*Improving personalized elderly care using AI*

**Usability Evaluation Plan**

*i42 Project Group*

*List of your Names*:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Position** | **email** | **phone** |
| **Chirag Chirag** | Team Member | [103529993@student.swin.edu.au](mailto:103529993@student.swin.edu.au) | 0432745991 |
| **Garrich Farrell Hardjojuwono** | Team Member | [102764065@student.swin.edu.au](mailto:102764065@student.swin.edu.au) | 0414511006 |
| **Leon Nguyen** | Team Member | [103139729@student.swin.edu.au](mailto:103139729@student.swin.edu.au) | 0432518898 |
| **Nick Bui** | Team Leader | [100575870@student.swin.edu.au](mailto:100575870@student.swin.edu.au) | 0423456768 |
| **Rehman Ali** | Team Member | [102886422@student.swin.edu.au](mailto:102886422@student.swin.edu.au) | 0426259197 |
| **Tung Nguyen** | Team Member | [103181157@student.swin.edu.au](mailto:103181157@student.swin.edu.au) | 0405335420 |

*COS40006, Computing Technology Project B, Semester 2 – 2024*

**Document Change Control**

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Authors** | **Summary of Changes** |
| **1.0** |  |  | Created the document. |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Document Sign Off**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Position** | **Signature** | **Date** |
| **Chirag Chirag** | Documentation Champion | A close-up of a signature  Description automatically generated |  |
| **Garrich Farrell Hardjojuwono** | Code Lead | A black line drawing of a bird  Description automatically generated |  |
| **Leon Nguyen** | Bug Tracker | A black background with a black square  Description automatically generated with medium confidence |  |
| **Nick Bui** | Team Leader | A black and white logo    Description automatically generated |  |
| **Rehman Ali** | Git Champion | A black line drawn on a white background  Description automatically generated |  |
| **Tung Nguyen** | Testing Champion | A black line on a white background  Description automatically generated |  |

**Client Sign off**

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Position** | **Signature** | **Date** |
|  |  |  |  |
| **Organisation** | | | |
|  | | | |

**Table of Contents**

[1 Executive Summary 4](#_Toc173720437)

[2 Methodology 5](#_Toc173720438)

[3 Participants 6](#_Toc173720439)

[4 Training 7](#_Toc173720440)

[5 Procedure 8](#_Toc173720441)

[6 Roles 9](#_Toc173720442)

[7 Usability Tasks 10](#_Toc173720443)

[8 Usability Metrics 11](#_Toc173720444)

[8.1 Scenario Completion 11](#_Toc173720445)

[8.2 Errors 11](#_Toc173720446)

[8.3 Subjective Evaluations 11](#_Toc173720447)

[8.4 Time on Tasks 11](#_Toc173720448)

[9 Usability Goals 12](#_Toc173720449)

[10 Problem Severity 13](#_Toc173720450)

[10.1 Impact Ranking 13](#_Toc173720451)

[10.2 Frequency Ranking 13](#_Toc173720452)

[10.3 Severity Ranking 13](#_Toc173720453)

[11 Reporting Results 14](#_Toc173720454)

# Executive Summary

Usability evaluations are a significant process to be completed in achieving the best possible

prototype. A prototype can match the requirement specifications collected from the client but

might not always meet the expectations of the end-user. There can be certain non-functional

requirements that can only be gathered by validating the prototype with a user. The prototype

must be tested with participants of the target demographic who will wind up using the product in

the workplace. Demographic questionnaires can help identify the target user group. Usability

metrics like scenario completion rate, error rate, subject evaluations and time taken on tasks

must be gathered to help identify potential issues in the system. Recommendations to resolve

these issues are included in the usability test report to conclude the usability evaluation.

# Methodology

The factors mentioned below must be achieved to ensure a successful usability test.

**Number of participants**

A healthy number of participants would be needed to collect sufficient data to create the best possible interface. A minimum of 4 participants would be needed for this experiment.

**Environment**

The experiment will be conducted in the Swinburne usability testing lab in the SA building. The lab has a test room where the participant will undertake the test and the control room where the observers will be watching and logging the test.

**Tools**

“Morae Recorder” and “Morae Observer” would be used to observe and record participant feedback while tracking the time taken to complete each task.

**Measures**

Completion rate, error rate and subjective evaluations would be used as metrics to measure user performance to evaluate the application.

**Demographic Information**

A demographic questionnaire would be handed over to the participant right before the test to ensure that the participant belongs to the target user group that would use the product

**Satisfaction Assessment**

After the experiment, the participant would be handed a satisfaction questionnaire where they would inform us about what problems they found with the interface and the suggestions they must fix these problems.

# Participants

The end user of the Vuzix Smart Glass would be an employee or trainee working with an instructor in a training program. Apart from basic experience with technology, the participant would not be expected to have any additional technology skills.

Participants have the responsibility to complete tasks given to them while giving feedback by talking about their thought process while doing the task. Participants are also asked to complete a demographic questionnaire pre-evaluation, and satisfaction questionnaire post evaluation. The experiment would be a simulation of a real-life training scenario; therefore the participants would be students imitating the role of the operator and instructor. Participant recruitment would be done through social media.

