Name** | **Represents** | **Role** |
| Project Team Member | Software engineering and development staff. | Ensures that deliverable items are prepared and reviewed to drive application design. |
| Customer | Represents the main end users of the application. The application should be focused on their needs. | Paying customer that utilizes the smart system. |
| Sponsor (Professor) | Management | Lays out guidelines for project scheduling. |

## 

## User Summary

|  |  |  |
| --- | --- | --- |
| **Name** | **Description** | **Stakeholder** |
| Young User (Age 10-18) | A customer with limited capabilities within the system due to parental controls. | Represented by the retail customer stakeholders. |
| Administrative End User | A customer that has an admin account tied to a household. Can modify everything within the system. | Represented by the retail customer stakeholders. |
| System Administrator | A user that has a system administration account and can make system wide changes. | Represented by the Project Team Member stakeholders. |

## User Environment

The services provided by Smart Home System is for residential use. The system will be available for access 24 hours a day with occasional downtime as needed for system updates. The system will be made available for access only during sessions where user credentials have been authenticated. Length of authenticated sessions and who has access will be determined by the owner of the system.

The system has a central hub that receives commands from the user through voice, mobile, or web application through the home network, or through a server if outside the home network. The hardware controlled is the thermostat, lights, speaker, outlets, and motion activated camera. To activate the system, the user enters the application and select the device they would like to control. Upon selecting device, they will be presented with options specific to the device.

Currently the system does not integrate with any additional applications or platforms. Future enhancements to the system will include integrating user’s home security system.

## Stakeholder Profiles

## 3.5.1

## Project Team Member

|  |  |
| --- | --- |
| **Representative** | Team Members are represented by self. |
| **Description** | Engineering and Development staff. |
| **Type** | SDLC experts. |
| **Responsibilities** | Ensures that deliverable items are prepared and reviewed to drive application design. |
| **Success Criteria** | Fully functional application that has passed all testing and quality requirements. |
| **Involvement** | Involved in all phases of the SDLC. |
| **Deliverables** | Software Application, Use Case Specification, SRS, Product Plan, Vision Document |
| **Comments / Issues** | None |

## 3.5.2

## Customer

|  |  |
| --- | --- |
| **Representative** | Owner of the Smart Home System. |
| **Description** | Paying customer that uses the Smart Home System. |
| **Type** | User. |
| **Responsibilities** | To meet financial obligations tied to the install and continued use of the system. |
| **Success Criteria** | Services work fully as described with increased convenience and efficiency experienced by the customer. |
| **Involvement** | Involved in the daily use of the system. |
| **Deliverables** | N/A |
| **Comments / Issues** | None |

## 

**3.5.3**

**Sponsor (Professor)**

|  |  |
| --- | --- |
| **Representative** | Mr. Krishnakantha Jayashree Chandrashekhar |
| **Description** | To educate and evaluate the process being followed in the development of the Smart Home System. |
| **Type** | Software Engineering experts. |
| **Responsibilities** | To ensure the Project Team is given the necessary knowledge, direction, and resources to develop the Smart Home System. |
| **Success Criteria** | Project Team has developed a high quality product that meets all the requirements of the curriculum, and each Team Member is awarded an A for their efforts. |
| **Involvement** | Involved in all phases of the system’s development. |
| **Deliverables** | Requirements Engineering resources. |
| **Comments / Issues** | None |

## User Profiles

## 3.6.1

### **Young User**

|  |  |
| --- | --- |
| **Representative** | Stakeholder: Customer |
| **Description** | A customer aged 10 -18 years old with limited capabilities within the system due to parental controls. |
| **Type** | Limited User |
| **Responsibilities** | Interacts with features of the system as allowed through parental controls. |
| **Success Criteria** | System responds appropriately to user’s commands. |

**3.6.2**

### **Administrative End User**

|  |  |
| --- | --- |
| **Representative** | Stakeholder: Customer |
| **Description** | A customer that has an admin account tied to a household. Can modify everything within the system. |
| **Type** | Active User |
| **Responsibilities** | Interacts with features of the system as allowed through parental controls. |
| **Success Criteria** | System responds appropriately to user’s commands and settings. |

