Foreign Language Immersion Virtual Reality

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Foreign Language Immersion Virtual Reality (FLIVR) is a program with the purpose of helping people learn their target language. This document is a collection of requirements that describe the project, and if completed will result in a useful and engaging experience for the users of FLIVR. Below are the categories that each requirement potentially falls under:

1. Functional
2. Look and Feel
    i. Appearance
    ii. Style
3. Usability
    i. Ease of Use
    ii. Personalization and Internationalization
    iii. Learning
    iv. Understandability and Politeness
    v. Accessibility
    vi. Convenience
4. Performance
    i. Speed and Latency
    ii. Safety-Critical
    iii. Precision or Accuracy
    iv. Reliability and Availability
    v. Robustness or Fault-Tolerance
    vi. Capacity
    vii. Scalability or Extensibility
    viii. Longevity
5. Maintainability and Support
6. Security
    i. Access
    ii. Integrity
    iii. Privacy
    iv. Audit (*what information must be recorded to allow security checks.* e.g., logs)
    v. Immunity
7. Cultural

Table of Contents

Functionality

Requirement ID: 1
Type: Functionality
Description: The user is able to move freely in the virtual reality environment. Doing things like walking down a street and interacting with the environment should be similar to real life.
Rationale: To give the user exportability in the environment so that they can discover new vocabulary and achieve a greater sense of language immersion.
Fit Criterion: Test program and check that the in-game movement is comparable to real life.
Priority: 10/10
Dependences: N/A

Requirement ID: 2
Type: Functionality
Description: The user is able to select and interact with the environment they are in.
Rationale: To give the user the ability to discover new words through interacting with the environment around them.
Fit Criterion: The user will be able to select an object and then deselect when they are finished.
Priority: 10/10
Dependences: ID 1

Requirement ID: 3
Type: Functionality
Description: The program recognizes when the user selects a new word and records that they interacted with.
Rationale: To keep track of the user's progress, and to incorporate newly encountered words into future in-game activities. Recording this information, coupled with the use of a *Learning Algorithm*, will allow the program to recognize what words need to appear more/less often in the multiple-choice activity.
Fit Criterion: Encountering new words will cause them to be added to a database. These new words also must then be available for use in the multiple-choice activity.
Priority: 10/10
Dependences: ID 2

Requirement ID: 4
Type: Functionality
Description: The program gives the ability for the user to listen to the pronunciation of a word.
Rationale: To give the user an example of proper pronunciation so that they have a reference of the correct way pronouncing a given word.
Fit Criterion: The pronunciation of words will be able to be played with an object is selected.
Priority: 10/10
Dependences: IDs 2 & 3

Requirement ID: 5
Type: Functionality
Description: A heads up display (HUD) of the word and information regarding word when something in the game is selected. This HUD would be where the user is given the opportunity to listen to the pronunciation.
Rationale: To give users a way to view the vocabulary they come in contact with and to interact with this new information.
Fit Criterion: The HUD appears when an object is hovered and gives the user information about the object and pronounces the word for the user when they choose to do so.
Priority:10/10
Dependences: IDs 2-4

Requirement ID: 6
Type: Functionality
Description: Voice recognition for the user to practice pronunciation and conversation.
Rationale: To give users a way to practice their speaking abilities so that when they have real conversations, they are better prepared.
Fit Criterion: Program is able to recognize words and phrases being spoken by the user.
Priority: 4/10
Dependences: N/A

Look and Feel

Requirement ID: 7
Type: Look and Feel | Appearance
Description: First person point of view
Rationale: This gives the user a more realistic experience when interacting with the environment.
Fit Criterion: The program must give the user an authentic first-person experience.
Priority: 10/10
Dependences: N/A

Requirement ID: 8
Type: Look and Feel | Appearance
Description: The environment is an open-world experience that can be explored by the user.
Rationale: An open-world environment has a lot of vocabulary that can be discovered.
Fit Criterion: The program must have a convincing open-world environment.
Priority: 10/10
Dependences: N/A

Requirement ID: 9
Type: Look and Feel | Style
Description: The program is educational but should also be seen as a fun supplement to learning.
Rationale: This will give users the impression that it will be the more fun part of their study routine and make it more appealing to use.
Fit Criterion: Testers will rate if the program is fun and enjoyable to use. It should be more enjoyable than regular studies.
Priority: 10/10
Dependences: N/A

Usability

Requirement ID: 10
Type: Usability | Ease of Use
Description: This program will be easy to use by ages 13 and up
Rationale: Making this program easy to use for younger children will give them the ability to start learning languages at a younger age where the brain is more elastic. Also, making the program easy to use for older user is a must for people who discover their passions later in life.
Fit Criterion: Survey different age ranges and get an 85% approval rating for each age range
Priority: 10/10
Dependences: N/A

