Software Requirements Specification

for

ViaPod Control Software, Release 1.0

Version 1.0 approved

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Made for CEN 3073

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Revision History

Name	Date	Reason For Changes	Version
Charles Lowers	04/28/22	Initial Draft	1.0 draft 1

1. Introduction

1.1 Purpose

This SRS describes the functional and nonfunctional requirements for software release 1.0 of the ViaPod Control Software.

The purpose of this software project is to develop an AI-enabled user interface, digital agent, and applications manager for the Via Pod computing booth. Our applications manager will enable useful applications to be run at a click or a word spoken. By interacting with our advanced lifelike AI system, users will be immersed in a positive environment that develops strong mental health and socialization skills.

This document is intended to be used by the members of the project team who will implement and verify the correct functioning of the system. Unless otherwise noted, all requirements specified here are committed for release 1.0.

1.2 Scope

1.2.1 Product Name

- ViaPod Control Software
  - ViaPod Applications Manager
  - Pod Unit

1.2.2 Overview

The ViaPod control software consists of two integrated components:

- The ViaPod Applications Manger will be the main control interface for the ViaPod device. This will be a custom designed application interface that will set up individual user sessions for each user and contain administration tools for staff to set up applications and other parameters.
- The Pod Unit is the intelligent AI system that will interact with the user. It will be able to answer questions asked by the user, and converse with the user in an uplifting manner. The Pod Unit will be able to interact with the Applications Manager in order to open, customize, and interact with the user's applications.

1.2.3 Goals

The Applications Manager and Pod Unit will be working as the software backbone for the "ViaPod" device, a booth-like construct outfitted with hardware to help the user complete tasks in a fully customizable and private environment that provides a net positive for mental health of the user. The Pod Unit will be able to respond to spoken or typed questions and can give the user advice and connect to endless possible solutions through the various applications installed. The Applications Manager will host a variety of applications. This fits our business objectives of providing customized solutions for a private learning environment for students who require such.

List of high-level objectives of the software specifically:

- Basic text-based AI chatbot 2 months from start of development.
- Functioning applications manager 3 months from start of development.
- Text-to-speech voice for AI must be functional 4 months from start of development.
- AI character animations functioning and synced with voice 5 months from start of development.
- AI able to open applications given command by 6 months.
- Speech-to-text 95% functional in 7 months.

1.2.4 Out Of Scope

- The software won't be cross-platform.
- The AI will not have facial recognition,
- The software will not emulate other platforms to run applications not compatible with a x86-64 Linux OS at this time.
- The software will not require a "cloud" component and instead run completely locally.

