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Project: Interactive Mirror

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DOCUMENT REVISION HISTORY

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1	10/04/12	Initial Draft	
2	10/07/12	First Review Draft	Submitted for review
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1 PRODUCT CONCEPT

This section describes the purpose, use and the intended user audience for the Interactive Mirror System (IMS). IMS is an interactive wall mounted mirror system that incorporates facial recognition to recognize the user and display relevant data based on the user's personal preferences including basic health scanning functions.

1.1 PURPOSE AND USE

The user of IMS will be able to stand in front of the IMS; the IMS will then through the use of facial recognition recognize who the user is. The IMS will then display information that is relevant to the user's personal preferences and interests. This will include and is not limited to local weather forecasts, social media, news headlines, emails, stocks, local traffic, music, media, personal calendar, and will include both a visual and hardware based way of basic health diagnostics of the users. These heath diagnostics will include and is not limited to items such as heart rate, blood pressure, weight, body mass index (BMI), height and basic overall health. This information will be displayed in a clear and unobtrusive manner to the user. Through the use of gesture controls and voice commands the user will be able to move through and access more data and resources.

1.2 INTENDED AUDIENCE

The intended audiences of this product are people who are interested in quick access to personal preference information and basic personal health diagnostics. This can include the busy business person who needs to know the morning weather and traffic information as they get dressed for their day. It could also be the rushed college student who wishes to know their class schedule as they prepare in the morning, or even the high school student who is only interested in their social media and newest gossip news. It could be for the fitness fanatic who wants to keep track of their fitness progress and goals. It is also usable to the young child who needs an interactive reinforcement of good teeth brushing habits, as well as the mother who wants a daily report of their children's morning hygiene. Then, there are the grandparents, wanting a simple non-obtrusive way of tracking their basic overall health. Everyone can be using the same mirror, each getting their own personal relevant information.

2 PRODUCT DESCRIPTION AND FUNCTIONAL OVERVIEW

This section provides the reader with an overview of the Interactive Mirror System (IMS). The primary operational aspects of the product, from the prospective of the end users, maintainers and administrators, are defined here. The key features, and functions found in the product, as well as critical user interactions and user interfaces are described here in detail.

2.1 FEATURES AND FUNCTIONS

2.1.1.1 PHYSICAL DESCRIPTION

The Interactive Mirror System (IMS) is a collection of hardware that will be enclosed in a container with a one way mirror facing the user. It will be enclosed in such a way that it can be installed into a wall to give a flush mirror appearance to the user. It can also be just plainly hung on any wall that can hold its weight. All of the major hardware will be enclosed in the container to give a nice uniformed appearance. Around the base of the container there will be plugs for power and USB to connect to any outside sensors. An Ethernet port on the base and internal Wi-Fi hardware will allow the user to connect to the internet and home networks. On the inside of the container will contain the hardware components. These components will include the display monitor(s), camera system, power supply, sensors, and computer components. These components will be accessible from the rear through a removable opening or through the careful removal of the mirror front. External hardware can be plugged into the systems external ports. These can include but are not limited to external media (USB hard drives, MP3 players, Etc.), keyboards, mice, Human Interfaces Devices, weight scales, heart rate monitors, blood pressure monitors and other health sensors.

2.1.1.2 FACE RECOGNITION

The IMS will use a camera system to recognize faces and the users connected to them.

2.1.1.3 GESTURE RECOGNITION

The IMS system will use a camera system to recognize gestures. These gestures will allow the user to interact with the system and navigate through the information presented.

2.1.1.4 VOICE RECOGNITION

The IMS system will use a microphone for voice recognition and dictation. The user will be able to use voice commands to interact with the system and navigate through the information presented in a convenient manner.

2.1.1.5 USER INTERFACE

All of the data will be presented in a “Glance and Go” fashion. The user will want to use the IMS for quick bites of information, if too much information is presented, it can overwhelm the user and clutter the display real estate. A “Glance and Go” based user interface will allow the user to view small relevant chunks of information, if the user wishes to view more detailed information, they can use gesture and/or voice controls interact with the IMS to display the information in a larger format.

2.1.1.6 USER RECOGNITION

The user will be able to stand in front of the mirror. Using the camera the IMS will then recognize that there is a user present. Through the use of facial recognition IMS will attempt to recognize the user. If it is a new user or the user is unrecognized the system will ask the user if it is their first time using this system. If it is not a new user, the system will present some basic trouble shooting tips for improving facial recognition, this can include asking to improve the lighting conditions, clearing the mirror and more. The user can also request to be logged in using voice recognition, gesture recognition or through a keyboard and mouse. The system will ask for the user’s username and password, for voice recognition this would be done by the user speaking their username and password. For gestures this could be done by specified hand gestures that only the user should know for their username and password. With the keyboard and mouse this can be done using a username and password dialog.

2.1.1.7 NEW USER REGISTRATION

If this is a new user they can request to use the system as a guest. As a guest they will get limited access to the system and can only view generic non-personalized information. The user can also register as a new user. During new user registration the user will start by registering their name and password. They will fill out basic personal information about themself. They will then register their face for facial recognition, voice recognition and physical gestures so they can log into the system. From there they can login to the system. The system will know that this is their first time using the system and will guide them through a new user wizard and tutorial. The wizard and tutorial will guide and set them up for each of the major features of this system:

2.1.1.8 HEALTH DIAGNOSTICS:

Through the use of the visual camera and the usage of external sensors when needed the system will be able to scan for and track personal health. These include and are not limited to height, weight, body mass index, heart rate, blood pressure, fat and lean mass, diet, exercise, sleep patterns. This data will be tracked and compared over time. If major changes are noticed such as high changes in weight or blood pressure, the system will recommend some health tips. If extreme changes are noticed the system might recommend the user to seek a licensed health professional. The system will also include some basic health regimens, for example the user wishes to lose some extra weight, the system will recommend and track exercise and diet routines. It will also have some built in exercise that can be done and tracked in front of the mirror.

2.1.1.9 SOCIAL MEDIA

The user will be able to update and receive updates from their favorite social media Sources such as Facebook and Twitter. Initially the system will display the information in a clear uncluttered manner based on the users interface preferences. Through the use of voice or gesture controls the system will zoom in and user can view more information about their chosen social media. The user will also be able to update and send information to their social media applications.

2.1.1.10 EMAIL

The user will be able to view and update their personal email accounts. It will initially be displayed as small basic information, such as number of unread emails. The user will then with the use of voice and gesture commands zoom in on the email and read through their email accounts. Then the user can then respond to the email using a selectable group of pre-done replies, all of which the user can edit and add to. The user can also reply using voice dictation and audibly write out their reply. It will also be able to send out new emails.

2.1.1.11 CALENDAR

The user will be able to view and update their personal calendar and to do lists. The calendar information can be pulled from outlook and/or Google accounts. The user can also have a calendar that is not connected to any outside accounts. Initially the information will be displayed in a small glancing format, such as upcoming dates and to dos. Then using voice and gesture commands the user can zoom into their calendar to view upcoming appointments. The user can also add new appointments and to dos to their respected sections. The system will then update and sync any changes to their outside accounts.

2.1.1.12 WEATHER

The user will be able to view the current weather and the upcoming weather forecast. Initially it will be displayed in a small compact format, such as just the current temperature. Then the user through voice and gesture commands can zoom into the weather section and view current radar displays and extended forecasts. This will all be displayed in a nice visually pleasant presentation.

2.1.1.13 TRAFFIC AND MAPS

The user will be able to view current traffic conditions for their area. When set up, the system could know your travel schedule. For example, if the user goes to work every morning, the system can display the current traffic information for your commune to work. If it is no longer morning than this information might not be needed and is not displayed unless asked. You can access the traffic section through voice and gesture commands.

