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3 System Evolution
Requirements Specification for Patient In-Home Care System

1 Introduction

1.1 Purpose:

This document specifies the currently planned all requirements for the Patient In-home Care System project. These requirements describe the functionality, constraints, and interfaces of the system. *The Patient In-Home Care System* is a multi-functional in-home system that incorporates RFID and microcontroller circuits in addition to software applications. The system is to be designed for in home use and have affordability and flexibility in mind.

1.2 Scope:

This document describes the all requirements for the initial run of the *Patient In-Home Care System* project. The specifics of which are the tablet software, as well as the server. It describes all currently planned requirements for the software, as well as future plans for the next stage of development of the software. *The Patient In-Home Care System* is being designed by a truly cross functional team, incorporating electrical, computer and computer science engineers. This expertise will be well blended with the interfacing of the project functionalities.

1.3 Parts of project:

There are two main software components to the *Patient In-Home Care System* project:

1. The tablet software, which is designed to aid the caregiver and care-receiver in the daily management of their schedule, medication intake, biography and mental exercise.

2. The server, which is designed to communicate with microcontrollers around the house, and send alerts to the caregiver.

There are also several pieces of hardware involved in the project. Microcontrollers are placed around the house and communicate with the server. A bracelet is also used to track the care-receiver, as well as give him/her an alert button.
2 Requirements

2.1 Tablet:
   The Tablet represents the main interface of the patient.

   01 The tablet will display the current time displayed at all times.

   02 The tablet program will be in full screen mode at all times.

   03 The tablet will be touch screen activated.

2.1.2 Care Receiver’s Screens:
2.1.2.1 Main Screen:
   04 The main screen is the first screen displayed when the program is started.
05 The main screen offers three main buttons: Schedule, Friends and Family, and Activities. Prototype screen depicted.

06 A fourth button will be below the 3 main buttons and will be the admin access button.

07 A window will also appear if it is close to a time that a scheduled event is scheduled and will display the information about that event.

08 A sound alert will sound for a scheduled event. This time of the alert will be chosen by the caregiver when the event is scheduled.

09 Clicking on one of the three main buttons will access another screen, bringing up the given information for that screen.

10 Clicking on the Admin Login button will display a popup asking for Name and Password.

11 Inputting the correct name and password will activate admin mode. Admin mode will display the admin main screen.

Requirements Figure 2: Example Main Screen

<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Turns on the Tablet</td>
<td>The tablet software will automatically run. The software will display a screen similar to</td>
</tr>
</tbody>
</table>

Thursday December 3rd 2009

- Today's Schedule
- Family and Friends
- Games

Admin Login
User clicks on Today’s Schedule

The Software will display the “Today’s Schedule” screen.

User clicks on Family and Friends

The Software will display the “Family and Friends” screen.

User clicks on Games

The Software will display the “Games” screen.

User clicks on Admin Login

A popup will display asking for name and password.

2.1.1.2 Family Screen:

12 The Family and Friends screen will display pictures of all input people, and an exit button.

13 Clicking on the exit button will send display the main screen.

14 Clicking on a picture will display the information for that person, as well as a back button.

15 Clicking the back button while displaying family information will display the family and friends screen.

16 Information for a person will consist of Age, relationship to patient, and Notes.

<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User enters Family and Friends screen.</td>
<td>Display the pictures of all currently input people on the screen.</td>
</tr>
<tr>
<td>User clicks on a picture.</td>
<td>Display all information for the person related to the picture. Information includes Age, relationship to patient, and Notes. A back button is also displayed.</td>
</tr>
<tr>
<td>User clicks back button.</td>
<td>Sends user back to Family and Friends screen.</td>
</tr>
</tbody>
</table>
User Action                  | Patient In-Home Care System Response
---                          |-----------------------------------
User enters Schedule screen. | Display all currently input events.
User clicks exit button.     | Sends user back to Main screen.

2.1.1.3 Schedule screen:
17  The schedule screen will display the time and information for each event for the day.
18  A back button will tack the user back to previous screen.

2.1.1.4 Game Screen:
19  The game screen will display buttons for each game. This option is not planned to be implemented in this current round of development.
20  A back button will tack the user back to previous screen.