~~Requirement ID: 11~~
~~Type: Usability | Personalization and Internationalization~~
~~Description: Instructions and user interface will be available in Vietnamese~~
~~Rationale: Since I plan on testing this in Vietnam, having proper instructions in Vietnamese would help the testers better understand the program.~~
~~Fit Criterion: The testers will answer a survey which includes questions about the usability of FLIVR. 85% approval rating needed for satisfaction.~~
~~Priority: 7/10~~
~~Dependences: N/A~~

Requirement ID: 12
Type: Usability | Learning
Description: The user learns vocabulary and phrases while using the program.
Rationale: Vocabulary is important when learning a language.
Fit Criterion: Have participants be tested after playing for a certain amount of time. They must have improvement that is the same or higher than traditional learning techniques.
Priority: 10/10
Dependences: N/A

Performance

Requirement ID: 13
Type: Performance | Speed and Latency
Description: The program must run at 90 frames per second in order to qualify for the Oculus store.
Rationale: Maintaining a consistent frame rate of 90 frames per second will prevent motion sickness, disorientation, and nausea.
Fit Criterion: Run multiple tests in different conditions to make sure that the program runs at a consistent 90 frames per second.
Priority: 10/10
Dependences: N/A

Requirement ID: 14
Type: Performance | Speed and Latency
Description: Interactions with the environment should trigger the HUD to display instantly.
Rationale: Discovering new vocabulary should be a seamless process.
Fit Criterion: HUD appears in less than 1 second after selecting an object.
Priority: 10/10
Dependences: ID 5

Requirement ID: 15
Type: Performance | Robustness or Fault-Tolerance
Description: If the virtual reality device is disconnected from the internet, all of the features which do not require internet connect will still be usable. An example of something that may be unavailable when internet connection is lost would be voice recognition.
Rationale: Many people may not have constant internet access, so still being able to use most of the application would be beneficial.
Fit Criterion: Test the program without internet access to make sure that the core functionality of the program is still usable.
Priority: 8/10
Dependences: N/A

~~Requirement ID: 16~~
~~Type: Performance | Capacity~~
~~Description: The program will have a separate storage location for each user so that one person's progress does not interfere with another person's progress.~~
~~Rationale: Each user needs to have their own progress because everyone learns at different rates.~~
~~Fit Criterion: The program will be tested to make sure that user data does not overlap.~~
~~Priority: 7/10~~
~~Dependences: N/A~~

Requirement ID: 17
Type: Performance | Scalability or Extensibility
Description: The content to be learned will increase gradually as the user progresses further in the program.

Rationale: When a person first learns a language, it is best to learn simple concepts and become proficient at them. Then after mastering a concept the user will move on to the next step.
Fit Criterion: Have a metric that tracks the progress of the user which is based on how long they have spent doing each activity and how they perform while doing each activity. A user not performing at a high enough proficiency will not be able to move on to the next step of the learning process.
Priority: 8/10
Dependences: N/A

Requirement ID: 18
Type: Performance | Longevity
Description: The initial release of the program will have around 1-2 hours of playtime.
Rationale: The content in the game must be meaningful and for the user it must seem worthwhile and show results. An average study session for someone learning a language is around 1-2 hours. Since this product is meant to supplement regular language learning methods, there should be enough content to fit that time frame, but also still provide enough content for a user that does not use other language learning methods.
Fit Criterion: The content must on average take around 1-2 hours to complete. This program is meant to be an aid to studying, and it should be part of a person's study regime when they are learning a language. I estimate that the average person, if they studied every day, would use this program for 30-60 minutes per day or 3 ½ -7 hours per week.
Priority: 10/10
Dependences: N/A

Maintainability and Support

Requirement ID: 19
Type: Maintainability and Support | Adaptability Requirements
Description: FLIVR will be made for the Oculus Quest 2 but will eventually be made compatible for the future generation Quest 3 as well.
Rationale: Making the program compatible with the future generation Quests will give more people access to FLIVR.
Fit Criterion: The Oculus Quest 3 version must run comparable or better than Quest 2 version.
Priority:6/10
Dependences: N/A

Requirement ID: 20
Type: Maintainability and Support | Maintenance Requirements
Description: Updates will be often (around every 2 weeks) and contain bug fixes and added content.
Rationale: This gives time for the added content to be tested for bugs.
Fit Criterion: There must be at least two updates per month.
Priority: 10/10
Dependences: N/A

Security

~~Requirement ID: 21~~
~~Type: Security | Access Requirements~~
~~Description: There will be multiple save files so that more than one person can learn using FLIVR on a singular Oculus VR device. These save files will be protected behind a username and password.~~
~~Rationale: This would let families or classes use a singular device for multiple people.~~
~~Fit Criterion: Create multiple save states and then play them using the same device.~~
~~Priority: 5/10~~
~~Dependences: N/A~~

Cultural

~~Requirement ID: 22~~
~~Type: Cultural~~
~~Description: The environment of the area will accurately emulate an open-world city environment located in the United States.~~
~~Rationale: This would help with the language immersion of the program.~~
~~Fit Criterion: Survey play testers to get an 85% approval rating and make changes based on suggestions from the testers.~~
~~Priority: 10/10~~
~~Dependences: N/A~~