

Evaluation Assignment 11

Usability Test Report

App: Drone
Team 1: 3D_rone

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1. Introduction

This report provides a detailed usability test result for the application named **3D_rone** developed by undergraduate student team 1. The report first describes the app briefly. Then it outlines the usability test events such as instructions, questionnaires, consent form, test scenarios, bug report and result. The required forms are included in the appendices.

2. System Description

Built environments must be assessed to ensure their safety. The ceiling trusses of buildings such as sports arenas must be inspected in specifically. Typically, this has been accomplished by having scissor lifts and repeatedly going up and down to cover the entire area. This is obviously inefficient and time-consuming. This work of surveying massive buildings has been simplified especially with modern drone technology.

Flying drones, on the other hand, is a challenging task. It is highly susceptible to human mistake, and crashes are common while flying in challenging or unfamiliar locations. Furthermore, because there is little or no GPS signal in inside conditions, flights must be conducted manually. Given the difficulty of flying in new interior spaces, it would be good to give some means of training and familiarizing rookie pilots with the space before flying on-site. That is, to acquaint and train people to duplicate or conduct a flight path comparable to one taken by an expert drone pilot during an inspection.

The App's aim is to give a way to visualize drone flights that are utilized in interior building inspections or other situations where autonomous GPS-driven flights aren't possible to operate. Drone pilots will be able to better understand the flight paths of expert pilots who have completed simulated checks within the space due to this visualization. The ability to communicate spatial flight route data intuitively inside a 3D space is required to provide this feature.

3. Test Goal

The goals for the usability testing of “3D_rone” app was to find out whether the UI elements are perfectly developed and if the users of the app are completely satisfied with the UI designs of the app. It was also a matter of concern if there is any bug in the application system and report them so that the developers would be able to fix it before the app is delivered to the client.

4. Outline of the Usability Test

The series of tasks that were performed in the usability test are:

- a. Instructions to participants
- b. Signing consent form
- c. Demographic questionnaire/Pre-Test questionnaire
- d. Demonstration of the task scenarios. (Total 2 task scenarios were developed based on the functionality of the App)
- e. Performing the tasks
- f. Post-experiment questionnaire

5. Instructions to Participants

Before starting the experiment, the experimenter explained the goals and objectives of the app in detail. Then the tasks that they had to perform were explained in brief. The experimenter ensured that there will be no risk using this app. Also, the experimenter mentioned that the confidentiality of the participants will be maintained. Then the participants were asked if they have any questions regarding the usability tasks.

6. Signing Consent Form

The participants signed an informed consent form that acknowledges: the participants privacy was safeguarded. The experimenter asked the participant if they have any questions. The participants could have only participated in the study after signing the consent form. The consent form is included in Appendix A.

7. Usability Questions

Three sets of questions were used in the usability test. The first one is demographic questionnaire which was given before scenarios are tested, the second one is the task performance related questions which were asked during the tasks were performed and the third one is post-experiment questionnaire which were given after the scenarios were tested.

7.1 Demographic Questionnaire

After signing the consent form, the participants were given a questionnaire which ask basic demographics questions such as participant's age, previous experience about drone flight, experience in using drone apps and so on. The demographic questionnaire is included in Appendix B.

7.2 Task Performance Questionnaire

After demonstrating the tasks to the participants, they were given some time to perform the tasks and asked some basic questions related to the tasks to know whether they were flexible enough to use the app while answering the questions. To know whether the App is giving the targeted output or not was also an intention of asking these questions. The task performance questionnaire is included in Appendix C.

7.3 Post Experiment Questionnaire

After finishing the tasks, the participants were given another questionnaire. This questionnaire asked about the experience of the participants during the experiment. Also, it asked the participants to provide suggestions or comments about the app. The post experiment questionnaire is included in Appendix D.

8. Test Scenarios

Two different test scenarios were designed below covering all possible cases. These test scenarios were performed during the usability test.

8.1 Test Scenario 1 – Drone Pilot trying to Inspect the building using 3D_rone App

Test Goal

- To find how the app is analyzing the drone flight paths.
- To find the data collection of a flight path to inspect the building.
- To find how the app is responding during the analysis.

