Smart Home and Reliable Property System (SHaRPS)

CS 3337 Software Engineering

Software Requirements Document (SRD)

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Document Change Log

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List of TBD Items

Page	Item	Description	Status
Section 4	SHaRPS Detailed Design	TBC During CS437	TBD
Section 5	SHaRPS Elements of Implementation	Coding	TBD
Section 6	SHaRPS Test Plan	Testing Plan	TBD

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1.   INTRODUCTION

1.1   Purpose

The purpose of this document is **four-fold**:

a) Completely defines a full set of requirements for the **SHaRPS** – This is Section 3 of the document and it corresponds to a Software Requirements Document SRD.

b) Completely define the design for the **SHaRPS –** This will be Section 4.0.of the document which will not be fully completed until the second part of this course (cs437). This section corresponds to the elements of a Software Design Document, SDD..

c) Defines and (partially) implements feasible modules for the **SHaRPS –** This will be Section 5.0 of the document and it will be completed in cs437. This section corresponds to the Software Implementation Document, SID.

d) Completely defines the Test Plan for the **SHaRPS – Section 6.0**. This section corresponds to a Software Test Plan, STP. The main structure takes the requirements listed in Section 3 and adds a new column including the type of test to be included for each of the requirements.

The complete definition of all **SHaRPS** requirements provides the source requirement inputs for the development of the subsequent supporting software subsystems documents.

1.2   Scope

The documentation was developed as part of a Software Design class, CS337. The class included developing the **SHaRPS** SRD, parts of the SDD, and parts of the STP (Sections 1, 2 and 3, parts of section 4 and parts of Section 6). The remaining parts of the document (completion of Section 4 plus Sections 5 and completion of Section 6) are left for the next software engineering class, CS437.

The scope of this document includes the following:

- All functional and non-functional requirements on the **SHaRPS** are captured. This includes Verification & Validation (V&V) requirements, as well as inter-software subsystems requirements
- A complete set of **SHaRPS** Requirements, derived and traceable to the incoming cs437 class requirements. These requirements are organized by key **SHaRPS** functional units shown on the Level 1 DFD. The Level 1 DFD is shown on page 10.
- The functional requirements defined in the **SHaRPS** Requirements section have been expanded to include the non-functional requirements and more specific hardware requirements. The non-functional requirements and hardware requirements are listed after the software requirements with no further analysis.
- Testing methods for each functional requirement.

1.2.1 Document Organization

The organization of this document provides a natural 'flow' or allocation of requirements to each succeeding section.

Details regarding the overall document are given in sub-section 1.5 below.

1.2.2 Relationship to Other Documents

The **SHaRPS** SRD/SDD/STP/SID is a complete self contained document. Some relationships to other documents in the literature are indicated below in sub-section 1.5.

1.3 SHaRPS Architecture

1.3.1 Detailed Context Diagram (DFD Level 0)

The **SHaRPS** architecture is summarized in the Context Diagram (DFD Level 0) given below. A more complete Functional Description is given in Section 2 of this document.
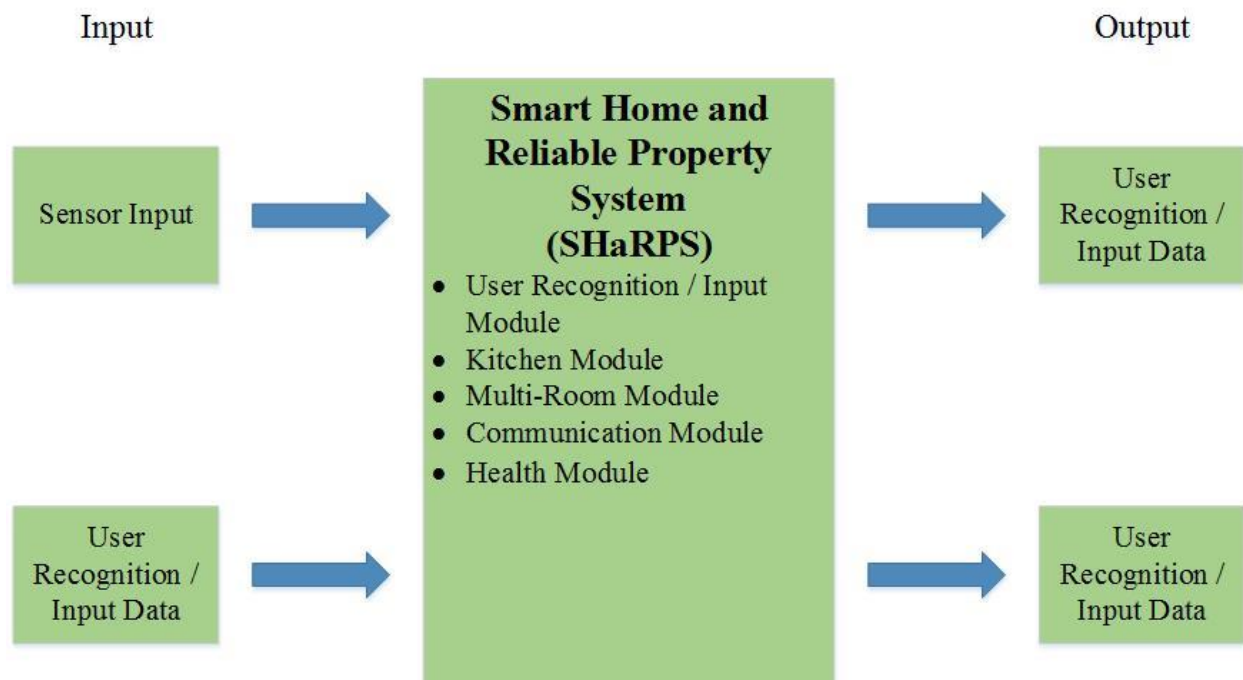