2.1.1.14 NEWS AND STOCKS

The user can have their stocks displayed to them in an easy convenient manner. The user can also have local and regional news briefs displayed. The user can have the news Sources they view most important initially display in bite sized format onto the display. Then using voice and gesture recognition, the user

can zoom into the news articles that are most important to them. The news section will also be able to display RSS feeds from the user's favorite websites and blogs.

2.1.1.15 MUSIC AND MEDIA

The system will be able to display music and media of the users choosing. The system can display images in both a small picture frame fashion and as a larger slide show / screen saver. The images can be pulled from the users public picture albums from Facebook, Flickr and others, or from albums on the hard drive. Music can be streamed from online Sources such as Last.fm or from the hard drive or USB devices.

2.2 EXTERNAL INPUTS AND OUTPUTS:

Main inputs will be done through the camera and microphone; these inputs will allow for facial/gesture inputs and voice commands respectively. The system will take these commands and processes them for usage with the user interface. The main output will be done through the monitor(s) behind the mirror. Initial input from the user will be created during the new user registration. This will include data for facial recognition, user imputed username and password and user selected gestures and voice commands for use in gesture/voice based username and password input using the camera and microphone. The user can then select what data they wish displayed (Social, Email, Traffic, Weather, News, Etc.) the system will then populate the data by retrieving the data from the selected services through the internet. Then user can then decide and customize their user interface for their own personal preference. Visual and external sensors will be used for health based diagnostics. External sensors may include items such as weight scales, heart rate monitor, blood pressure cuff, and more. This data will be imputed to the system either wirelessly or through USB and the data will be logged over a period of time. This data can be displayed to the user in a user friendly interface.

FIGURE 1 HARDWARE LAYOUT

2.2.1.1 SOURCE	INPUT	OUTPUT	DESTINATION
User - Visual		Face, Gesture	Camera
User - Audio		Voice	Microphone
User – Body		Biometrics (Height, Weight, Blood Pressure, Heart rate, Etc.).	Camera
User – Body		Biometrics (Height, Blood Pressure, Heart rate, Etc.)	Scale
User – Body		Biometrics (Heart rate, Blood pressure, Etc.)	Biometric Sensors
User – Preferences	Application	Preferences	Application (App)
Camera	Raw 2D/3D Visual/Infrared	Processed Visual Data	Computer
Microphone	Raw Audio	Raw/Processed Audio	Computer
Computer	Camera – 2D Visual	Facial Recognition	Computer
Computer	Facial Recognition	User Authentication	Computer
Computer	Camera – 3D Visual	Gesture Recognition	Computer
Computer	Gesture Recognition	GUI Interaction	Computer
Computer	GUI Interaction	GUI Display	Display
Computer	Voice	Voice Commands	Computer
Computer	Voice Commands	GUI Interaction	Computer
Computer	Voice	Voice Dictation	Computer
Computer	Voice Dictation	Text Input	Computer
Camera	Visual (Biometrics)	Visual Data	Computer
Scale	Biometrics	Biometric Data	Computer
Biometric Sensors	Biometrics	Biometric Data	Computer
Computer	Biometric Data	Log	Computer

Display	Computer	Visual Display	User
App - Social	User Preferences	User Data	Internet
App - Email	User Preferences	User Data	Internet
App - Calendar	User Preferences	User Data	Internet
App - Weather	User Preferences	User Data	Internet
App - Maps	User Preferences	User Data	Internet
App - News	User Preferences	User Data	Internet
App - Media	User Preferences	User Data	Internet
Internet	Applications	User Data	Application
Application	Internet	User Data	Application

TABLE 1 INPUT AND OUTPUT TABLE

2.3 PRODUCT INTERFACES

Majority of the interfaces will be done through the mirror screen itself. Input to this interface will be done through gesture (camera), voice (microphone) and the mouse and keyboard (maintenance usage). Output will be displayed on the screen with the use of a physical monitor behind the mirror. The overall graphical user interface will follow a “glance and go” philosophy. This will allow us best usage of the display real-estate by displaying just what is important to the user based on the user’s personal preferences. The user can also choose what and where each piece of data is presented giving the user a highly customized personal user face. If the user chooses to see more of which ever application they can do so using voice and gesture commands. This will open up a larger more detailed interface for the user. The physical enclose itself will have as little physical interface as possible, primarily just having a power button.

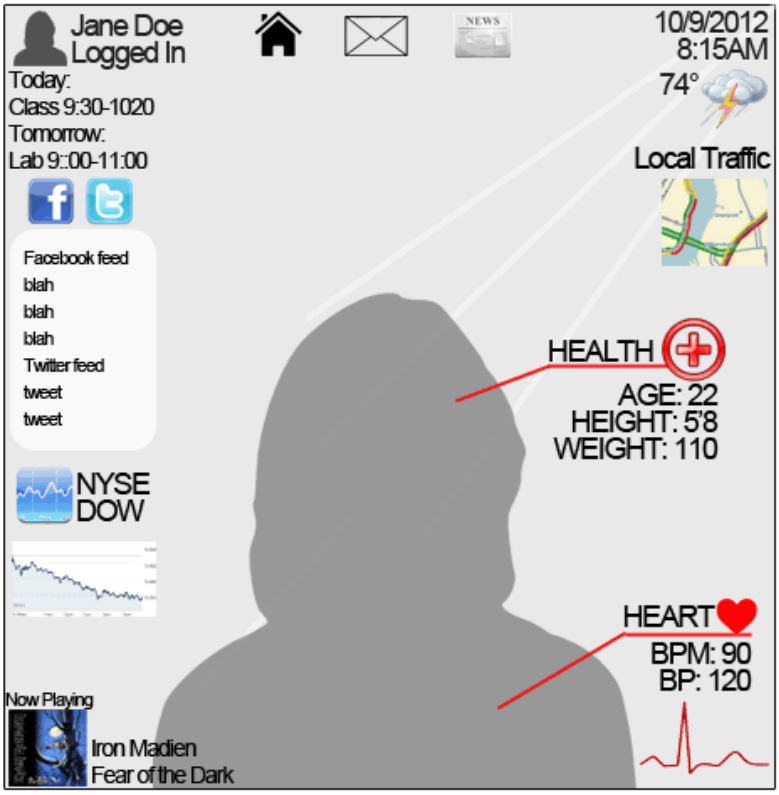

FIGURE 2 USER INTERFACE

3 CUSTOMER REQUIREMENTS

This section lists requirements of features and functions of the Interactive Mirror System, these include directly observable features and functions of the product that will be encountered by its users. Requirements specified in this section are created with, and must not be changed without, specific agreement of all stakeholders.

3.1 SIMPLE USER INTERFACE

3.1.1.1 DESCRIPTION

The User Interface will interact with the user and provide broad array of information pertinent to the user. The interface will be simple and concise.

3.1.1.2 SOURCE

Team 5 – Mirrors Inc.

3.1.1.3 CONSTRAINTS

Screen Size, Screen resolution

3.1.1.4 STANDARDS

“Glance and Go” design philosophy

3.1.1.5 PRIORITY

Level 1 - Critical

3.2 FACIAL RECOGNITION

3.2.1.1 DESCRIPTION

Using the incorporated camera, the user(s) will be recognized based on their individual characteristics. Based on the facial recognition results, data will outputted to the user.

3.2.1.2 SOURCE

Team 5 – Mirrors Inc.

3.2.1.3 CONSTRAINTS

Height of the customer, location of camera

3.2.1.4 STANDARDS

Quickly recognizes user

3.2.1.5 PRIORITY

Level 1 – Critical

3.3 GESTURE RECOGNITION

3.3.1.1 DESCRIPTION

Using the incorporated camera, the user will be able to perform gestures and the system will react/interact based on those gestures.