Scenario Description

You have been appointed as a Drone Pilot Inspector in a Construction Company. You have previous experience of flying drone, but this is the first time inspecting a building using drone flight mode. You have come to know about 3D_rone app from one of your friends that this app helps to analyze drone flight building paths with all possible parameters. So, you decided to test the app before going to the final show.

Task List

- (Upload View) Upload and/or select a building space (.glb) and inspection points (.txt) and provide a name for the space.
- (Upload View) Upload drone flight paths (.txt) individually, providing a name for each.
- Switch to “Analyze View” using a tab or button
- Orient scene to fit the path(s) (if needed)
- Selects to visualize, up to several, loaded drone flight paths
- Navigate the 3D environment and highlights individual paths and analyze drone flight paths, position, orientation, inspection points, trouble areas.
- Close App

Quantitative Measurement List

- Total time taken to complete the task.
- Number of times when app was giving error while uploading flight paths.
- Number of events when the app crashed while analyzing drone paths.

Qualitative Measurement List

- Whether the participant is confused and if so, why?
- How difficult it was to navigate through the page while analyzing paths.

Potential Observations of Participant

- Confusion level of the participants.
- Expression and Engagement of participants.

8.2 Test Scenario 3 – Novice User - Navigate the App using the help page.

Test Goal

- To find how easy the app is to navigate with the help of help & documentation.
- To find the user friendliness of the app.

Scenario Description

A novice user has been appointed to do a building inspection survey. He has been come to know that using 3D_rone app, he will be able to inspect a building's inspection points using drone flight paths. But he is a novice user and never used the app. He will be taking help from the help and documentation tab to navigate the app and achieve his goal.

Task List

- Open the Help & Documentation Tab.
- Navigate each tab using the help provided for corresponding tab.
- Do the analysis in analyze tab and find the data of inspection points of a building using help tab.
- Match data points of inspection corresponding to the documentation.

Quantitative Measurement List

- Total time taken to complete the task.
- Number of events when the app crashed or giving error while analyzing drone paths.
- Number of questions arises when navigating help tab.

Qualitative Measurement List

- Whether the participant is confused and if so, why?
- How difficult it was to navigate through the page while analyzing paths using help tab?
- Was participant satisfied using the app?

Potential Observations of Participant

- Was there any question in mind for the participants?
- Expression and Engagement of participants.

9. Test Results

There was total 8 participants out of 7 were present during the test sessions. Test results are prepared based on the Pre-test questionnaire, Task Performance questionnaire and Post-test questionnaire.

13.1 Pre-test questionnaire results

There was total 8 participants out of 7 were present during the test sessions. Test results are prepared based on the Pre-test questionnaire, Task Performance questionnaire and Post-test questionnaire. No participant used any app or website to analyze drone flight paths or to inspect building using drone flight. 75% participants were very interested testing this application while 25% were neutral. 75% participants were not familiarized with building inspection parameters while 25% were neutral. Figure 01 represents the Pre-Test Questionnaire Result.