Figure 1-1

1.3.2   Description and major functions of the **SHaRPS**

  SHaRPS will automate certain tasks within a home as well as adjust to certain aspects of a user's lifestyle by monitoring user activity through pattern detection, behavior analysis, and pattern recognition. Once these tasks are automated, users should gain increased time to use to their benefit. SHaRPS will also monitor the perimeter of the home to provide security through an alarm system, as well as by protecting against household emergencies. SHaRPS will also monitor user data related to health to provide an increased level of comfort. All user data analyzed by ShaRPs is stored, and retrieved from a secure database.

SHaRPS is a software application for a home with the following main functions:
- SHaRPS will provide a secure home by verifying residents, guests, and intruders using facial recognition technology. Voice recognition technology will be used to identify users when cameras cannot perform this task. Voice commands will be used to control every aspect of a home, as well as to request changes to any stored user data.
- SHaRPS will monitor food consumption, and food stored as well as provide recipes to users based on current food supply. SHaRPS will allow users to manage recipes in the database through the Food Manager Sub-Module.
- SHaRPS will monitor and store select user activity in the form of appliance activation, room temperature settings, and activity performed within a room, and use this data to make life easier for the user. SHaRPS will also grant users the ability to control select appliances remotely.
- SHaRPS will monitor user health and their medications. In the event of an emergency, the appropriate authorities will be notified. SHaRPS will provide remote access to shopping lists, and any medication lists.
- SHaRPS will control all doors, lights, and windows. When intruders are detected, SHaRPS will notify the appropriate authorities, and store all data related to the intruder detection in the database.

1.4   Documentation Development Process

The **SHaRPS** detailed functional description is documented in section 2.0. Basically, Section 2 is a succinct software description for the document. The overall detailed functional description is based on higher level DFDs. All major functional units are described in detail in this part of the document.

In general, all requirements affecting **SHaRPS** are captured in Section 3.0. These requirements are a refinement and completion of requirements first collected as part of a Software Engineering project. The document is cited in Section 1.2.2. This section is the one worked in most detail to become a reasonably complete Software Requirements Document (SRD). It includes both functional and non-functional software requirements together with several detailed "rational" paragraphs whenever necessary to complete the understanding of each requirement.

Section 4 is the **SHaRPS** detailed Design Description Document (SDD). This part of the document includes all higher level DFDs including at least Level 2 DFDs plus all interface units. This part of the document is highly technical and detailed and it is based on section 2 descriptions. This Section will be completed in cs437.

Section 5 includes elements of implementation of **SHaRPS**. This section includes the various constraints that effectively limit the implementation as well as the sub-units that will be coded. The implementation goals are defined and the code and pseudo code are included as an attachment to this section. Section 5 will be fully implemented and completed in cs437.

Section 6 is the last major section in this document and includes the overall Test Plan (TP) of the **SHaRPS**. The test plan details the various techniques used to test the requirements and it also includes a Validation Matrix where each requirement specified in section 3 is listed with its corresponding validation method. This Section is initiated in cs337 and completed in cs437.