3.3.1.2 SOURCE

Team 5 – Mirrors Inc.

3.3.1.3 CONSTRAINTS

User Height, placement of the camera

3.3.1.4 STANDARDS

Accurately responds to the user(s)' gesture and choices made based on those gestures.

3.3.1.5 PRIORITY

Level 2 - High

3.4 VOICE RECOGNITION

3.4.1.1 DESCRIPTION

Using an incorporated microphone, the system will use voice recognition as an alternate way to identify the user.

3.4.1.2 SOURCE

Robert Klenka

3.4.1.3 CONSTRAINTS

Quality of the microphone

3.4.1.4 STANDARDS

Accurately responds to the user(s)' voice and responds appropriately

3.4.1.5 PRIORITY

Level 3 - Moderate

3.5 USER RECOGNITION

3.5.1.1 DESCRIPTION

First time users will be required to allow the system to recognize their facial characteristics (facial recognition) and voice (voice recognition). Once these two functions have been performed, the user will be given the option to create a username and password. If the user chooses not to do so, the user will be required to perform the same steps the next time he/she uses the IMS. Current users will be automatically recognized by the mirror and be able to log in using his/her voice.

3.5.1.2 SOURCE

Team 5 – Mirrors Inc.

3.5.1.3 CONSTRAINTS

First time users must not be registered in the IMS

3.5.1.4 STANDARDS

Will store the new user's information or display current user's information

3.5.1.5 PRIORITY

Level 1 - Critical

3.6 NEW USER REGISTRATION

3.6.1.1 DESCRIPTION

First time users will be required to allow the system to recognize their facial characteristics (facial recognition) and voice (voice recognition). Once these two functions have been performed, the user will be given the option to create a username and password. If the user chooses not to do so, the user will be required to perform the same steps the next time he/she uses the IMS.

3.6.1.2 SOURCE

Team 5 – Mirrors Inc.

3.6.1.3 CONSTRAINTS

Must not be registered in the IMS

3.6.1.4 STANDARDS

Will store the new user's information

3.6.1.5 PRIORITY

Level 1 - Critical

3.7 HEALTH DIAGNOSTICS

3.7.1.1 DESCRIPTION

Will provide up to but not limited to height, weight, body mass index, heart rate, blood pressure, fat and lean mass, diet, exercise, sleep patterns. If the user wishes to lose some extra weight, the system will recommend and track exercise and diet routines. It will also have some built in exercise that can be done and tracked in front of the mirror.

3.7.1.2 SOURCE

Team 5 – Mirrors Inc.

3.7.1.3 CONSTRAINTS

The user must be alive

3.7.1.4 STANDARDS

Will provide health results based on recognition of the user

3.7.1.5 PRIORITY

Level 2 – High

3.8 SOCIAL MEDIA

3.8.1.1 DESCRIPTION

The user will be able to log into social media sites such as Twitter, Facebook, Windows Live, etc.

3.8.1.2 SOURCE

Team 5 – Mirrors Inc.

3.8.1.3 CONSTRAINTS

Must be a member of social media site

3.8.1.4 STANDARDS

Provide Social Media selections to the user

3.8.1.5 PRIORITY

Level 2 - High

3.9 EMAIL

3.9.1.1 DESCRIPTION

Will display the user's email on the screen if the user chooses to do so.

3.9.1.2 SOURCE

Team 5 – Mirrors Inc.

3.9.1.3 CONSTRAINTS

Must have an active email account

3.9.1.4 STANDARDS

Display user's email if they choose

3.9.1.5 PRIORITY

Level 2 - High

3.10 CALENDAR

3.10.1.1 DESCRIPTION

Will display the user's personal calendar if they choose to do so

3.10.1.2 SOURCE

Team 5 – Mirrors Inc.

3.10.1.3 CONSTRAINTS

Must have a calendar setup

3.10.1.4 STANDARDS

Will display the user's calendar if they choose

3.10.1.5 PRIORITY

Level 2 - High

3.11 WEATHER, TRAFFIC, AND MAPS

3.11.1.1 DESCRIPTION

Displays the user's current location's weather, traffic, and maps.

3.11.1.2 SOURCE

Team 5 – Mirrors Inc.

3.11.1.3 CONSTRAINTS

User must choose locations which weather, traffic, and map details are available for.

3.11.1.4 STANDARDS

Display the weather accurately if the user chooses to do so.

3.11.1.5 PRIORITY

Level 2 - High

3.12 NEWS AND STOCKS

3.12.1.1 DESCRIPTION

Will display the user's choices of news and stocks if he/she chooses to do so.

3.12.1.2 SOURCE

Team 5 – Mirrors Inc.

3.12.1.3 CONSTRAINTS

User must identify stocks and what type of news they wish to see

3.12.1.4 STANDARDS

Display and news and stocks if the user chooses to do so

3.12.1.5 PRIORITY

Level 2 - High

3.13 MUSIC AND MEDIA

3.13.1.1 DESCRIPTION

Will play music from the internal speaker system if the user's choosing

3.13.1.2 SOURCE

Team 5 – Mirrors Inc.

3.13.1.3 CONSTRAINTS

User must have music/media that is accessible from the IMS online or have music/media loaded to a USB drive.

3.13.1.4 STANDARDS

Plays the user's selection for music or media

3.13.1.5 PRIORITY

Level 2 - High

4 PACKAGING REQUIREMENTS

The system will be delivered as a single contained package. It can be directly hanged on a wall or you could be installed into the wall to create a flush surface. It will include all necessary power cables.

The product will be delivered in a single box containing the mirror and all internal components contained within the mirror, mounting hardware, instruction manual written in English only enclosed in a plastic bag, and Styrofoam cushioning.

4.1 STAGNANT WITHIN BOX

4.1.1.1 Description

The IMS should be properly packaged so that it does not move within the box.

4.1.1.2 SOURCE

Dr. Bahram Khalili

4.1.1.3 CONSTRAINTS

N/A

4.1.1.4 STANDARDS

Packaged properly

4.1.1.5 PRIORITY

Level 1 - Critical

4.2 PRELOADED SOFTWARE

4.2.1.1 DESCRIPTION

Software is preloaded and ready for customer use

4.2.1.2 SOURCE

Team 5 – Mirrors Inc.

4.2.1.3 CONSTRAINTS

N/A

4.2.1.4 STANDARDS

Software is loaded to the IMS

4.2.1.5 PRIORITY

Level 1 – Critical

4.3 USER MANUAL

4.3.1.1 DESCRIPTION

IMS will be shipped with a user manual to advise the customer how to correctly use the IMS.

4.3.1.2 SOURCE

Team 5 – Mirrors Inc.

4.3.1.3 CONSTRAINTS

N/A

4.3.1.4 STANDARDS

User Manual is in the box

4.3.1.5 PRIORITY

Level 1 - Critical

4.4 MOUNTING HARDWARE

4.4.1.1 DESCRIPTION

The mounting hardware will contain mounting brackets, screws, and wall anchors

4.4.1.2 SOURCE

Team 5 – Mirrors Inc.

4.4.1.3 CONSTRAINTS

N/A

4.4.1.4 STANDARDS

Ship the mounting hardware in the box

4.4.1.5 PRIORITY

Level 1 - Critical

5 PERFORMANCE REQUIREMENTS

This section outlines the performance requirements for the IMS. The IMS should respond quickly to the user actions, specifically to gestures, facial recognition, voice prompts, and processing of all commands provided by the user. These requirements outline the typical performance of the IMS.

5.1 PROCESSOR SPEED

5.1.1.1 DESCRIPTION

The processor should process the functions requested in a timely manner, but not cause overheating within the IMS.

5.1.1.2 SOURCE

Team 5 – Mirrors Inc.

