CS Senior Capstone Problem Statement

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CDK Global: No more touch. No more keyboard. Bring it All Together. Using Technology to Teach Humans.

Prepared for

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Look Boss, No Hands

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Abstract

Look Boss, No hands seeks to develop a new interaction method between a user looking at enterprise data. Instead of sitting behind a computer screen typing and clicking around to get graphs, and charts. This project aims to remove the standard methods of input, in lieu of more novel methods of input such as, voice and virtual reality. With the stretch goals of tracking a user's interaction with the new experience via a wearable.

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1 Introduction

1.1 Purpose

The purpose of this document is to provide the specific requirements needed to our client (Trevor Moore), about the Look Boss, No Hands project, and what it means to be done and to succeed.

1.2 Scope

The Look Boss, No Hands software will allow for voice recognition to retrieve data and show it in a human comprehensive way with data visualization (such as basic bar and line charts) on a VR headset. Along with the stretch goal of adding wearable interaction to monitor the users vitals. This allows for the integration of three separate systems to integrate with one to provide users a new method of access and interaction with data.

1.3 Definitions, Acronyms, Abbreviations

- **Virtual Assistants** are voice activated devices that when spoken to will reply with relevant information or perform a requested action. They feature speech comprehension in order to attempt to best understand what is requested of them.[1]
- **Virtual Reality (VR)** creates a virtual world for the user through the use of devices to simulate senses. A pair of head mounted screens create the visual world and a pair of controllers allow for the user to interact with the world they see.[2]
- **Wearables** are electronic devices that are designed to be worn and come with an array of sensors and outside connections. Smartwatches are the most common example of a wearable. They come with sensors to detect things such as heart rate and typically connect to a smartphone through Bluetooth.[3]

1.4 Overview

The rest of this document contains descriptions of the required functionality, interfaces, and use cases.

2 Overall Description

2.1 Product perspective

The product is intended to provide an interface for accessing a database and displaying retrieved data in a VR headset. Due to this, the system is not self-contained. The project is also built on the assumption that a user doesnt have to use their hands to interact with a computer, instead using their voice to be put inside a virtual environment to experience the data.

2.2 Product Functions

2.2.1 Voice Recognition

Voice recognition is one of the two primary functions of the product, this lets a user verbally start the experience. At the very least, it needs to be able to take in one command that correlates to the data desired. Such as “Show me Fords sales data in 2016“.

2.2.2 Display

Display is the other primary function, the display in VR should show a user data in a virtual environment. In which they can interact with the data such that they can overlay graphs, zoom in and out, and swipe with their hands to get new graphs.

2.2.3 Secondary Commands And Displays (Stretch Goal)

Adding a secondary command will show how modular our system is, and the ease of adding another query actually is.

2.2.4 Heart Rate Monitoring (Stretch Goal)

A user wearing a wearable will have their heart rate monitored and tracked by the device, learning what data trends causes stress in the user and to later send notifications when the data begins following a similar trend.

2.2.5 Machine Learning (Stretch Goal)

With machine learning, have Alexa learn what common requests are made. Such that when someone asks Alexa for sales data, Alexa suggests related data or what data type is most commonly preferred among users.

2.3 User Characteristics

Everyone should be able to experience the program by putting on the headset and telling the voice assistant to do something.

2.4 Constraints

There should only be a certain number of ways someone can request the voice assistant to do something. Based on the ambiguity of the English language.

2.5 Assumptions and Dependencies

The entire project relies on a powerful enough computer to be able to run a VR system. And that the computer is able to properly connect to the server awaiting signals to populate the headset with an environment.

3 SPECIFIC REQUIREMENTS

3.1 External Interface Requirements

3.1.1 System Interfaces

- The product needs to interface with a database in order to retrieve data
- Speech recognition in order to determine what data should be retrieved

3.1.2 User Interfaces

- Contextual requests allow the user to follow up their request with a related one without having to request the data again. This allows the user to ask for ”Ford sales in 2016” and to then refine it with ”sales data in November” without having to specify the year again.
- A VR headset to display the requested data

3.1.3 Hardware Interfaces

- The user should be able to just simply slip on the headset, tell the voice assistant to do something, and then see it in VR.