A Data Dictionary has been included to clarify terms and definitions used as part of this document.

Lastly, a list of all acronyms and abbreviations used have been tabulated at the end of the document.

1.5   References

All references used in the creation of this document are listed below.
DO NOT FORGET THE INTERNET

1.5.1   Controlling Documents

http://electronics.howstuffworks.com/gadgets/high-tech-gadgets/facial-recognition.htm

1.5.2   Applicable Documents

No additional applicable document has been used in the production of this document.

1.5.3   Standards

No Standard has been used in the creation of this document. However, some Standards described in textbooks have been examined as a reference. In particular, the IEEE standard has been briefly discussed in class. However, the document follows closely the pattern of other classical standards used in the industry.

2.0   DETAILED FUNCTIONAL DESCRIPTION OF THE *SHARPS*

2.1   Detailed **SHaRPS** Functional Description.

The major tool used to design **SHaRPS** is the Data Flow Diagram, DFD. The rationale behind the selection of DFDs as the preferred design tool was their simplicity and versatility. In the future more sophisticated tools may be used particularly if a correlation from Design to Requirement to Implementation and Testing is found to be a necessary addition

2.1.1   Higher Level Data Flow Diagrams.

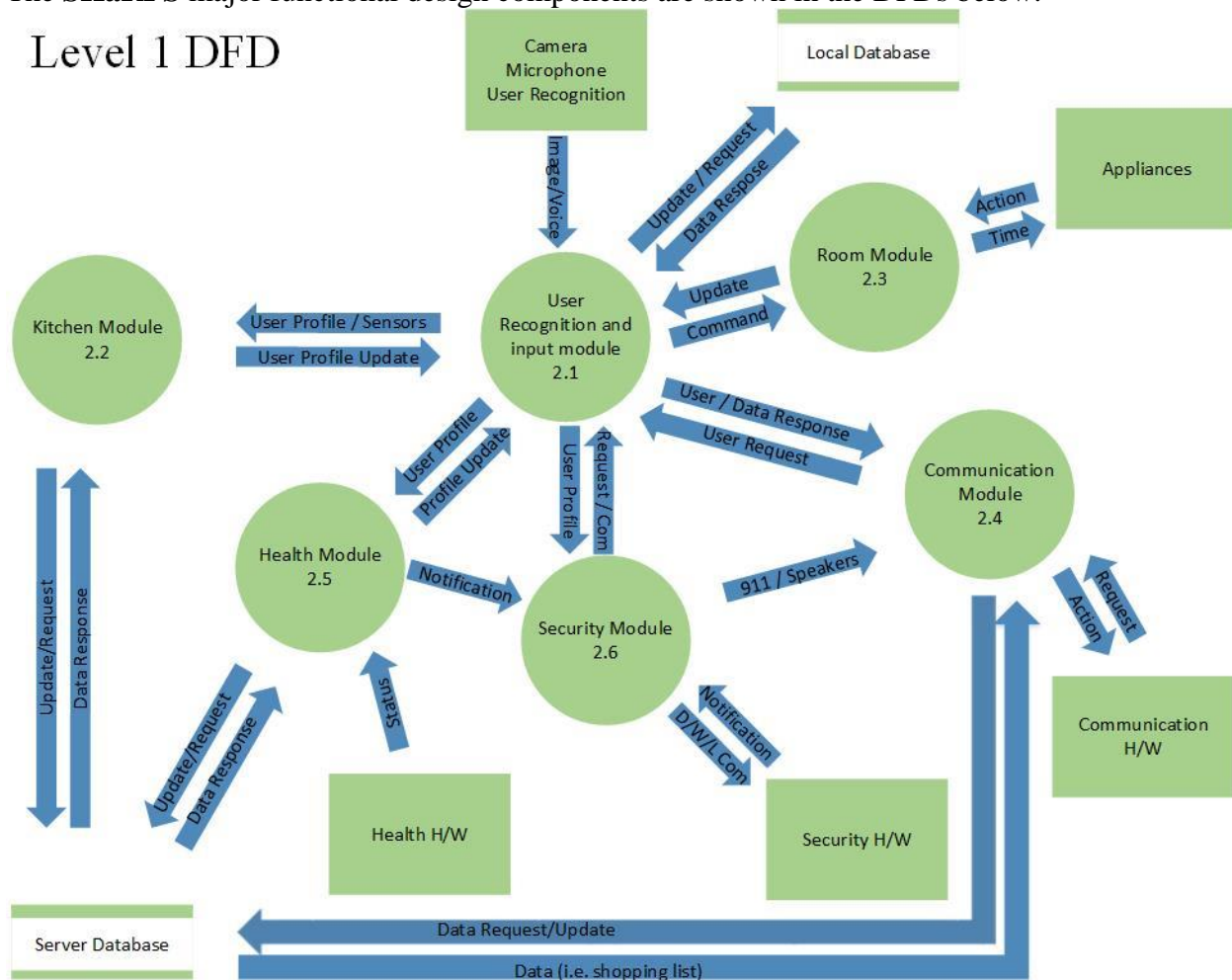The **SHaRPS** major functional design components are shown in the DFDs below.