2.1.3 Admin options:
2.1.3.1 Admin Main Screen
21  Logging into the admin screen will send the user to the admin main screen. (Admin main screen looks exactly like the care-receiver’s main screen with a “log out” button replacing the “log in” button)
22  The admin’s main screen will have the same options as the normal main screen, with the exception of the admin button which will be a "Log out" button.
23  The “Log out” button will log the admin out and bring up the normal main screen.
24  Clicking on the Today's Schedule button will display the admin’s Schedule screen.
25  Clicking on the admin’s "Family and Friends" button will display all the current family and friends as well as an "Add new" button.
<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User clicks on Today’s Schedule</td>
<td>The Software will display the “Admin’s Today’s Schedule” screen.</td>
</tr>
<tr>
<td>User clicks on Family and Friends</td>
<td>The Software will display the “Admin’s Family and Friends” screen.</td>
</tr>
<tr>
<td>User clicks on Log Out button.</td>
<td>The software will display the normal main screen.</td>
</tr>
</tbody>
</table>

2.1.3.2 Admin Schedule Screen

26 The admin’s schedule screen will have the list of all events, along with an "Add Event" button.

27 Clicking on the "Add Event" button will bring up the new event screen.

28 The Add Event screen will display options for inputting the events day, time, and event info. Also two button labeled save and cancel will be displayed.

29 Clicking on an event will bring up an edit event screen.

30 The Edit Event screen will display options for inputting the events day, time, event information. Also three buttons labeled delete, save and cancel will be displayed.

31 Clicking on the delete button in the Edit event screen will delete the event from the system.

32 The edit event screen when displayed will have its fields populated with the currently input data for that event.

33 Clicking the save button on either the edit event screen or the add new event screen will save the information to the system and display the admin schedule screen.

34 Clicking the cancel button on either the edit event screen or the add new event
<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Clicks on a Scheduled item.</td>
<td>Display Event Edit screen.</td>
</tr>
<tr>
<td>User clicks on Add Event</td>
<td>Display Add Event screen.</td>
</tr>
<tr>
<td>User clicks back button.</td>
<td>Display Admin’s main screen.</td>
</tr>
</tbody>
</table>

**Requirements Figure 3: Example Add Event Screen**

2.1.3.3 Admin Family Screen

35 The admin’s family will display pictures of all input people, an Add Event button and an exit button.

36 Clicking on the "Add new" button will bring up the new family and friend screen.

37 The add new family and friend screen will display options for inputting the Family and friends information. Also two button labeled save and cancel will be displayed.

38 Clicking on a current family and friend button will bring up the edit family and friend screen.

39 The edit family and friend screen will display options for inputting the Family and friends information. Also three buttons labeled delete, save and cancel will be displayed.
40 Clicking the edit family and friends screen delete button will delete the entry from the system.

41 The edit event screen when displayed will have its fields populated with the currently input data for that event.

42 Clicking the save button on either the edit event screen or add new family and friend screen will save the information to the system and display the admin schedule screen.

43 Clicking the cancel button on either the edit event screen or the add new event

**Requirements Figure 4: Example Add Family and Friends Screen**

<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Clicks on a Family and Friends item.</td>
<td>Display a Family and Friends Edit screen.</td>
</tr>
<tr>
<td>User clicks on Add a Family and Friends</td>
<td>Display Add a Family and Friends screen.</td>
</tr>
<tr>
<td>User clicks back button.</td>
<td>Display Admin’s main screen.</td>
</tr>
</tbody>
</table>
2.2 Server
2.2.1 Server Hardware:
44 The Server hardware will consist of a windows based personal Computer with standard peripheral devices such as a keyboard, monitor and mouse for human interaction.

45 The server will have internet access.
46 A microcontroller will be connected to the PC’s USB port to provide connectivity to the wireless sensor network.

47 The microcontroller will collect and manage all incoming signals from the connected sensors.

48 The microcontroller will interpret these signals and forward the data to the server and server software

2.2.2 Server software:

2.2.2.1 Main Screen:
49 The main screen is the first screen displayed when the program is started on the computer hardware described in section 2.2.1

50 After launching the server application, the main screen will appear in the computer monitor.

51 Main screen will have a clickable option to update-sync tablet data described in section 2.1.2. This data include all scheduling information and family and friend information.

52 Main screen will have a clickable option to turn on/off sensors inputs presented in section

53 Main screen will have a clickable option to turn on/off email or text message alerts.

54 Clicking on the Update Tablet Data button will display the Tablet update screen which will display options to update patient Schedule and family/fiend information. The Schedule screen will mimic the admin’s schedule screen of the tablet pc described in section 2.1.2, allowing the server user to edit and add events. The Family and Friends will mimic the admin’s Family and Friends screen of the tablet PC, allowing the server user to edit and add family and friends. This screen is further delineated in section 2.2.2.2

55 Clicking on the "Sensors" button will bring up a screen with option to enable or disable the available sensors. This process is further explained in section 2.2.2.3
Clicking on the "Alerts" button will bring up a screen with option to enable or disable the text message or e-mail alerts. This process is further explained in section 2.2.2.4

2.2.2.2 Update Tablet Data Screen

The update tablet data screen is divided into 2 separate sections. Section 1 will contain options to update the patients schedule while section 2 will contain options to update family/ friends data.