3.1.4 Communications Interfaces

- The entire project is based on communication, such that a user speaks to the voice assistant to request data, and the VR headset places the user in the virtual environment.

3.2 Functional Requirements

3.2.1 Voice Assistant

Introduction / Purpose

- The voice assistant be the main input method of taking in commands and starting the appropriate programs.

Response Sequence

- The voice assistant should state that it got the command received, and reply back letting the user know that the correct program has been started.

3.2.2 VR Headset

- The headset should be synchronized with the voice assistant to respond and show the appropriate data visualization when prompted. In which a user can reach out and touch and move the data with the hand controllers.

3.2.3 Branching System

- A gitflow work system should be followed, such that there are three main branches: master, develop, and hotfix. The master branch will be reserved for product releases, develop will contain working renditions of features that haven't made it into production, and hotfix will be for any bugs that occur during production that need to be fixed quickly.
- During development, branches should also be put into folders such as, feature/voice-recognition.

3.3 Code Review

To keep code clean and functional, updates should be submitted to appropriate code repository branches. These updates should then be reviewed by another individual of the group and once that is complete and the update is satisfactory, it is then added to the develop branch of the repository.

3.4 Design Constraints

Our client has stated that while the base goal of using an Alexa to request data from words. The system must be modular and flexible enough to incorporate new commands to pull from the database and display to the VR with minimal effort. Meaning adding new commands shouldnt take more than a few hours worth of work both on the voice recognition and virtual reality side.

3.5 Software System Attributes

The code must be testable and tested for any pull request that is to be added to the master branch.

4 Non-Functional Requirements

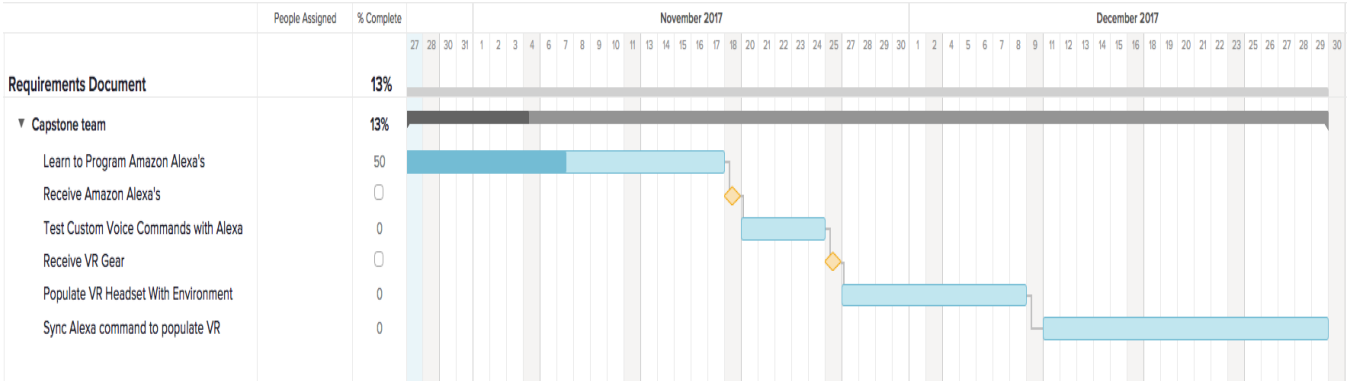
4.1 Performance requirements

A user should simply be able to walk into a pre-configured environment, and speak a command to the voice assistant. The process of populating the VR headset shouldn't take more than 15 seconds.

4.2 Software Quality

The software quality of our product must allow for further addition of more data from multiple other dealerships. Employees will have to add additional data as new dealerships rise. To allow easy modifications, our code must be uniformed and simple to understand. As employees add more data to the databases, more information can be retrieved from the voice assistant to the VR headset.

5 Gantt Chart



5.1 References

REFERENCES

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[2] . Dr. Brian Jackson, PhD on June 3, "What is virtual reality? vr definition and examples — marxent," Oct 2017.

[3] D. Sung, "What is wearable tech? everything you need to know explained," Aug 2015.