# Training

The participant will be given a brief overview of how the Vuzix Smart Glass works, where the buttons are located and hand gestures to trigger functions as the participant might not have any prior experience using the product.

# Procedure

Participants will undertake the usability evaluation test at the Swinburne Usability Laboratory located in the AS building. The lab has a test room and a control room separated by a two-way mirror. The test room is equipped with a computer, webcam and a microphone connected to another computer in the control room. A software called Morae Observer and Morae Recorder would be used to record user feedback from the control room.

Before the experiment, the participant is briefed on the how the experiment will be conducted with a short training session to introduce them to the hand gestures needed to trigger certain functions. Informed consent would inform the participant that they can leave at any time, how they will be recorded while keeping their identity protected.

The participant will fill out a demographic questionnaire before the test, a post-task questionnaire after completing each task and a post-test satisfaction questionnaire. To get a verbal record which could be reviewed, the participant would be asked to read the task aloud and think aloud while doing the task.

# Roles

Members of the team will be assigned roles that they must carry out during the experiment.

**Trainer**

Gives the participant a brief training session before the test.

**Facilitator**

Briefs the participant on how the test will be conducted and will be available to respond to the participant’s requests.

**Test Observer**

Logs down participant feedback, while analyzing application issues.

# Usability Tasks

The tasks are common tasks which every end user would expect to do while using the application. The tasks aren’t same for each participant with some playing the role of the operator, while others play the role of the instructor, and would be given different tasks accordingly.

The tasks include sketching, taking screenshots and sending video feed which are significant as it will be the most basic tasks which will be done every time the smart glasses are used. All of the tasks in the tests would be significant which end users of the application must not find any issues with. The task descriptions will be reviewed by the project supervisor, and client. Their acceptance would be documented.

# Usability Metrics

Usability requirements can be evaluated using usability metrics like scenario completion rates, error rates, subject evaluations and time of completion will be used to calculate usability performance on tasks.

## Scenario Completion

A scenario is completed when the user has gotten the expected output or when the user requests assistance and cannot complete the task due to usability issues.

## Errors

There are two types of errors being critical and non-critical errors. Critical errors are those of which prevent the user from getting the expected output and non-critical errors are errors which the user can recover from but could potentially give an unexpected outcome.

## Subjective Evaluations

Post-test satisfaction questionnaires are a method of collecting subjective evaluations at the end of the session.

## Time on Tasks

Time taken to complete each scenario is recorded.

# Usability Goals

The usability goals for this usability evaluation would be a completion rate of 100% and an error- free rate of 80%. The completion rate is the percentage of participants who successfully complete the task without critical errors. The error-free rate is the percentage of participants who complete the task without both critical and non-critical errors.

# Problem Severity:

In the general fall detection system using RGB camera technology we are developing; we are required to cautiously rank any issues we find out. This helps us fix the most important issues first.

## Impact Ranking

We'll utilise three levels to show how much a problem affects our system and users:

High: These are critical problems that might stop the system from precisely detecting falls or alerting the users. For example, if the system doesn’t succeed to detect a fall in real-time, that will be classified as a high-impact problem.

Moderate: These problems make the system more difficult to use or we can say less efficient but don't affect the core fall detection ability of our system. For instance, if the UI layout is confusing and slows down its interaction with the user.

Low: These are minor problems that insignificantly affect fall detection or user interaction. For instance, a unimportant UI element has the incorrect colour.

## **Frequency Ranking**

We'll also look over at how frequently each problem occurs:

High: If more than 3 out of 10 users experience this problem, it would be categorized as a problem with high frequency.

Moderate: If between 1 and 3 out of 10 users face this problem, it would be categorized as a problem with moderate frequency.

Low: When less than 1 in 10 users face this problem, we will see it as low frequency.

## **Severity Ranking**

When we join impact and frequency, we get four levels of severity:

Severity 1: These are at the top of our priority list. They're the risky problems that occure frequently. We must fix these immediately.

Severity 2: These are also important. They are occur fairly often and drastically compromise the system's functionality. We should resolve these quickly.

Severity 3: These problems might annoy the users however they don't significantly impact fall detection. We'll fix them when we can.

Severity 4: These are minor concerns we'll go over at if we have time. fixing them would be great but isn't crucial.

# Reporting Results

After the system is thoroughly tested by us, a detailed report would be created on this. And the following would be the aspects of that report:

1. How well users interact with the fall detection UI, including task completion rates, error rates, and time taken to complete key actions.
2. Assessment of these results to our set objectives, evaluating whether we met, exceeded, or fell short of accomplishing those goals.
3. Recommendations for refining our model to improve fall detection accuracy and make the system easier for users to work with.
4. User feedback on the system, counting their experience with the UI and overall impressions of the fall detection functionalities.
5. Key learnings, highlighting how accurately the model detects falls and acts to several scenarios.
6. A list of potential enhancements, prioritized by investigating the most severe hurdles faced by users.