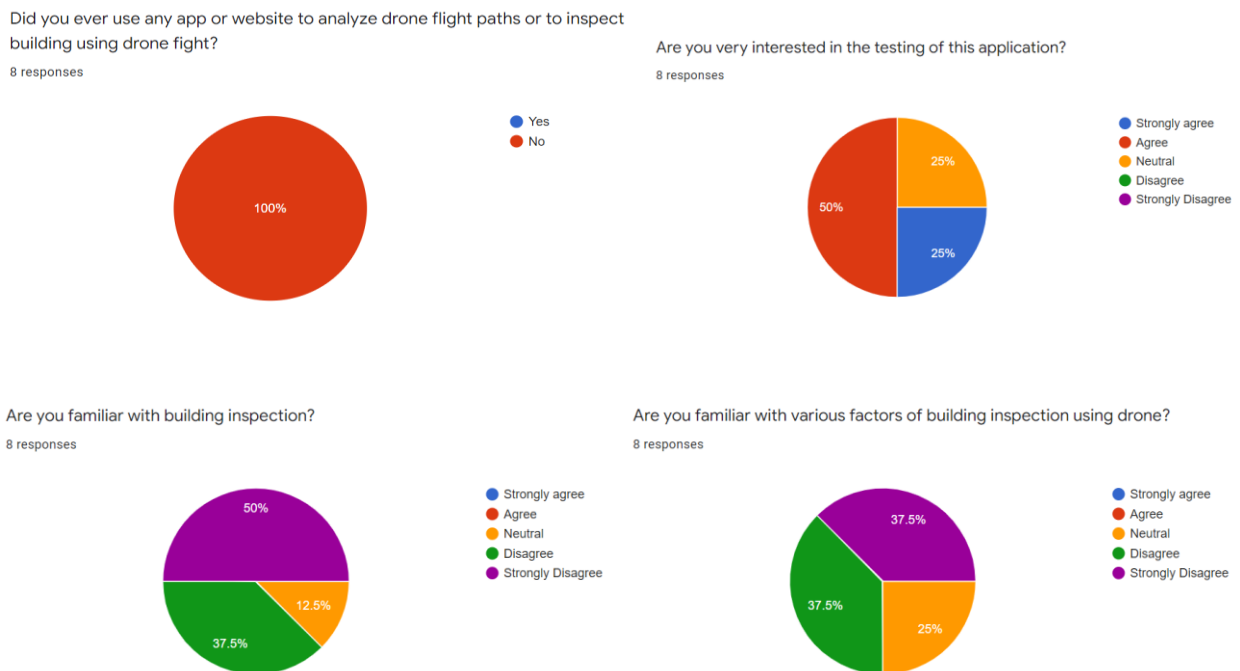


Figure 01: Pre -Test Questionnaire Result

13.2 Task Performance Related Questionnaire results

Participants were asked task performance related questions after the finishing of the tasks and those were answered perfectly by each and every participant. Time varied based on the participants response time, but all the participants were able to answer the questions which is included in Appendix C.

13.3 Post-test questionnaire results

After finishing task performance related questions, participants were asked Post-Test Questionnaire to know the feedback about the usability test. 100% participants though it was easy to perform the tasks. 100% enjoyed using the application too. 87.5% participants though they were able to perform the tasks efficiently whereas 12.5% though neutral. Figure 02 demonstrates Post-Test Questionnaire Result.

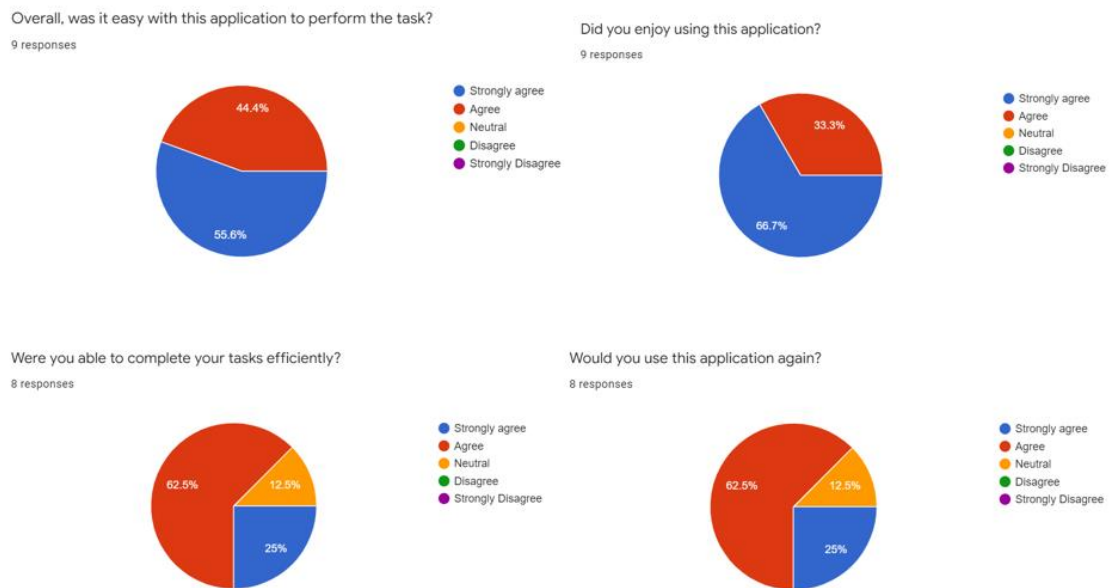


Figure 02: Pre -Test Questionnaire Result

10. Suggestions and Comments

After finishing the tasks and test, participants were asked if they have any suggestions to be given for the app. We got some constructive feedbacks with which developers are working and checking feasibility whether those can be incorporated or not. Some suggestions are given below.