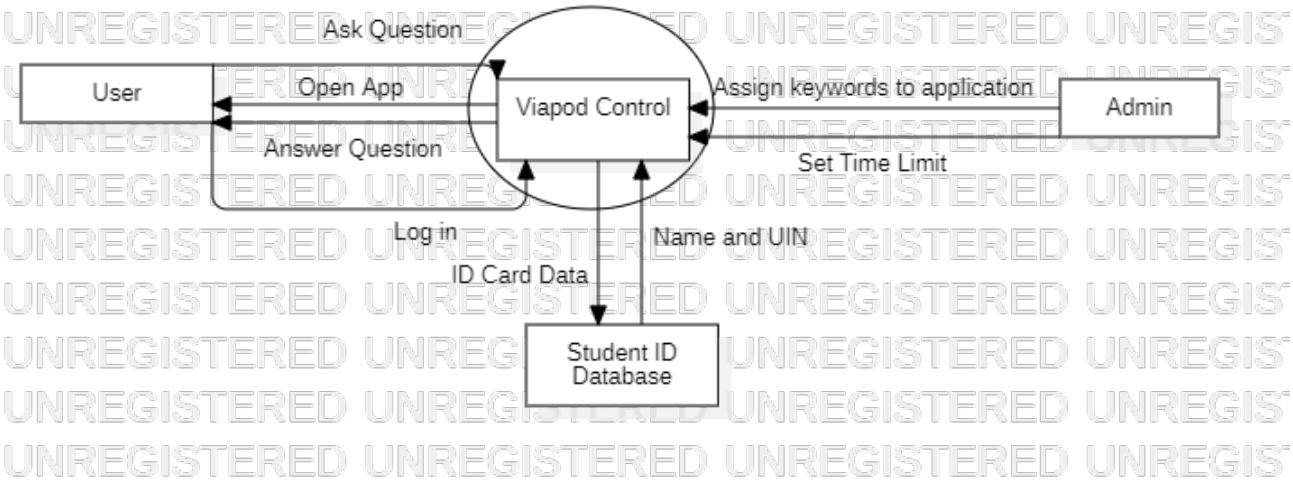
1.3 Product Overview

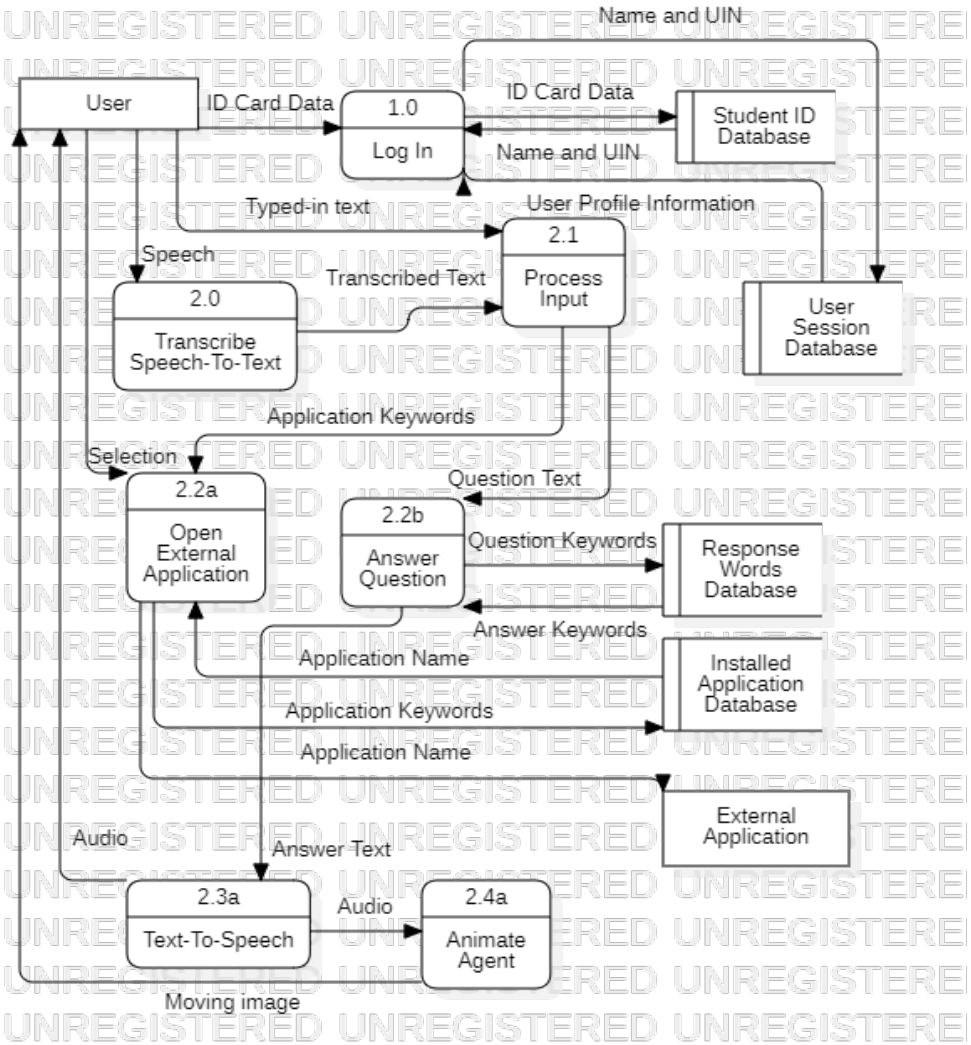
1.3.1 Product Perspective

1.3.1.1 Constraints

Key	Summary	T	P
LR-41	CON-10 Administrator dashboard shall be a webpage accessible via a TCP/IP connection [Communications interfaces]		
LR-40	CON-9 Microphone installed in booth must be sensitive enough to pick up user's voice clearly [Hardware interfaces].		
LR-39	CON-8 System control computer must fit behind a facade at the top of the booth. [Physical size limitation]		
LR-38	CON-7 The user clicks the application icons to execute the applications. [specific user interface control imposed as a design constraint on a functional requirement]		
LR-27	CON-6 The system's code must be well-documented through comments. [Required development conventions or standards]		
LR-26	CON-5 The system application must not consume over 4GB (4096 MB) of RAM [Hardware constraint]		
LR-25	CON-4 The AI component of the system must be able to function without an Internet connection [design constraint]		
LR-24	CON-3 The system must run on the Linux Debian OS [Architecture constraint]		
LR-23	CON-2 The system's GUI must properly fit on the 16:9 touch screen installed in the ViaPod booth [physical constraint]		
LR-22	CON-1 The system must be programmed in the Java language [architecture constraint]		

1.3.1.2 Data Flow/Context Diagrams





1.3.2 Product Functions

- Creates session for each user.
- Menu for launching applications
- Launches applications on voice command
- Parses spoken speech into text stream which AI program can understand
- AI is able to have basic conversations and answer simple questions
- Animated agent on screen and text-to-speech voice connects AI to end user.

1.3.3 User Characteristics

- Users will generally be young adults in progress of taking a college education.
- Users may have limited computer skills.
- Users may be disabled, requiring use of alternate input devices
- Users will not have prior experience of our system.

1.3.4 Limitations