Figure 2-1

2.1.2   Detailed Description of **SHaRPS** Major Sub-Units

The **SHaRPS** major functional subunits shown in the DFDs in the previous sub-sections, are described in detail below.

User Recognition – Module 2.1

This is the base of all user input. It will perform user recognition on every person to enter the view of a camera. It will also try to identify users by voice. All commands given to the system must go through the User Recognition Module. It will send commands to the appropriate modules to ensure that all actions are performed. User Profiles will be created to store the users' preferences and information.

Kitchen – Module 2.2

The primary function of the will be food management. This will keep track of all food stored. It looks for expiration dates and when food supply is low. As food is expiring or running low, items will be added to the shopping list if the user regularly buys these items. Also, the appliances in the kitchen will be controlled through this module. It will report which appliances are activated and the time of activation so that patterns can be recognized by the User Recognition Module.

Multi-Room – Module 2.3

The primary function is to monitor the users' preferences such as room temperature, water temperature, and appliance activation. The times that appliances are turned on and the temperatures regularly used will be stored in user profiles.

Communication – Module 2.4

Connection to mobile devices and using SHaRPS speakers will be controlled though the Communication Module. It will allow users to see data from their mobile phones as well as control selected appliances. All preferences can be set by the users while in the house. This appliance will use the server database to gather any needed information.

Health – Module 2.5

This module will monitor daily vitals. Once users' vitals are received, they will be compared to previous values and compared to dangerous values. If the users' vitals are ever dangerous or a life-threatening event is detected, the authorities will be notified. Medications will be monitored in the same way that food is monitored. If the users have any daily medications to take, then the users will be notified when to take their medicine.

Security – Module 2.6

All users must pass the security system. There is no way into the home without crossing a camera. The Security module will determine if the person entering the home is an intruder or not. If the person is an intruder, their information (pictures and any measurements that can be taken

through recognition) will be stored for the authorities. Also, the police will be notified immediately in order to increase the likelihood of catching the criminal. This will also control the lights, windows, and doors. Lastly, gas, water, and electricity will be monitored and users' will be notified if irregularities are found.

3.0 SHaRPS REQUIREMENTS

3.1 SHaRPS Functional Requirements

This Section collects all **SHaRPS** Functional Requirements. This Section includes the complete set of functional requirements with explanation and rational where the statement of the requirement was deemed insufficient or needing additional background/justification. All requirements relate to the design modules described in Section 2. An effort has been made to standardize the correlation between the design modules and the requirements to make their access and organization more consistent. For example, module 2.1 requirements are labeled 3.1, sub-module 2.1.1 requirements are labeled 3.1.1 and so on. The list of requirements follows.

User Recognition Module 2.1 (URM)	
Requirement No.	Requirement Description
3.1.1	URM shall act as an interface between modules and the local database.
3.1.2	URM shall ensure that users' data and input is sent to the appropriate modules.
3.1.3	URM shall receive video from all cameras.
3.1.4	URM shall distinguish faces in video and convert to images.
3.1.5	URM shall take facial images and measure the nodal points.
3.1.6	URM shall compare facial images with 3-D images stored in local database.
3.1.7	URM shall send information about the users to the Security Module people enter the house.
3.1.8	URM shall load users' profiles if they are residents.
3.1.9	URM shall store people as guests if the Security Module labels them as guests.
3.1.10	URM shall send the users' profiles to the health module.
3.1.11	URM shall send the users' profiles to the kitchen module when users enter the kitchen.
3.1.12	URM shall send the users' profiles to the multi-room module when users enter a room.
3.1.13	URM shall receive a request for a username/password log in.
3.1.14	URM shall load a list of all usernames and passwords from the local database.
3.1.15	URM shall receive the entered username and password from communication module.