5.1.1.3 CONSTRAINTS

Processor Type; i.e., Pentium, Atom, Turon

5.1.1.4 STANDARDS

Will perform functions as required by the IMS

5.1.1.5 PRIORITY

Level 1 - Critical

5.2 CAMERA

5.2.1.1 DESCRIPTION

The camera will be able to autosense gesture movements and be able to perform facial recognition.

5.2.1.2 SOURCE

Team 5 – Mirrors Inc.

5.2.1.3 CONSTRAINTS

Must be small enough to be housed within the enclosure. It must be placed in the correct position so that it can read people of different heights.

5.2.1.4 STANDARDS

Will provide accurate gesture and facial recognition

5.2.1.5 PRIORITY

Level 1 – Critical

5.3 MICROPHONE

5.3.1.1 DESCRIPTION

Microphone will be used to provide voice recognition to the IMS for each user

5.3.1.2 SOURCE

Robert Klenka

5.3.1.3 CONSTRAINTS

Must incorporate noise cancellation

5.3.1.4 STANDARDS

Will provide accurate voice commands from the user to the IMS

5.3.1.5 PRIORITY

Level 2 - High

6 SAFETY REQUIREMENTS

Safety requirements ensure that the IMS carries out the functions needed to make it acceptably safe. The following list summarizes the safety requirements for ensuring safety of the IMS. Please keep in mind that this listing is not complete and you use your judgment for your own safety.

6.1 ELECTRICALLY SAFE

6.1.1.1 DESCRIPTION

The IMS should be electrically safe. The system should be insulated in such a way that its users will be protected from electric shocks, and all other electric hazard.

6.1.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.1.1.3 CONSTRAINTS

N/A

6.1.1.4 STANDARDS

N/A

6.1.1.5 PRIORITY

Level 1 - Critical

6.2 ON / OFF SWITCH

6.2.1.1 DESCRIPTION

The IMS should have an on / off switch, so that in case of a system malfunction, it should be easy for the user to turn off the system. The user should also have the capability of turning on / off the system at their will.

6.2.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.2.1.3 CONSTRAINTS

N/A

6.2.1.4 STANDARDS

N/A

6.2.1.5 PRIORITY

Level 3 – Moderate

6.3 NO SHARP EDGES

6.3.1.1 DESCRIPTION

The IMS should not have any sharp edges or any sharp objects that's exposed to the user.

6.3.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.3.1.3 CONSTRAINTS

N/A

6.3.1.4 STANDARDS

N/A

6.3.1.5 PRIORITY

Level 1 - Critical

6.4 EXPOSED WIRING

6.4.1.1 DESCRIPTION

The IMS should be enclosed in such a way that the wiring is not exposed to its users.

6.4.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.4.1.3 CONSTRAINTS

N/A

6.4.1.4 STANDARDS

N/A

6.4.1.5 PRIORITY

Level 2 - High

6.5 PROPERLY MOUNTED

6.5.1.1 DESCRIPTION

The IMS should be properly mounted and secured.

6.5.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.5.1.3 CONSTRAINTS

N/A

6.5.1.4 STANDARDS

N/A

6.5.1.5 PRIORITY

Level 2 – High

6.6 POWER SOURCE

6.6.1.1 DESCRIPTION

The IMS should only be coupled to a power Source that is 110 volts.

6.6.1.2 SOURCE

Dr. Bahram Khalili, Team 5

6.6.1.3 CONSTRAINTS

N/A

6.6.1.4 STANDARDS

N/A

6.6.1.5 PRIORITY

Level 1 – Critical

7 MAINTENANCE AND SUPPORT REQUIREMENTS

The Interactive Mirror System (IMS) is designed to be easy to use with low maintenance. The hardware powering the IMS will be using common off the shelf computer components. This will allow a knowledgeable end user or technician to perform basic hardware changes and upgrades if needed. A few more critical sections of the hardware will be isolated and blocked off such as the physical monitor itself. The software powering the IMS will be able to perform automated system and software updates when connected to the internet. It can also perform updates if the updates are downloaded onto a bootable USB drive if no internet is available. The system will also be able to restore back to factory settings and can be accessible from a USB keyboard and mouse for diagnostic and maintenance usage.

7.1 CONSUMER HARDWARE COMPONENTS

7.1.1.1 DESCRIPTION

The hardware for this system will use common consumer based computer hardware components including hard drives, memory and power supply.

7.1.1.2 SOURCE

Team 5 – Mirrors Inc.

7.1.1.3 CONSTRAINTS

Common consumer hardware

7.1.1.4 STANDARDS

80% of the hardware can be bought at any computer store

7.1.1.5 PRIORITY

Level 2 - High

7.2 RESTRICTED HARDWARE SECTIONS

7.2.1.1 DESCRIPTION

Though most of the hardware will be consumer based some of the more critical hardware such as the monitor will have restricted access for safety and trade secrets.

7.2.1.2 SOURCE

Team 5 – Mirrors Inc.

7.2.1.3 CONSTRAINTS

Ease of access

7.2.1.4 STANDARDS

N/A

7.2.1.5 PRIORITY

Level 3 – Moderate

7.3 AUTOMATIC SOFTWARE UPDATES

7.3.1.1 DESCRIPTION

The system will have the option for an automatic software updater that will use the internet to check for new software versions.

7.3.1.2 SOURCE

Team 5 – Mirrors Inc.

7.3.1.3 CONSTRAINTS

Internet, User refusal

7.3.1.4 STANDARDS

N/A

7.3.1.5 PRIORITY

Level 3 - Moderate

7.4 MANUAL SOFTWARE UPDATES

7.4.1.1 DESCRIPTION

The system will have a method for manually updating the software in case there is no internet access or the user declines automatic updates. The user can have the system search and update, the user can also manually download updates from the product website and for major updates the user can update the system through a USB drive.

7.4.1.2 SOURCE

Team 5 – Mirrors Inc.

7.4.1.3 CONSTRAINTS

User refusal, internet, type of updates

7.4.1.4 STANDARDS

N/A

7.4.1.5 PRIORITY

Level 2 - High

7.5 RESTORE TO FACTORY SETTINGS

7.5.1.1 DESCRIPTION

The system will have the ability to format and restore back to the original factory settings

7.5.1.2 SOURCE

Team 5 – Mirrors Inc.

7.5.1.3 CONSTRAINTS

Hardware errors

7.5.1.4 STANDARDS

N/A

7.5.1.5 PRIORITY

Level 1 – Critical

7.6 KEYBOARD AND MOUSE

7.6.1.1 DESCRIPTION

The system will be accessible from a keyboard and mouse for the use of maintenance and diagnostics.

7.6.1.2 SOURCE

Team 5 – Mirrors Inc.

7.6.1.3 CONSTRAINTS

Hardware, hardware failure

7.6.1.4 STANDARDS

Hardware that can be bought at any computer store

7.6.1.5 PRIORITY

Level 1 – Critical

8 ERROR HANDLING REQUIREMENTS

This section describes the error handling requirements for the IMS system. This system will handle errors both physical and software based errors in a safe predictable manor.

8.1 CATASTROPHIC HARDWARE FAILURE

8.1.1.1 DESCRIPTION

IMS is designed using replicable off the self-components allowing for easy replacement of parts in case of hardware failure

8.1.1.2 SOURCE

Team 5 – Mirrors Inc.

8.1.1.3 CONSTRAINTS

Hardware

8.1.1.4 STANDARDS

Hardware that can be bought at any computer store

8.1.1.5 PRIORITY

Level 1 – Critical

8.2 CATASTROPHIC SOFTWARE FAILURE

8.2.1.1 DESCRIPTION

IMS is designed to be able to revert back to factory settings in case of a catastrophic software failure

8.2.1.2 SOURCE

Team 5 – Mirrors Inc.