Jira

Key	Summary	T	P
LR-11	System must run on X86-64 Linux distribution		
LR-10	AI and Applications Manager must load and run locally (no "cloud" required) for basic functionality.		
LR-9	Entire system must not consume more than 4GB of RAM		

3 issues Refresh

1.4 Definitions

- Agent: A program that employs an animated character so a user can interface with a computer system more comfortably.
- ViaPod: A booth-like construct consisting of an AI-assisted interface.
- Linux: An open-source OS that can run on multiple platforms
- x86: A popular computer processor platform.

2. References

Figma Prototype. Figma. (2022, March 31). Retrieved May 2, 2022, from https://www.figma.com/file/4m2B1ywfc2AmW3bADk9mXt/Untitled?node-id=0%3A1

Social Science Research Influences Computer Product Design. (n.d.). Retrieved May 2, 2022, from https://web.archive.org/web/20180313075429/https://web.stanford.edu/dept/news/pr/95/950106Arc5423.html

Power Point presentation by Marie McLeggon.

3. Specific Requirements

3.1 Set of Requirements

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Key	Summary	Description	T	Linked Issues	P	Labels
LR-37	When the "Save" button is clicked on the "Settings" page, the system shall save the current settings to the User Profile Database under the currently logged-in user's profile.	Source: Prototype, Domain Expert			=	Functional, Interface, Usability
LR-36	The "Settings" page shall have options to change the character, voice, and font size.	Sources: User Survey, Project Lead Interview, and Prototype			=	Functional, Interface, Usability
LR-35	When pressed, the "Settings" button shall bring up a list of settings.	Sources: Prototype and Domain Expert			=	Functional, Interface
LR-34	When pressed, the "Volume" button shall display a menu that adjusts the volume of the speakers.	Source: Prototype			^	Functional, Interface, Usability
LR-33	When pressed, the "Talk" button shall open the audio stream from the microphone.	Sources: Project Lead Interview and Prototype			^	Functional, Interface