3.1.16	URM shall compare the entered username and password to all of the stored usernames and passwords.
3.1.17	URM shall send an error message if the username and/or password do not match.
3.1.18	URM shall grant access to the server database if a username and password match is found.
3.1.19	URM shall receive voice input from microphones throughout the house.
3.1.20	URM shall compare voice input to voices stored for user recognition if facial recognition is not available.
3.1.21	URM shall analyze the words spoken and compare them to a stored dictionary and the User Dictionary.
3.1.22	URM shall send voice input to the correct module based on the analysis of the voice input.
3.1.23	URM shall send commands issued by the users to the appropriate module.

Kitchen Module 2.2 (KM)	
Requirement No.	Requirement Description
3.2.1	KM shall detect with certainty which user is in the kitchen perimeter.
3.2.2	KM shall interface with User Recognition Module, and load appropriate user profiles into Kitchen Module
3.2.3	Software shall place itself on standby as users are detected within the kitchen.
3.2.4	KM shall distinguish all user activity through pattern detection, behavior analysis, and pattern recognition.
3.2.5	KM shall allow for manual override of all functions to give users full control when desired.
3.2.6	KM shall centralize all appliances, monitor their usage, and monitor energy levels.
3.2.7	KM shall monitor food quality and alert users when food is spoiled.
3.2.8	KM shall recommend recipes that can be made with the current food supply.
3.2.9	KM shall provide nutritional value of food upon users' requests.
3.2.10	KM shall create grocery lists using data from previous grocery lists, as well as the current food supply.
3.2.11	KM shall detect and keep track of the food consumed, food stored, and time of meals.

Multi-Room Module 2.3 (MRM)	
Requirement No.	Requirement Description
3.3.1	MRM shall detect with certainty any user within the given perimeter.

3.3.2	MRM shall interface with User Recognition Module, and load appropriate user profiles into Multi-Room Module
3.3.3	MRM shall place itself on standby when users are detected within the given perimeter.
3.3.4	MRM shall distinguish all user activity through pattern detection, behavior analysis, and pattern recognition.
3.3.5	MRM shall allow for manual override of all functions to give users full control when desired.
3.3.6	MRM shall centralize all appliances, monitor their usage, and monitor energy levels.
3.3.7	MRM shall accommodate all user activity detected, and automatically provide comfort settings.
3.3.8	MRM shall label its perimeter with correct label (living room, bedroom, garage, and bathroom, etc.) and name (user's name bedroom/bathroom).
3.3.9	MRM shall operate in this manner for every room except the kitchen.
3.3.10	MRM shall operate indefinitely once settings have been detected and established.
3.3.11	MRM shall automatically detect privacy settings required while accommodating user activity.
3.3.12	MRM shall enable appropriate privacy settings while accommodating user activity and labeling rooms.

Communication Module 2.4 (CM)	
Requirement No.	Requirement Description
3.4.1	CM shall receive commands and current user form User Recognition Module.
3.4.2	CM shall require user log in from mobile devices.
3.4.3	CM shall request a username and password log in.
3.4.4	CM shall grant mobile devices access to server database after logging in.
3.4.5	CM shall perform actions received in the commands.
3.4.6	CM shall display grocery or medical list on the mobile devices upon request.
3.4.7	CM shall retrieve data directly from Server Database.
3.4.8	CM shall handle one-way communication (speakers).
3.4.9	CM shall handle two-way communication (mobile devices).

Health Module 2.5 (HM)	
Requirement No.	Requirement Description
3.5.1	HM shall receive and temporarily store user profiles from the User

	Recognition Module as users enters the house.
3.5.2	HM shall only monitor the health of the residents of the house.
3.5.3	HM shall take record of the users' health parameters from various sensors.
3.5.4	HM shall receive health information from health monitoring devices and sync the information with the current data.
3.5.5	HM shall update users' health profile regularly.
3.5.6	HM shall regularly check the users' health record for any serious anomaly.
3.5.7	HM shall not make any health diagnosis.
3.5.8	HM shall call 911 if a medical emergency should occur.
3.5.9	HM shall remind the users to perform daily health related activities.
3.5.10	HM shall monitor the inventory of the medicine cabinet.
3.5.11	HM shall notify the users' if medication expiring or running out.
3.5.12	HM shall order medicine upon users' approval.
3.5.14	HM shall notify the user if anomaly in children occurs such as dangerous sleeping position, respiratory problem etc.
3.5.15	HM shall remind the users about the children's feeding times.
3.5.16	HM shall remind the users about children's health related activities.