**3.6.3**

### **System Administrator**

|  |  |
| --- | --- |
| **Representative** | Stakeholder: Project Team Member |
| **Description** | A user that has a system administration account and can make system wide changes. |
| **Type** | System Expert |
| **Responsibilities** | System design, development, and documentation. |
| **Success Criteria** | Fully functional system that meets quality standards. |
| **Involvement** | Design of the system, software programming, quality control, testing, and documentation |
| **Deliverables** | Fully functional system, product plan, vision document, SRS, user manual |
| **Comments / Issues** | None |

## Key Stakeholder / User Needs

1. To automate mundane and repetitive tasks.
   * Problem exists due to many tasks requiring direct user engagement at the time task needs to be addressed. For example: flipping a light switch, or adjusting a knob on the thermostat.
   * Solved by providing system settings to allow customer to schedule tasks.
   * The hub will automatically keep inventory of pantry and fridge items and can be automated to order items based on inventory levels.
   * The hub will track user behavior and store data to learn to automate lighting and room temperature.

2. Perform common daily tasks with convenience and ease.

* + Problem exists due to many tasks requiring direct user engagement.
  + Solved by giving user access to a system, through web and mobile applications, that automates repetitive tasks, and perform tasks in real time upon a user’s commands

3. Have a secure system.

* Problem exists due to others potentially desiring to access the system.
* Solved by ensuring that system requires a session to be authenticated by user credentials.

4. Have a dependable system.

* Problem exists as a result of the fast pace of changes in technology.
* Problem solved by performing regular software updates during low usage
* The user will be giving application tools to perform testing and repairs.

5. Feel the benefits of the system outweighs the expense.

* Problem exists due to high costs of many systems in terms of hardware and service fees.
* Solved by offering tiered service pricing.
* Installation incentives for professional installation can improve sense of value.
* Allowing customer to self install system will reduce overall cost to user.

6. System needs to be easy to use.

* Problem exists due to public’s lack of patience with complicated technology.
* User interface will resemble contemporary designs user likely to be familiar with through current web and mobile applications.

7. Need for good customer service.

* Public has negative perception of customer service departments across all industries.
* Solved by having highly trained agents.
* Giving agents ability to make decisions on spot will allow issues to be resolved quickly.

## Alternatives and Competition

### **3.8.1 Ring**

### Offers a reputable product that is easy to use and low cost. However, it is limited in the amount of services it offers. For this reason it would likely be a weak choice for those looking for a robust smart home system.

### **3.8.2 AT&T Digital Life**

Highly recognizable business with strong branding. Size of company gives it an advantage to offer incentives and attractive pricing. Currently offers free installation and hardware which could persuade customers to choose their services. AT&T weakness is their customer service. Those who have been customers in the past very likely would pass on their smart home system due to their experiences with customer service.

**3.8.3 Nest**

Great marketing scheme could attract customers away from our product. Simple to use products would likely appeal to people less technically inclined. New promotion has Nest currently offering complete security system for $499 which is an attractive price. Major weakness however is Nest only offers thermostat and cameras outside of home security. As a result, our system would be more attractive to customers looking for a more robust smart home solution.

# Product Overview

## Product Perspective

HOMEplus is designed as an independent and totally self-contained smart home system, it will not interface with existing hardware or software in similar fields.

## Summary of Capabilities

**Smart Home System**

|  |  |
| --- | --- |
| **User Needs** | **Solution** |
| Perform common daily tasks with convenience and ease. | Quick access to task solutions through web and mobile apps. |
| To automate mundane and repetitive tasks. | Provide system settings to allow customer to schedule tasks. The hub will also automatically keep inventory of pantry and fridge items and can be automated to order items based on inventory levels. |
| Have a secure system. | System will only allow access to tasks if session has been authenticated with user credentials. |
| Feel the benefits of the system outweighs the expense. | Offer competitive pricing using a Tiered model. |
| The system needs to be dependable. | System will perform regular updates and maintenance during non peak usage. |
| Easy to use. | User interface will resemble contemporary designs user likely to be familiar with through current web and mobile applications. |
| Good customer support. | Knowledgeable support staff will be available 24/7 via email, phone, or online chat. |

## Assumptions and Dependencies

It is assumed the user has home internet, and/or cellular service. Operation of the Smart Home System is dependent on user having, at minimum, one these services. It is also assumed the user will have an Air and Heating system in order to use the Thermostat control.