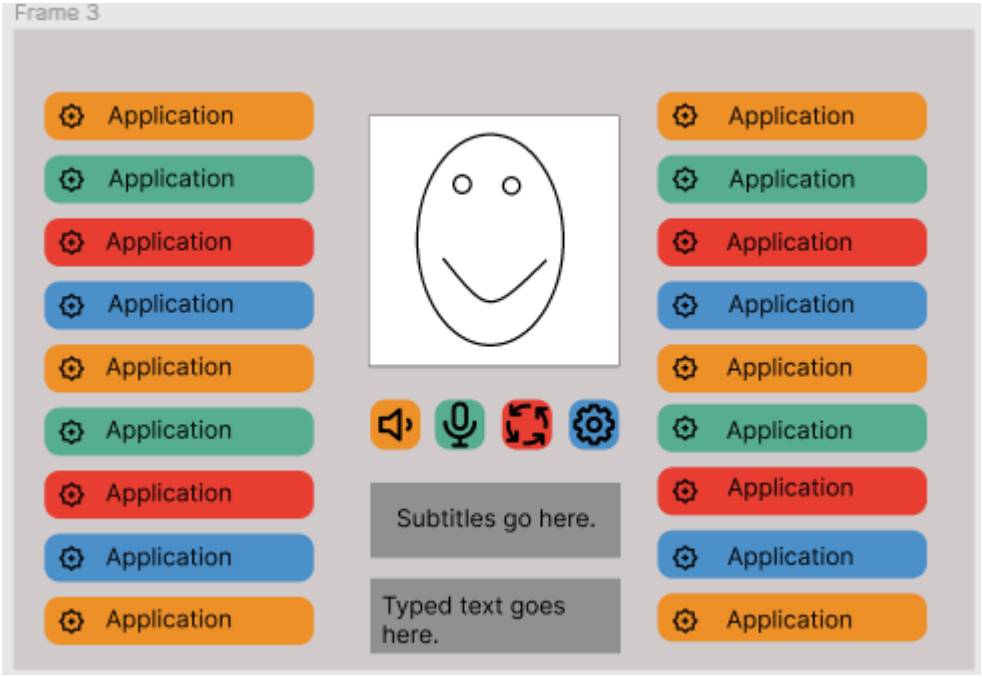
LR-32	When pressed, the "Repeat" button shall repeat the last statement spoken by the AI.	Source: Prototype			Functional, Interface
LR-31	The User Profile Database must store and list the name and UIN of a user hashed to a settings profile.	Source: Domain Expert			Database, Functional
LR-30	While in listening mode, system shall receive and analyze an audio stream from a microphone in the booth	Source: Project Lead Interview			Functional
LR-29	When the button for an application is clicked, the system shall open the application.	Source: Project Lead Interview			Functional, Interface
LR-28	The system shall display installed applications and their icons on the main menu screen.	Source: Project Lead Interview			Functional, Interface
LR-21	The system shall allow the Administrator to add applications installed on the system to the main menu list, along with relevant keywords	Source: Business Analyst (me)			Database, Functional, Usability
LR-20	When keywords related to an application are detected in a user query, the system shall launch the application.	Sources: User Survey and Project Lead Interview.			Database, Functional, Usability
LR-19	The animated agent shall lip-sync with the system response output audio file as it is played.	Sources: Ideas Slideshow and Project Lead Interview.			Functional
LR-18	When an output response has been computed, the system shall pass the output text to the installed text-to-speech engine.	Source: Project Lead Interview and Domain Expert.			Functional
LR-17	The system shall scan an asked question for keywords, and compile an answer from an internal database of words and phrases.	Sources: User Survey, Project Lead Interview, and Idea Slideshow.			Database, Functional
LR-16	When the User input has been transcribed to text, the system shall scan the text for keywords to determine if it is a query or a command.	Sources: User survey and Project Lead Interview.			Functional
LR-15	The system shall limit the User's maximum session time to a value set by the Administrator.	Source: Project Lead Interview			Functional, Usability
LR-14	The system shall allow the Administrator to change time limits for the User's maximum allowed login session.	Source: Project Lead Interview			Functional, Usability
LR-13	When ID card is swiped, the system shall create or load the cardholder's profile.	Source: Project Lead Interview		LR-4	Functional
LR-12	When microphone input is received, the system shall transcribe the spoken words into text to, at worst, a 95% accuracy.	Source: User Survey		LR-6	Non-functional, Performance