8.2.1.3 CONSTRAINTS

Hardware

8.2.1.4 STANDARDS

N/A

8.2.1.5 PRIORITY

Level 1 - Critical

8.3 SOFTWARE EXCEPTION HANDLING

8.3.1.1 DESCRIPTION

The software will be designed to follow standard software exception handing protocols to assure best user experience. Known generic errors such as “No Internet Connection” will have a pop up dialog displayed to the user along with a list of ways to fix the errors.

8.3.1.2 SOURCE

Team 5 – Mirrors Inc.

8.3.1.3 CONSTRAINTS

Software

8.3.1.4 STANDARDS

N/A

8.3.1.5 PRIORITY

Level 2 – High

8.4 SOFTWARE CRASHES

8.4.1.1 DESCRIPTION

In the occurrence of a software crash, such as the Social Media app, a log file will be saved and a dialog will be presented to the user to ask if they wish to send the crash data to the developers

8.4.1.2 SOURCE

Team 5 – Mirrors Inc.

8.4.1.3 CONSTRAINTS

Hardware, Software, Internet

8.4.1.4 STANDARDS

N/A

8.4.1.5 PRIORITY

Level 2 - High

8.5 KINECT FAILURE

8.5.1.1 DESCRIPTION

If the Kinect is unable to recognize facial and gesture usage the user can opt to use a keyboard and mouse for interactivity.

8.5.1.2 SOURCE

Team 5 – Mirrors Inc.

8.5.1.3 CONSTRAINTS

Hardware

8.5.1.4 STANDARDS

N/A

8.5.1.5 PRIORITY

Level 1 - Critical

8.6 UNABLE TO LOG IN VIA FACE RECOGNITION

8.6.1.1 DESCRIPTION

If the registered user is unable to log in using facial recognition the user can then opt to log in using a keyboard and mouse to enter username and password credentials

8.6.1.2 SOURCE

Team 5 – Mirrors Inc.

8.6.1.3 CONSTRAINTS

N/A

8.6.1.4 STANDARDS

N/A

8.6.1.5 PRIORITY

Level 1 - Critical

8.7 VISUAL HEALTH SENSOR FAILURE

8.7.1.1 DESCRIPTION

In case of a failure using the visual health sensors the application will ask the user if they wish to switch over to the hardware based health sensors

8.7.1.2 SOURCE

Team 5 – Mirrors Inc.

8.7.1.3 CONSTRAINTS

Software, Hardware

8.7.1.4 STANDARDS

N/A

8.7.1.5 PRIORITY

Level 3 - Medium

8.8 HARDWARE SENSORS CONNECTION FAILURE

8.8.1.1 DESCRIPTION

If the IMS cannot connect to the hardware based sensors it will present to the user some troubleshooting methods

8.8.1.2 SOURCE

Team 5 – Mirrors Inc.

8.8.1.3 CONSTRAINTS

Hardware

8.8.1.4 STANDARDS

N/A

8.8.1.5 PRIORITY

Level 2 - High

8.9 INTERNET NETWORK CONNECTION FAILURE

8.9.1.1 DESCRIPTION

If the IMS cannot connect to the internet for application usage (Weather, Email) it will display the last used information and display to the user the lack of internet connectivity. Any changes and updates needed will be queued and processed when connection is restored

8.9.1.2 SOURCE

Team 5 – Mirrors Inc.

8.9.1.3 CONSTRAINTS

Hardware

8.9.1.4 STANDARDS

N/A

8.9.1.5 PRIORITY

Level 3 - Medium

9 TESTING REQUIREMENTS

This section describes basic testing requirements for the IMS. This is not a complete list as more will be added as development progresses to allow a more through testing.

9.1 FACIAL RECOGNITION

9.1.1.1 DESCRIPTION

The facial recognition system must be able to recognize and differentiate between different users and non-users of the system

9.1.1.2 SOURCE

Team 5 – Mirrors Inc.

9.1.1.3 CONSTRAINTS

Hardware, Software

9.1.1.4 STANDARDS

N/A

9.1.1.5 PRIORITY

Level 1 – Critical

9.2 LOGGING IN VIA FACIAL RECOGNITION

9.2.1.1 DESCRIPTION

Log in via facial recognition and have the system display and update based on the logged in user, then log out and have another user log in

9.2.1.2 SOURCE

Team 5 – Mirrors Inc.

9.2.1.3 CONSTRAINTS

Hardware

9.2.1.4 STANDARDS

N/A

9.2.1.5 PRIORITY

Level 1 – Critical

9.3 SWITCH USERS AFTER LOGGING IN

9.3.1.1 DESCRIPTION

Once a user has logged in, switch with another user. If the logged in user has selected to block other users from their account the system should see the different user and lock the screen. If the first user does not wish to block other users, the system should ask the new user if they wish to switch to their account or stay on the current user

9.3.1.2 SOURCE

Team 5 – Mirrors Inc.

9.3.1.3 CONSTRAINTS

Hardware, Software

9.3.1.4 STANDARDS

N/A

9.3.1.5 PRIORITY

Level 2 – High

9.4 SYSTEM TIMED OUT DUE TO INACTIVITY

9.4.1.1 DESCRIPTION

Based on the users preferences, if they wish to log out after inactive use or not, the system will choose to log out or go to a screen saver mode

9.4.1.2 SOURCE

Team 5 – Mirrors Inc.

9.4.1.3 CONSTRAINTS

Hardware, Software

9.4.1.4 STANDARDS

N/A

9.4.1.5 PRIORITY

Level 2 – High

9.5 HAND GESTURE RECOGNITION

9.5.1.1 DESCRIPTION

Test hand gesture recognition based upon the current active application or usages

9.5.1.2 SOURCE

Team 5 – Mirrors Inc.

9.5.1.3 CONSTRAINTS

Hardware, Software

9.5.1.4 STANDARDS

N/A

9.5.1.5 PRIORITY

Level 3 – Medium

9.6 HARDWARE SENSORS

9.6.1.1 DESCRIPTION

The IMS should be able to recognize and read data from connected hardware sensors

9.6.1.2 SOURCE

Team 5 – Mirrors Inc.

9.6.1.3 CONSTRAINTS

Hardware

9.6.1.4 STANDARDS

N/A

9.6.1.5 PRIORITY

Level 2 – High

10 OTHER REQUIREMENTS

This section is for requirements that do not fit into other sections of this document.

10.1 SOURCE CONTROL

10.1.1.1 DESCRIPTION

Development code for the software will be kept in an online Source control repository.

10.1.1.2 SOURCE

Team 5 – Mirrors Inc.

10.1.1.3 CONSTRAINTS

N/A

10.1.1.4 STANDARDS

Mercurial Source control

10.1.1.5 PRIORITY

Level 3 - Moderate

10.2 SYSTEMS GOES IDLE AND DISPLAYS A BLANK SCREEN

10.2.1.1 DESCRIPTION

When there is no user interaction for a determined amount of time, the mirror will enter a power safe mode and display a blank screen

10.2.1.2 SOURCE

Team 5 – Mirrors Inc.

10.2.1.3 CONSTRAINTS

N/A

10.2.1.4 STANDARDS

NA

10.2.1.5 PRIORITY

Level 3 – Moderate

11 ACCEPTANCE CRITERIA

This section describes the acceptance criteria for the IMS system. Based upon the following criteria for the features, and examination process, the sponsor will determine if the product's requirements are complete or not.

11.1 RECOGNIZE AND RESPOND TO KNOWN GESTURES

11.1.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.1 Simple User Interface
- Requirement 3.3 Gesture Recognition

11.1.1.2 VERIFICATION PROCEDURE

The customer will verify this with a live demonstration, with a provided list of gestures that the mirror knows.