## Installation

Hardware:

User will be given option to self-install hardware. If user chooses to install hardware, it will be shipped to their home address. Self-install requires user to sign a release of liability for any damages resulting from wiring, or from improperly following supplied instructions. For self-installs, warranty is waived should it be determined hardware was not installed properly. User will also be provided an option to have a professional install the Smart Home System. If system is professionally installed, company will be liable for damages done to user’s property in the course of the install, or resulting from equipment malfunction.

Software:

System software will be available as a web or mobile application. The software application will be available for devices operating under iOS, Android, or Windows. The application need to be installed on the user devices and will be made available in the device’s app store, or online on company’s website.

# Product Features

## HOMEplus hub

#### This will be the main control for the smart home system. It will be a hardware device the size of an average tablet that will be able to be freestanding but also has a wall mounted home port in the home. This will be where a user sets all preferences including lighting for vacation, power saving and daily use, temperature, and voice shortcuts. This is also the home of the recipe database. The HOMEplus hub will have functionality to learn the user's preferences over time if the user does not desire to set preferences.

## Web/Mobile Application

#### The web/mobile applications will have all the same functionality as the HOMEplus hub remotely.

## Temperature Control

Temperature preferences and modification will be able to be made at the main hub as well as through the web/mobile apps.

## Light Functionality

Lights can dim/brighten according to user preferences including: lights on when user movement detected, lights off when no movement detected, sleep mode, vacation mode. Lights will be wifi (via the hub or web/mobile app) and voice enabled.

## Smart Lock System

The smart lock system will consist of wifi enabled deadbolt locks on all exterior doors including any garage, shed and barn doors. All locks will have code unlock functionality along with voice recognition. The smart lock will log times that users come and go and communicate with the HOMEplus hub to manipulate the home temperature in preparation for a user coming home.

## Main Entry Door Motion Camera

A main entry door motion camera will be tied in with a doorbell to stream to application to monitor deliveries/uninvited guests

## Home Goods Inventory

A fridge/pantry/sundry item inventory that will be synced with the main HOMEplus hub. Preferences can be set to auto order specific items when inventory becomes low. Text message confirmations.

## Smart Outlets

Smart outlets will allow the user to access outlets throughout the house via wifi (through main hub or web/mobile app) and voice activation. These will also be affected by power saving mode as well as vacation mode. Outlets will be able to be given shortcuts/nicknames for quick activation.

## Voice-Activated Speakers

Speakers, both hardlined into the home and standalone, will have the ability to hear voice command and output sound as well.

# Constraints

1. System will support iOS and Android applications.
2. System will have server to provide service outside the home network.
3. System response times will meet industry standards.
4. The hub will interface with the server.
5. The hub will interface with the Smart Devices.
6. The external door camera will have motion control.
7. Camera will be able to open live stream with hub for viewing.
8. See section 4c for additional constraints.

# Precedence and Priority

The following table lists features from most important to least

|  |  |  |
| --- | --- | --- |
| ID | Name | Description |
| FET-1 | HOMEplus hub | This will be the main control for the smart home system. It will be a hardware device the size of an average tablet that will be able to be freestanding but also has a wall mounted home port in the home. This will be where a user sets all preferences including lighting for vacation, power saving and daily use, temperature, and voice shortcuts. The HOMEplus hub will be the main processing unit in charge of learning and adapting to user preferences. It will also be the main line of communication to the server. |
| FET-2 | Web/Mobile Application | The web/mobile applications will have similar functionality as the HOMEplus hub, but remotely. It will not have the processing requirements as that of the hub. |
| FET-3 | Temperature Control | Temperature preferences and modification will be able to be made at the main hub as well as through the web/mobile apps. |
| FET-4 | Light Functionality | Lights can dim/brighten according to user preferences including: lights on when user movement detected, lights off when no movement detected, sleep mode, vacation mode. Lights will be wifi (via the hub or web/mobile app) and voice enabled. |
| FET-5 | Smart Lock System | The smart lock system will consist of wifi enabled deadbolt locks on all exterior doors including any garage, shed and barn doors. All locks will have code unlock functionality along with voice recognition. The smart lock will log times that users come and go and communicate with the HOMEplus hub to manipulate the home temperature in preparation for a user coming home. |
| FET-6 | Smart Outlets | Smart outlets will allow the user to access outlets throughout the house via wifi (through main hub or web/mobile app) and voice activation. These will also be affected by power saving mode as well as vacation mode. Outlets will be able to be given shortcuts/nicknames for quick activation. |
| FET-7 | Voice Activated Speakers | Speakers, both hardlined into the home and standalone, will have the ability to hear voice command and output sound as well. |
| FET-8 | Main Entry Door Motion Camera | A main entry door motion camera will be tied in with a doorbell to stream to application to monitor deliveries/uninvited guests. |