20 issues Refresh

3.2 Requirements Checklist

The system-level technical requirements are traceable to the user requirements.	Yes
Each system requirement describes something relevant: a function the system must perform, performance a function must provide, a constraint on the design, or a reference such as to an interface definition.	Yes
The level of detail that the requirements provide about system functionality is appropriate	Yes
The requirements are sufficient to describe what the overall system must do, what its performance must be, and what constraints an engineer should consider. There are few requirements that specifically affect the design of only one component of the system. The major requirements drivers (e.g., those stressing the design) and associated risks should be identified.	Yes
The requirements include any legal or regulatory constraints within which the system must perform.	No
The requirements include enterprise architecture constraints within which the system must integrate (or toward which the system is desired to migrate). Requirements include appropriate open systems and modularity standards.	Yes
Environmental design requirements are specified.	Yes
All external interfaces for the system are included. Major internal interfaces may also be included if they are important to system modularity, or future growth in capability.	No
Requirement statements use the word “shall” or “should.”	Yes
Requirements statements are unambiguous.	Yes
Terminology is clear without the use of informal jargon. Statements are short and concise.	Yes

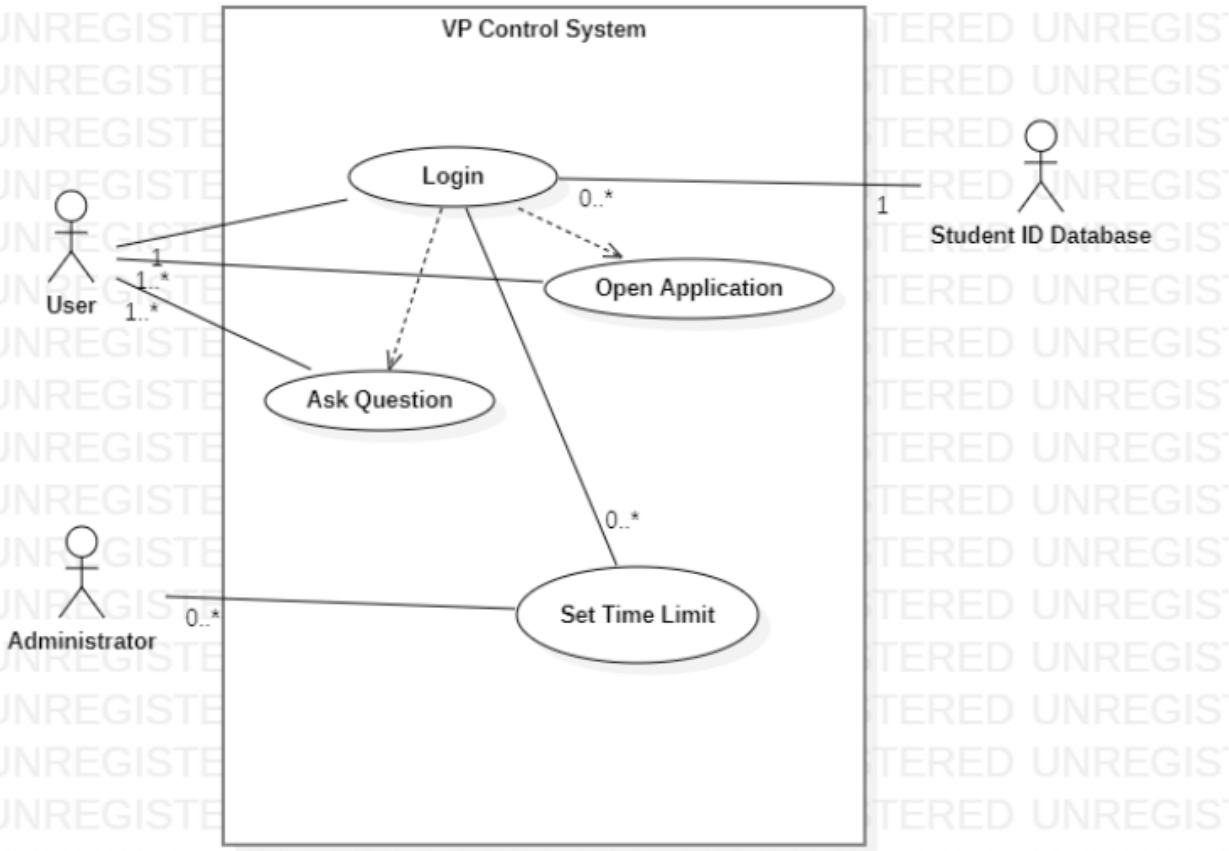
3.3 Mock-up



3.4 Use Cases

- Create user session for each user.
- Launch applications from menu
- Launches applications on voice command
- Parses spoken speech into text stream which AI program can process
- AI able to have basic conversations and answer simple questions
- Animated agent on screen and text-to-speech voice connects AI to end user.

3.5 Use Case Diagram



4. Verification

4.1 Verification Approach

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Key	Summary	Verification Approach
LR-37	When the "Save" button is clicked on the "Settings" page, the system shall save the current settings to the User Profile Database under the currently logged-in user's profile.	Test
LR-36	The "Settings" page shall have options to change the character, voice, and font size.	Inspection
LR-35	When pressed, the "Settings" button shall bring up a list of settings.	Demonstration
LR-34	When pressed, the "Volume" button shall display a menu that adjusts the volume of the speakers.	Demonstration