11.2 RECOGNIZE AND RESPOND TO A USER'S VOICE COMMANDS

11.2.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.4 Voice Recognition

11.2.1.2 VERIFICATION PROCEDURE

The customer will verify this with a live demonstration, with a provided list of voice commands that the mirror knows.

11.3 RECOGNIZES THE INDIVIDUAL USERS

11.3.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.2 Facial Recognition
- Requirement 3.5 User Recognition

11.3.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will stand in front of the mirror and the mirror will recognize that he is not another user.

11.4 DOES NOT SHOW INFORMATION THAT BELONGS TO ANOTHER USER

11.4.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.5 User Recognition

11.4.1.2 VERIFICATION PROCEDURE

In a live demo, when the sponsor logs in, the information displayed will not belong to another user

11.5 AFTER 'LOGGING IN' WILL DISPLAY THE USER'S INFORMATION

11.5.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.7 Health Diagnostics
- Requirement 3.8 Social Media
- Requirement 3.9 Email

11.5.1.2 VERIFICATION PROCEDURE

In a live demo, the mirror will recognize the sponsor as a user and log them in, and display their information.

11.6 RECOGNIZES IF SOMEONE IS NOT A USER

11.6.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.2 Facial Recognition
- Requirement 3.5 User Recognition

11.6.1.2 VERIFICATION PROCEDURE

In a live demo the sponsor will verify that the mirror does not recognize him.

11.7 BE ABLE TO REGISTER NEW USERS BASED ON NOT RECOGNIZING THE FACE

11.7.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.2 Facial Recognition
- Requirement 3.6 New User Registrations
- Requirement 3.5 User Recognition

11.7.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will verify that the mirror does not recognize him, and then create a new account for him.

11.8 RECOGNIZES CERTAIN GESTURES FOR WHAT THEY ARE

11.8.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.3 Gesture Recognition

11.8.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will perform a series of gestures, and the mirror will respond accordingly.

11.9 MEASURES HEIGHT WITH THE CAMERA

11.9.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.7 Health Diagnostics

11.9.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will stand in front of a calibrated mirror, and it will measure the sponsor's height.

11.10 MEASURES BODY MASS INDEX

11.10.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.7 Health Diagnostics

11.10.1.2 VERIFICATION PROCEDURE

The sponsor will verify this by comparing the output with a given algorithm using the sponsor's weight, height and age.

11.11 APPS DO NOT INTERFERE WITH REGULAR MIRROR USAGE

11.11.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.1 Simple User Interface
- Requirement 3.7 Health Diagnostics
- Requirement 3.8 Social Media

- Requirement 3.9 Email
- Requirement 3.10 Calendar
- Requirement 3.11 Weather, Traffic, and Maps
- Requirement 3.12 News and Stocks
- Requirement 3.13 Music and Media

11.11.1.2 VERIFICATION PROCEDURE

In the live demo, the sponsor will stand in front of the mirror and show that the apps are not intrusive on face space

11.12 INTUITIVE USER INTERFACE

11.12.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.1 Simple User Interface
- Requirement 3.7 Health Diagnostics
- Requirement 3.8 Social Media
- Requirement 3.9 Email
- Requirement 3.10 Calendar
- Requirement 3.11 Weather, Traffic, and Maps
- Requirement 3.12 News and Stocks
- Requirement 3.13 Music and Media

11.12.1.2 VERIFICATION PROCEDURE

The sponsor will test out the product and feedback if the interface is simple to learn and use.

11.13 ABLE TO WRITE EMAILS VIA DICTATION AS WELL AS GESTURES

11.13.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.9 Emails
- Requirement 3.3 Gesture Recognition
- Requirement 3.4 Voice Recognition
- Requirement 3.1 Simple User Interface

11.13.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will write out and send an email.

11.14 ABLE TO SEND AND RECEIVE EMAILS FROM ONE ACCOUNT

11.14.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.9 Emails
- Requirement 3.3 Gesture Recognition
- Requirement 3.4 Voice Recognition
- Requirement 3.1 Simple User Interface

11.14.1.2 VERIFICATION PROCEDURE

The sponsor will send and receive an email during a live demo

11.15 THE PERSONAL CALENDAR KEEPS TRACK OF AND ALTERS THE TO-DO LIST

11.15.1.1 REQUIREMENT(S) ADDRESSED

- Requirement 3.1 Simple User Interface
- Requirement 3.10 Calendar
- Requirement 3.3 Gesture Recognition

11.15.1.2 VERIFICATION PROCEDURE

In a live demo, the sponsor will add and edit his personal to-do list.

11.16 SYSTEMS GOES IDLE AND DISPLAYS A BLANK SCREEN

11.16.1.1 REQUIREMENT(S) ADDRESSED:

- System enters a power save mode

12 USE CASES

This section specifies UML use cases for the user-visible features and functions specified in this document.

12.1 OPERATING THE POWER BUTTON

12.1.1.1 SCENARIO

User pushes the on/off button.