Security Module 2.6 (SM)	
Requirement No.	Requirement Description
3.6.1	SM shall monitor all safety related aspects of the home.
3.6.2	SM shall receive commands from the User Input module and execute the commands as needed.
3.6.3	SM shall alert home owners of emergencies.
3.6.4	SM shall alert 911 of security emergencies.
3.6.5	SM shall control all doors.
3.6.6	SM shall alert users if carbon monoxide is detected.
3.6.7	SM shall alert users if smoke is detected.
3.6.8	SM shall control all interior lighting.
3.6.9	SM shall use Passive Infrared sensor to monitor average home temperature to keep track of any abnormal heat changes.
3.6.10	SM shall alert user if abrupt abnormal heat signature is detected.
3.6.11	SM shall alert users if any outside intrusion is detected.
3.6.12	SM shall control all windows.
3.6.13	SM shall control exterior cameras and store the data if an emergency occurs.

3.6.14	SM shall send status of all utilities and appliances.
3.6.15	SM shall monitor all water pressure.
3.6.16	SM shall alert user if an irregularity in water pressure is detected.
3.6.17	SM shall monitor all electrical current throughout the home.
3.6.18	SM shall alert users if abnormal electrical current is detected.
3.6.19	SM shall monitor all gas lines throughout the home.
3.6.20	SM shall alert user if any irregularity in the gas lines is detected.
3.6.21	SM shall shut off gas if a leak is detected
3.6.22	SM shall shut off water if a leak is detected.
3.6.23	SM shall send commands to turn off potentially dangerous appliances when all users leave the house

3.2   SHaRPS Non-Functional Requirements

This Section collects all the SHaRPS Non-Functional Requirements.

NF – 1 SHaRPS shall have a Database Management System that is capable of handling millions of users at once.
NF – 2 SHaRPS shall have a sufficient enough bandwidth to handle millions of users without crashing.
NF – 3 SHaRPS shall not disclose personal information without either proper User Authentication or permission that the user grants to others.
NF – 4 SHaRPS shall have enough processor cores so that each module has enough cores to handle each module interaction with individual cores
NF – 5 SHaRPS will have a 1024-bit encryption for all data

3.3   SHaRPS Hardware Requirements

This Section collects all the SHaRPS Hardware Requirements.

H – 1   High resolution cameras that can get clear images at night.
H – 2   Microphones that can record high enough quality for voice recognition
H – 3   Appliances that can be controlled from an external device (i.e. wirelessly)
H – 5   Special refrigerator and cabinets that can scan images of items, weight items, determine item locations, and use a barcode scanner
H – 6   Special Medicine cabinet that can scan images of items, weight items, determine item locations, and use a barcode scanner
H – 7   Wearable devices to monitor users' vitals

4.0   SHaRPS DETAILED DESIGN

*********** this section will be developed in cs437 ***********

5.0   SHaRPS ELEMENTS OF IMPLEMENTATION

*********** this section will be developed in cs437 ***********

6.0 SHaRPS TEST PLAN

6.1 INTRODUCTION

In this section the testing methodology to be used to V&V each of the requirements listed in section 3.0 has been identified. At points some additional testing may be required and they shall be documented as an attachment to this document.

The methodologies and testing strategies identified at this point include three major approaches with various variations to adapt to the **SHaRPS** project:

- Testing using additional ad-hoc created software including a correlation testing unit.

- Demonstration of the specified capability

- Inspection of the software code possibly using additional inspection techniques.

6.2 FUNCTIONAL REQUIREMENTS VALIDATION MATRIX

The **SHaRPS** functional and performance requirements validation and verification matrix is given below.

User Recognition Module 2.1 (URM)		
Requirement No.	Requirement Description	Testing Methodology
3.1.1	URM shall act as an interface between modules and the local database.	Testing
3.1.2	URM shall ensure that users' data and input is sent to the appropriate modules.	Testing
3.1.3	URM shall receive video from all cameras.	Demonstration
3.1.4	URM shall distinguish faces in video and convert to images.	Demonstration
3.1.5	URM shall take facial images and measure the nodal points.	Demonstration
3.1.6	URM shall compare facial images with 3-D images stored in local database.	Demonstration
3.1.7	URM shall send information about the users to the Security Module people enter the house.	Demonstration
3.1.8	URM shall load users' profiles if they are residents.	Demonstration
3.1.9	URM shall store people as guests if the Security Module labels them as guests.	Demonstration
3.1.10	URM shall send the users' profiles to the health module.	Demonstration
3.1.11	URM shall send the users' profiles to the kitchen module when	Demonstration