LR-33	When pressed, the "Talk" button shall open the audio stream from the microphone.	Demonstration
LR-32	When pressed, the "Repeat" button shall repeat the last statement spoken by the AI.	Demonstration
LR-31	The User Profile Database must store and list the name and UIN of a user hashed to a settings profile.	Analysis
LR-30	While in listening mode, system shall receive and analyze an audio stream from a microphone in the booth	Test
LR-29	When the button for an application is clicked, the system shall open the application.	Demonstration
LR-28	The system shall display installed applications and their icons on the main menu screen.	Inspection
LR-21	The system shall allow the Administrator to add applications installed on the system to the main menu list, along with relevant keywords	Demonstration
LR-20	When keywords related to an application are detected in a user query, the system shall launch the application.	Demonstration
LR-19	The animated agent shall lip-sync with the system response output audio file as it is played.	Demonstration
LR-18	When an output response has been computed, the system shall pass the output text to the installed text-to-speech engine.	Test
LR-17	The system shall scan an asked question for keywords, and compile an answer from an internal database of words and phrases.	Demonstration
LR-16	When the User input has been transcribed to text, the system shall scan the text for keywords to determine if it is a query or a command.	Test
LR-15	The system shall limit the User's maximum session time to a value set by the Administrator.	Test
LR-14	The system shall allow the Administrator to change time limits for the User's maximum allowed login session.	Demonstration
LR-13	When ID card is swiped, the system shall create or load the cardholder's profile.	Demonstration
LR-12	When microphone input is received, the system shall transcribe the spoken words into text to, at worst, a 95% accuracy.	Test

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5. Appendices

5.1 Assumptions and Dependencies

Hardware for the software solution will be developed and ready at time of release.

- Competent developers will be hired to fulfill our requirements needs.
- The Java programming language will be sufficient to complete both pieces of software.
- Organization will already have a system of magnetic Student ID cards to set up user sessions.
- Viapod system will have at least 4GB RAM

5.2 Acronyms and Abbreviations

- GUI: Graphical User Interface
- LAN: Local-area network
- UIN: User Identification Number