12.1.1.2 ACTORS

User

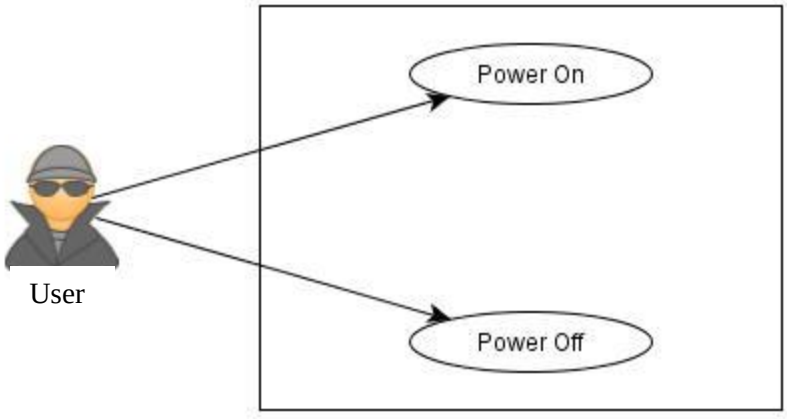

FIGURE 3 OPERATING THE POWER BUTTON

12.2 LOGGING INTO THE SYSTEM

12.2.1.1 SCENARIO

User logs into the system

12.2.1.2 ACTORS

User

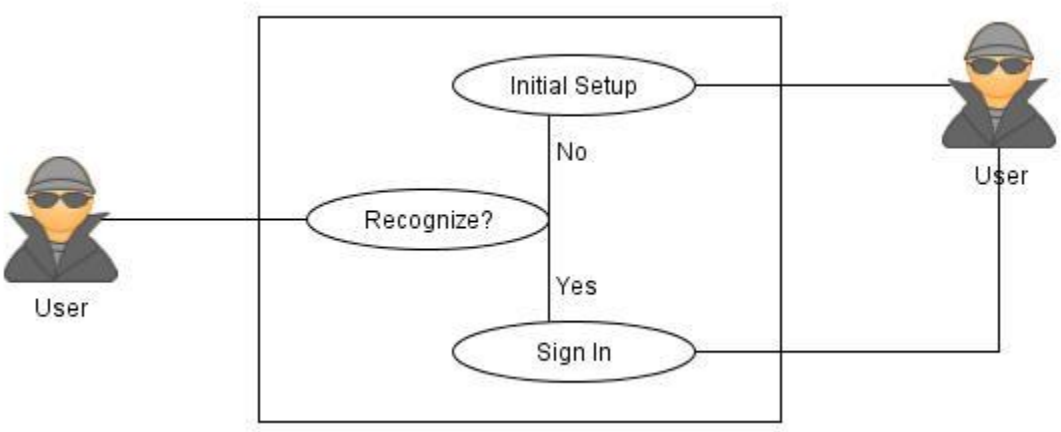

FIGURE 4 LOGGING INTO THE SYSTEM

12.3 SYSTEM DISPLAYS USER'S PREFERENCES

12.3.1.1 SCENARIO

User's information displays on the screen after login

12.3.1.2 ACTORS

User, Social Media, Weather, News, Music and Media, Email, Traffic and Maps

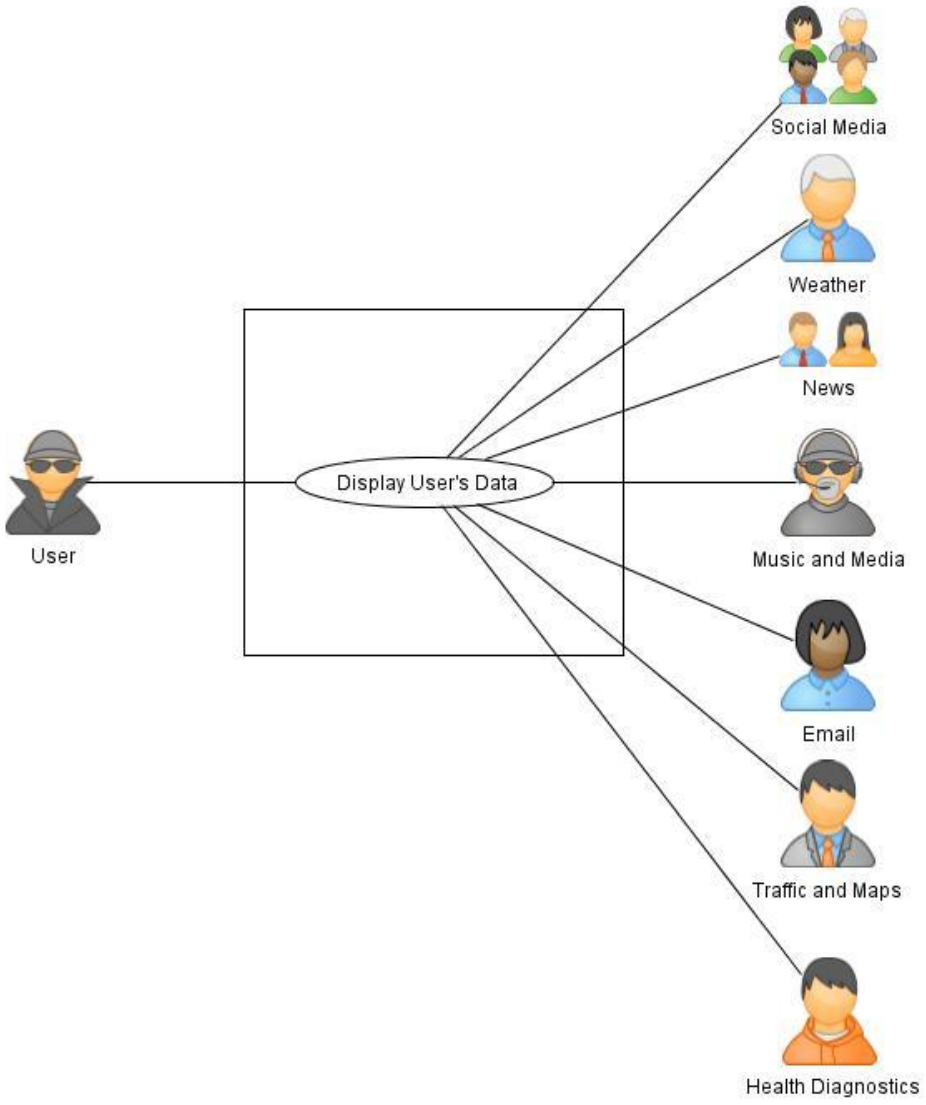

FIGURE 5 SYSTEM DISPLAYS USER'S PREFERENCES

12.4 SYSTEM RECOGNIZES USER'S VOICE AND GESTURES

12.4.1.1 SCENARIO

User commands system with voice or gestures

12.4.1.2 ACTORS(S)

User

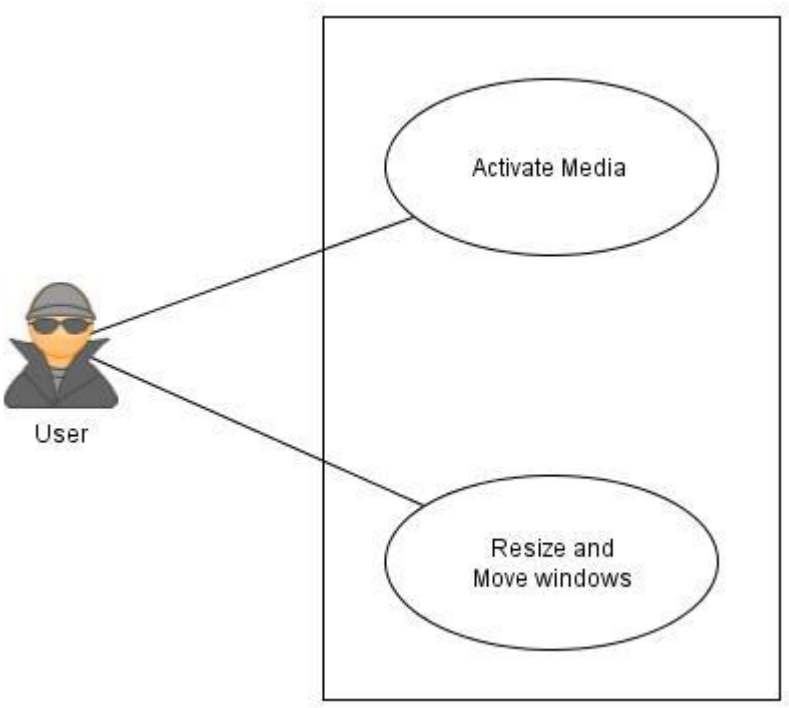

FIGURE 6 SYSTEM RECOGNIZES USER'S VOICE AND GESTURES

12.5 USER EXITS/LOGS OFF OF THE SYSTEM

12.5.1.1 SCENARIO

User logs off system

12.5.1.2 ACTOR(S)

User

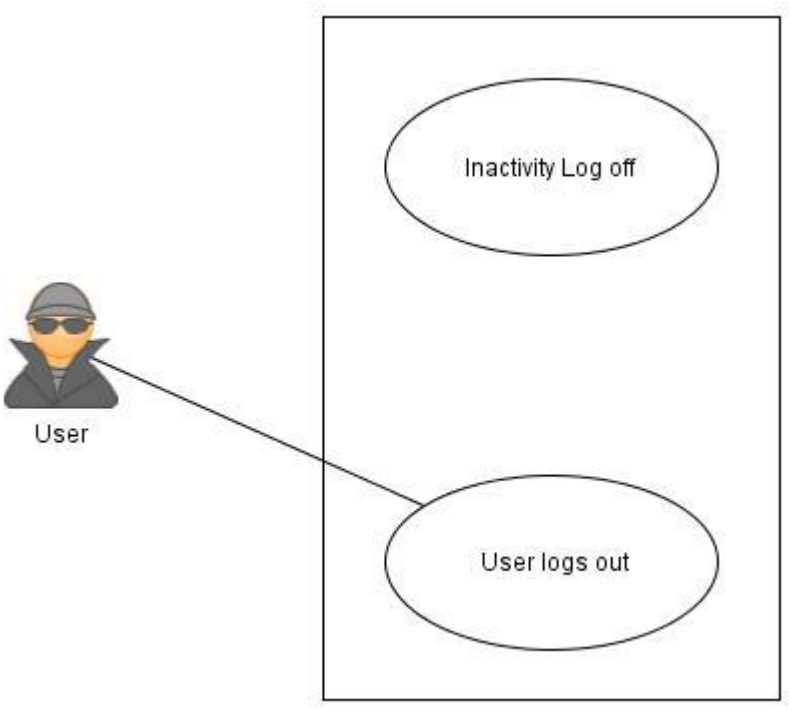

FIGURE 7 USER EXITS/LOGS OFF OF THE SYSTEM

13 FEASIBILITY ASSESSMENT

13.1 SCOPE ANALYSIS

Through our intense research on this interface mirror we have been able to locate a wireless scale which can be used primarily to check users' weight and blood pressure, also we got Kinect already which is extremely important to this product interface. The most difficult part of this product is the face recognition as well as getting all the health functionality to recognize the mirror components, but this is a team of high dedicated personal of five and we trusts each other and get along very well. we also did our research and analysis of two previous CSE Senior Design projects that were almost similar to our product and on top of it we have almost seven months to complete it. Therefore we extremely believe that we can create and operate a fully working prototype on time.