# Other Product Requirements

## Applicable Standards

1. The system will comply with standards for the following platforms:

* Windows
* Unix
* iOS
* Android

1. The system will meet communication and network standards for TCP/IP and ISDN.
2. The following Quality and Safety standards will be met:

* UL 316 for Video Surveillance Systems.
* UL 62638-1 Safety requirements for AV equipment.
* UL 2900-1 Cyber Security for network connected products.
* UL 1480A Speaker standards for commercial use.
* ISO 9001 Quality Management to ensure quality products and customer service.
* IEEE 802.11 for products using Wifi for network communications.

1. The Uniform Commercial Code (UCC) will be followed to meet state statutes governing commercial transactions.

# Documentation Requirements

## User Manual

This user manual is a technical communication document providing a glossary of Definitions, Acronyms and Abbreviations

* + 1. **Glossary**

**Acronyms**

*FLOSS* - Free/Libre and Open Source Software

*COTS* - Commercial Off The Shelf

**Definitions**

*Sleep Mode* - Activation of power save mode, alarm clock activation and smart lights power down.

*Vacation Mode* - Activation of power save mode, lock smart locks, scheduled smart light power on/off to give the illusion that a user is home.

*Power Save Mode* - The system will power down devices including smart plugs and lights according to user preferences as well as preset timers that track inactivity.

*HOMEplus Hub* - Main user interface for the HOMEplus smart home system. This is where all user preferences/settings are set. This will have all interfaces to interact with and manipulate all smart home devices. The hub will be standalone as well as have a wall mounted home location where it should be stored for charging.

*Smart Device* - Any end device that provides advanced functionality to a user through the web or mobile application.

# Appendix 1 - Feature Attributes

## Status

|  |  |
| --- | --- |
| Proposed | Smart Outlets, Home Goods List, Ingredient Database |
| Approved | HOMEplus Hub, Web/Mobile Application, Temperature Control, Light Functionality, Smart Lock System, Main Entry Door Motion Camera |

## Benefit

|  |  |
| --- | --- |
| Critical | HOMEplus Hub, Web/Mobile Application |
| Important | Temperature Control, Light Functionality, Smart Lock System, Main Entry Door Motion Camera |
| Useful | Smart Outlets, Home Goods List, Ingredient Database |

## Effort

* One team for oversight comprised of one stakeholder, one end-user, a team leader (responsible for team consistency and fixing roadblocks), a planner/scheduler, and a systems architect.
* Five teams for development each having five members:

IOS App Development

Android App Development

Web App Development

Back-End Server

Device Integration

* One team for testing to have three members to include one team leader and two testers to ensure that all exceptions are handled, code coverage meets standards, and unit tests are completed. Most testing will be accomplished using continuous integration requiring that test cases are written by the developers at time of development.

## Development Schedule Estimate: Eight months for the back end server team and the device integration team to have the system running, three months for the app and website development, and one month for testing.

|  |  |  |
| --- | --- | --- |
| Item | Sprints (2 weeks) | Hours |
| Back end server and device integration | 16 | 1280 |
| App development | 6 | 480 |
| Testing | 2 | 160 |
| Total | 24 | 1920 |

## Risk

* Individual team setbacks/delays could result in the delay of the final system roll out.
* End-user cost for whole home system could be too high for the sake of convenience.
* The inability of our system to be able to interface with existing smart home hardware and software might deter customers from purchasing the system because they would have to purchase all new hardware.
* Another company releasing a similar product before ours.