Requirement No.	Requirement Description	Testing Methodology
	users enter the kitchen.	
3.1.12	URM shall send the users' profiles to the multi-room module when users enters a room.	Demonstration
3.1.13	URM shall receive a request for a username/password log in.	Demonstration
3.1.14	URM shall load a list of all usernames and passwords from the local database.	Demonstration
3.1.15	URM shall receive the entered username and password from communication module.	Demonstration
3.1.16	URM shall compare the entered username and password to all of the stored usernames and passwords.	Demonstration
3.1.17	URM shall send an error message if the username and/or password do not match.	Demonstration
3.1.18	URM shall grant access to the server database if a username and password match is found.	Demonstration
3.1.19	URM shall receive voice input from microphones throughout the house.	Demonstration
3.1.20	URM shall compare voice input to voices stored for user recognition if facial recognition is not available.	Demonstration
3.1.21	URM shall analyze the words spoken and compare them to a stored dictionary and the User Dictionary.	Demonstration
3.1.22	URM shall send voice input to the correct module based on the analysis of the voice input.	Demonstration
3.1.23	URM shall send commands issued by the users to the appropriate module.	Demonstration

Kitchen Module 2.2 (KM)		
Requirement No.	Requirement Description	Testing Methodology
3.2.1	KM shall detect with certainty which user is in the kitchen perimeter.	Demonstration
3.2.2	KM shall interface with User Recognition Module, and load appropriate user profiles into Kitchen Module	Demonstration
3.2.3	Software shall place itself on standby as users are detected within the kitchen.	Demonstration
3.2.4	KM shall distinguish all user activity through pattern detection, behavior analysis, and pattern recognition.	Demonstration
3.2.5	KM shall allow for manual override of all functions to give users full control when desired.	Demonstration
3.2.6	KM shall centralize all appliances, monitor their usage, and monitor energy levels.	Demonstration
3.2.7	KM shall monitor food quality and alert users when food is	Demonstration

	spoiled.	
3.2.8	KM shall recommend recipes that can be made with the current food supply.	Demonstration
3.2.9	KM shall provide nutritional value of food upon users' requests.	Demonstration
3.2.10	KM shall create grocery lists using data from previous grocery lists, as well as the current food supply.	Demonstration
3.2.11	KM shall detect and keep track of the food consumed, food stored, and time of meals.	Demonstration

Multi-Room Module 2.3 (MRM)		
Requirement No.	Requirement Description	Testing Methodology
3.3.1	MRM shall detect with certainty any user within the given perimeter.	Demonstration
3.3.2	MRM shall interface with User Recognition Module, and load appropriate user profiles into Multi-Room Module	Demonstration
3.3.3	MRM shall place itself on standby when users are detected within the given perimeter.	Demonstration
3.3.4	MRM shall distinguish all user activity through pattern detection, behavior analysis, and pattern recognition.	Demonstration
3.3.5	MRM shall allow for manual override of all functions to give users full control when desired.	Demonstration
3.3.6	MRM shall centralize all appliances, monitor their usage, and monitor energy levels.	Demonstration
3.3.7	MRM shall accommodate all user activity detected, and automatically provide comfort settings.	Demonstration
3.3.8	MRM shall label its perimeter with correct label (living room, bedroom, garage, and bathroom, etc.) and name (user's name bedroom/bathroom).	Demonstration
3.3.9	MRM shall operate in this manner for every room except the kitchen.	Demonstration
3.3.10	MRM shall operate indefinitely once settings have been detected and established.	Demonstration
3.3.11	MRM shall automatically detect privacy settings required while accommodating user activity.	Demonstration
3.3.12	MRM shall enable appropriate privacy settings while accommodating user activity and labeling rooms.	Demonstration

	Communication Module 2.4 (CM)	
Requirement No.	Requirement Description	Testing Methodology
3.4.1	CM shall receive commands and current user form User Recognition Module.	Testing
3.4.2	CM shall require user log in from mobile devices.	Testing
3.4.3	CM shall request a username and password log in.	Demonstration
3.4.4	CM shall grant mobile devices access to server database after logging in.	Demonstration
3.4.5	CM shall perform actions received in the commands.	Demonstration
3.4.6	CM shall display grocery or medical list on the mobile devices upon request.	Demonstration
3.4.7	CM shall retrieve data directly from Server Database.	Demonstration
3.4.8	CM shall handle one-way communication (speakers).	Demonstration
3.4.9	CM shall handle two-way communication (mobile devices).	Demonstration