13.2 RESEARCH

Through our research we have been able to locate several projects similar and share the same factors as our product especially the monitor scale which checks body mass index (BMI) and situates your data in relation to the healthy reference ranges set to your profile, we also research methods of doing touch screen using LCD monitor, how our device CPU will operate, voice and gesture recognition software, and able to get Kinect from our professor for free to reduce some of our expenditures.

13.3 TECHNICAL ANALYSIS

This product will let our team utilize almost all our skills obtain from studying technical components since our product complies with hardware, voice recognition, body gestures, wireless scale that monitor your health. The probability of completing is high since we have computer science engineers, software engineers and a computer engineer.

Our main component to the mirror systems is a hardware solution so that there exist a wireless transmitter and receives to detect the scale and the mirror.

13.4 COST ANALYSIS

For the cost analysis we start with video camera component, the Microsoft Kinect for Windows MSRP is $249 dollars and has a system requirements of a 32 or 64 bit processor with at least two cores and 2.66-GHz or faster. For the prototype we have acquired a Kinect from the professor for free. The minimum processor unit we wish to use is an Intel Atom based duel core processor with an integrated NVIDIA ION based graphics processor. A complete Atom system would cost around $350, a team member has offered to donate an unused Atom. This Atom unit will be lower on the processor power scale but would run on less energy and with less heat then other systems in a complete ultra-small package. Though the Atom is less powerful we will be using an embedded windows operating system, this will allow us to greatly reduce the processing power overhead by removing unneeded software components. Another option is a more powerful Intel i3 or i5 processor, this will allow the usage of more power components at the cost of more physical space and higher energy usage. It will also increase the units costs, a i3/i5 unit would cost around $550. For initial and prototyping development we are using a Core 2 Duo duel-core processor that

was donated to use by the TA for usage. The final operating system will be a Windows Embedded Standard 7 which costs around $5 a unit. For development we will be using Windows 7. A monitor with a resolution of at least 720p will be used for the display system, it should cost around $200. The system will be placed into a wood framed enclosure with the one way mirror creating a complete finished product, this will cost $50. The only development hardware we are missing that has not currently been donated is a large enough monitor with at least 720p resolution. This currently places us well under our development budget with options for future production models.

	Atom Based	I3/I5 Based	Development
Camera	MS Kinect - $249 (Donated)	MS Kinect - $249 (Donated)	MS Kinect - Donated
CPU	Intel Atom - $350 (Donated)	Intel I3/I5 - $550	Intel Core 2 – Donated
Monitor	720p - $200	720p - $200	720p - $200
Operating System	Embedded - $5 (Donated)	Embedded - $5 (Donated)	Windows 7 – Donated
Enclosure	Wood - $50 (Donated)	Wood - $50 (Donated)	Wood – Donated
Total if Purchased	$854	$1,054	$200
Total with Donations	$200	$750	$200

Table 2 Cost Analysis

13.5 RESOURCE ANALYSIS

We got two computer science, a software engineer and computer engineer, with this mix we should be able to complete our project in timely and adequate time since we got some of our component completed especially the scale and Kinect component. Mirror incorporated team strengths include documentation, scheduling, hardware components, and software. We are very dedicated individuals and punctual to get task done including completing all deliverables on timely manner. We are very strong in software aspects such as c, c++, and java.

13.6 SCHEDULE ANALYSIS

For our schedule analysis we will be using the COCOMO II Constructive Cost Model. For this estimate we have designed our code into smaller sections to get a more accurate estimation. With the planned usage of Microsoft Kinect we will have access to the Kinect SDK which will increase our usage of reused and modified code. Our research has shown that it has a good out of the box facial features recognition built in, this will make the user facial recognition log in system easier to implement. We believe that this will take an estimated 200 lines of new code and around 100 lines of reused code using the Kinect API. The Kinect also includes APIs for voice recognition and dictation including vocal keywords, we wish to expand upon this for a more natural implantation so we expect around 100 lines of modified code with around 100 lines of new code. The SDK includes very basic APIs for hand gestures but has good built in hand and limb tracking, we believe that this will be around 100 lines of modified and 200 lines of new code. For the health features based around vision are the hardest to estimate at this time and is expected to be the most time consuming aspect of this project, if successful we are estimating around 350 lines of new code with about 100 lines of reused or modified code. Health monitoring based around a physical scanner is estimated at around 100 lines of new code. Social Media features will be based around Facebook and Twitter APIs and will include about 100 lines of reused code and around 150 lines of new code combined. News and Weather features will be around 100 lines of new code combined. Media features such as music

playback is estimated at another 100 lines of modified code due. The overall back end system and graphical user interface to tie the whole system together is estimated at around 500 lines of new code. This gives us an estimated total of 1,700 lines of new code and 600 lines of reused or modified code with a grand total of 2,300 lines of code. We then decided to add a buffer of new code giving us a grand estimated total of 2,750 lines of code.

Some of the Software Scale Drivers include high development flexibility and normal risk resolution. Software Cost Drivers included a high need for software reliability due to facial and health features. Low database size due to streaming most data live off the internet, with nominal programmer capability and application experience due to teams previous usage of Visual Studio development environment. We do have a high platform of time constraints but nominal storage constraints. We estimated software labor rates as if we were working a conservative 20 hours a week or 80 a month at $20 dollars an hour. The following figure displays our estimated results:

Software Development (Elaboration and Construction)

Effort = 5.9 Person-months
Schedule = 6.6 Months
Cost = $9383

Total Equivalent Size = 2150 SLOC

Staffing Profile

Your project is too small to display a staffing profile due to truncation.

Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	0.4	0.8	0.4	$563
Elaboration	1.4	2.5	0.6	$2252
Construction	4.5	4.1	1.1	$7132
Transition	0.7	0.8	0.9	$1126

Software Effort Distribution for RUP/MBASE (Person-Months)

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.0	0.2	0.4	0.1
Environment/CM	0.0	0.1	0.2	0.0
Requirements	0.1	0.3	0.4	0.0
Design	0.1	0.5	0.7	0.0
Implementation	0.0	0.2	1.5	0.1
Assessment	0.0	0.1	1.1	0.2
Deployment	0.0	0.0	0.1	0.2

FIGURE 8 COCOMO ESTIMATES

Using this estimate at the start of October to go through the due month of May and including work over winter break puts us on schedule with this estimation. Using the estimate of 20 hours a week gives us the advantage of adding overtime work that would keep this under the scheduled time.

14 FUTURE ITEMS

Some future items if time and development is permitting us adding smart phone support. This includes items such as receiving and sending phone calls, text messages and being able to send files to and from your smart phone. This smart phone integration would be based around standard Bluetooth protocols and HTML5 to allow it be used on multiple smart phone platforms. Another future item is to allow access to data and cameras from a remote computer using a cloud based system, allowing users to track their health and other data from any internet enables computer or device.