2.2.2.3 Update Tablet Data Screen Section 1

Clicking on a current family and friend button will bring up the edit family and friend screen.

Clicking on the "Add new" button will bring up the new family and friend button.

The “add new” family and friend screen and the edit family and friend screen will display options for inputting the Family and friends information.

The edit family and friends screen will also have a delete button to delete the entry.

Inputting Family and friend’s information will consist of inputs for name, age and relationship to patient, notes, and the location of picture on the server.

When editing currently input data the update screens will have the current data filled in the given field.

Clicking on the "Sync Family and Friends" button will send the schedule changes to the patient’s Tablet PC.

2.2.2.4 Update Tablet Data Screen Section 2

The admin’s display screen will have the list of all events, along with an "Add Event" button.

Clicking on an event will bring up an edit event screen.

Clicking on the "Add Event" button will bring up the new event screen.
The Add Event screen, and edit event screen will display options for inputting the events day, time, and event info.

The Edit Event screen will also have a delete button to delete the event.

Clicking on the "Sync Schedule" button will send the schedule changes to the patient’s Tablet PC.

2.2.2.5 Sensors Screen

The sensors screen will display a list of the available sensors connected to the server hardware described in section 2.2.1.

The screen will contain a list of sensor names with a corresponding LED light and checkmark box.

The LED light will indicate whether the sensor is operational where a lit LED indicates connected and unlit indicates disconnected.

The check box will provide the option to toggle on or off the corresponding sensor. A checked box indicates the server will respond to signals from the sensor where unchecked indicates signals will be ignored.

2.2.2.6 Alerts Screen

The alerts screen will display two labeled checkbox options to enable or disable the email/text message options. This screen will also allow a user to enter email addresses and phone number to route the alerts to a desired set of destinations.

By clicking on a check box the corresponding function delineated by the label is enabled or disabled.

A List box will contain a list of desired email addresses that will receive email alerts.

Clicking on add new email address button will provide an option to enter a new email address to the list.

Clicking on delete email will provide an option to remove an email address from the list.
A List box will contain a list of desired phone numbers that will receive text message alerts.

Clicking on add new phone number button will provide an option to enter a new phone number to the list.

Clicking on delete phone number will provide an option to remove a phone number from the list.

2.2.1 Autonomous Server Functions:

These functions run autonomously without user interaction once the server begins.

The Server Back-end functions provide connectivity and communication between the Server, Sensor Network, and caregiver’s text message/ e-mail device.

The server will provide a protocol for direct communication between the server and tablet for schedule syncing. Once the syncing options described in section 2.2.2.2 are selected, all altered scheduling/ family data in the server will replaced the corresponding data in the tablet over a wireless network connection.

The server will accept and interpret signals in section … and determine the type and source of the signal. A task will continuously check the communication ports and determine the correct response to incomings signals.

The server will respond to signals with a respective e-mail or text message to the caregiver’s text message/ e-mail device based on the information provided by the user (see section 2.2.2.4).

2.3 Wearable device:

The wearable device will be constructed using water-resistant materials in order to protect sensitive electronic components of the device.
89 The device will have some sort of fastening component (eg. Velcro strap).

90 The wearable device will feature a button. When the button is pressed the system will send out a text or email to the caregiver. The message will alert the caregiver of the button being pressed.

<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User presses alert button on wearable device.</td>
<td>An alert is sent to the server. The server will process the alert and send a message based on input options.</td>
</tr>
</tbody>
</table>

2.4 Door Alert System:

91 An alert will sound when the door is opened and no tag is registered.

92 A message will be sent as a text or email to the caregiver when the alert is sounded.

93 The message will alert the caregiver of the door being opened.

94 If a tag is registered the server will store the tag ID into the system.

<table>
<thead>
<tr>
<th>User Action</th>
<th>Patient In-Home Care System Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>User opens the door without registering the tag.</td>
<td>An alert is sent to the server. The server will process the alert and send a message based on options</td>
</tr>
<tr>
<td>User opens the door with a tag registered.</td>
<td>Server stores the tag id.</td>
</tr>
</tbody>
</table>

2.5 User Manual

95 A user manual will be provided for a complete description of how all parts of the product works.

3 System Evolution

* Further plans for the system are to add games to the tablet software.

* Add the ability for the caregiver to update schedule remotely over the internet.
* Further testing with real users may change aspects of the project.

* More precise specifications for the server options need to be research and implemented into this document.