	Health Module 2.5 (HM)	
Requirement No.	Requirement Description	Testing Methodology
3.5.1	HM shall receive and temporarily store user profiles from the User Recognition Module as users enters the house.	Demonstration
3.5.2	HM shall only monitor the health of the residents of the house.	Demonstration
3.5.3	HM shall take record of the users' health parameters from various sensors.	Demonstration
3.5.4	HM shall receive health information from health monitoring devices and sync the information with the current data.	Demonstration
3.5.5	HM shall update users' health profile regularly.	Demonstration
3.5.6	HM shall regularly check the users' health record for any serious anomaly.	Demonstration
3.5.7	HM shall not make any health diagnosis.	Demonstration
3.5.8	HM shall call 911 if a medical emergency should occur.	Demonstration
3.5.9	HM shall remind the users to perform daily health related activities.	Demonstration
3.5.10	HM shall monitor the inventory of the medicine cabinet.	Demonstration
3.5.11	HM shall notify the users' if medication expiring or running out.	Demonstration
3.5.12	HM shall order medicine upon users' approval.	Demonstration
3.5.14	HM shall notify the user if anomaly in children occurs such as	Demonstration

	dangerous sleeping position, respiratory problem etc.	
3.5.15	HM shall remind the users about the children's feeding times.	Demonstration
3.5.16	HM shall remind the users about children's health related activities.	Demonstration

Security Module 2.6 (SM)

Requirement No.	Requirement Description	Testing Methodology
3.6.1	SM shall monitor all safety related aspects of the home.	Demonstration
3.6.2	SM shall receive commands from the User Input module and execute the commands as needed.	Demonstration
3.6.3	SM shall alert home owners of emergencies.	Demonstration
3.6.4	SM shall alert 911 of security emergencies.	Demonstration
3.6.5	SM shall control all doors.	Demonstration
3.6.6	SM shall alert users if carbon monoxide is detected.	Demonstration
3.6.7	SM shall alert users if smoke is detected.	Demonstration
3.6.8	SM shall control all interior lighting.	Demonstration
3.6.9	SM shall use Passive Infrared sensor to monitor average home temperature to keep track of any abnormal heat changes.	Demonstration
3.6.10	SM shall alert user if abrupt abnormal heat signature is detected.	Demonstration
3.6.11	SM shall alert users if any outside intrusion is detected.	Demonstration
3.6.12	SM shall control all windows.	Demonstration
3.6.13	SM shall control exterior cameras and store the data if an emergency occurs.	Demonstration
3.6.14	SM shall send status of all utilities and appliances.	Demonstration
3.6.15	SM shall monitor all water pressure.	Demonstration
3.6.16	SM shall alert user if an irregularity in water pressure is detected.	Demonstration
3.6.17	SM shall monitor all electrical current throughout the home.	Demonstration
3.6.18	SM shall alert users if abnormal electrical current is detected.	Demonstration
3.6.19	SM shall monitor all gas lines throughout the home.	Demonstration
3.6.20	SM shall alert user if any irregularity in the gas lines is detected.	Demonstration
3.6.21	SM shall shut off gas if a leak is detected	Demonstration
3.6.22	SM shall shut off water if a leak is detected.	Demonstration
3.6.23	SM shall send commands to turn off potentially dangerous appliances when all users leave the house	Demonstration

DATA DICTIONARY

     a. <u>User Dictionary</u> – A dictionary of words commonly used by the user stored through user recognition

     b. <u>Nodal Points</u> - distinguishable **landmarks**, such as the different peaks and valleys that make up facial features

B. ACRONYMS

    a. **TBD - To Be Determined**
    b. **TBC - To Be Completed**
    c. **SRD - Software Requirements Document**
    d. **SDD - Software Design Document**
    e. **SID - Software Implementation Document**
    f. **STP- Software Test Plan**
    g. **TP - Test Plan**
    h. **DFD - Detailed Functional Description**
    i. **URM - User Recognition Module**
    j. **KM - Kitchen Module**
    k. **MRM - Multi-Room Module**
    l. **CM - Communication Module**
    m. **HM - Health Module**
    n. **SM - Security Module**