- “Mouse Point Data could have been a better Idea while selecting a random inspection point.”
- “Deselecting/Selecting all flight/pilots with a single button is more flexible. “
- “Layout of text instructions could be better.”
- “Would be helpful to have a button to toggle visibility for all paths at once.”

Also, some open-ended questions were asked to know the overall feedback about the application from the participants. It was nice that they answered openly and discussed different thoughts of theirs regarding the Application. Some of the comments are given below from the participants.

- “The app was pretty straightforward.”
- “Complex idea represented in a simpler version. ”
- “3D Visualization is exciting and interesting with drone data.”
- “Wonderful idea to get the automation done.”

11. Bug Report

A bug report form was used to document any bug during the test but the table was empty.

Bug Number	Bug Name	Bug Location	Bug Description

12. Usability Test Schedule with Participant List

Below was the usability testing schedule with undergraduate participants list with their availability in the test. It was their wholehearted support which made the test a successful one.

Administrator	App	Location	Testing Date	Name	Email	Presence
M A Aziz Jahan	3D_rone App	Zoom	04/12/2022 12:00 PM	Robert (Bobby) Galbraith	rjgalbra@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	04/12/2022 1:05 PM	Lamarr Lewis	ldlewis@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	04/12/2022 2:10 PM	Tom Lottie	tlottie@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	4/14/2022 2:00 PM	Zoey Mishler	zamishle@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	4/14/2022 3:05 PM	Caleb Werdon	cawerdon@mtu.edu	No
M A Aziz Jahan	3D_rone App	Zoom	4/14/2022 4:10 PM	Mason Clark	mwclark@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	4/15/2022 3:00 PM	Henry dzurko	hedzurko@mtu.edu	Yes
M A Aziz Jahan	3D_rone App	Zoom	4/15/2022 4:05 PM	Connor Troub	cptroub@mtu.edu	Yes

13. Conclusion

Reviewing the results of the usability tests took place, it can be said that the Application was designed flawlessly. Users/Participants were very much flexible to use the app while reaching to the goal. It also represents the efficiency of the application as it is built to serve a specific purpose. Pre-test questionnaire, Task performance Questionnaire and Post-test questionnaire helped to get the output from the usability test. None but not the least, thanks to the development team for developing such a wonderful and effective app. It was amazing to run the usability test of 3D_rone App.

14. Appendix A - Consent Form

Computer User Interface Usability Testing Consent Form

You are being invited to participate in a research study to determine the usefulness and usability of computer user interfaces. This study is being conducted by Dr. Robert Pastel of Michigan Technological University Computer Science Department and students in Dr. Pastel's Human-Computer Interaction (HCI) courses. The students are performing the usability tests as part of their project and to fulfill the HCI course requirements.

There are no known risks if you decide to participate in this research study. There are no costs to you for participating in the study. The information you provide and tasks that you will perform will determine the usefulness and usability of user interfaces. The questionnaires and the tasks should take less than an hour to complete. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits.

The questionnaires and test are anonymous. Do not write your name on the survey. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study except for the instructor of the class that is giving you credit for participating. Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By completing the questionnaires and performing the tasks, you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer or not to perform a task for any reason. If you have any questions about the study, please contact Dr. Robert Pastel, Assistant Professor, Computer Science Department, Michigan Technological University, Houghton, MI 49931.

Participant signature and date:

15. Appendix B - Demographic Questionnaire

1. Age
2. Did you ever use any app or website to analyze drone flight paths or to inspect building using drone flight?
 - (a) yes
 - (b) No

Please indicate your level of agreement to the follow statements:

3. I am very interested in the testing of this application. / Are you very interested in the testing of this application?
 - (a) Strongly agree
 - (b) Agree
 - (c) Neutral
 - (d) Disagree
 - (e) Strongly disagree
4. I am familiar with the building inspection. / Are you familiar with building inspection?
 - (a) Strongly agree
 - (b) Agree
 - (c) Neutral
 - (d) Disagree
 - (e) Strongly disagree
5. I am familiar with various factors of building inspection using drone. / Are you familiar with various factors of building inspection using drone?
 - (a) Strongly agree
 - (b) Agree
 - (c) Neutral
 - (d) Disagree
 - (e) Strongly disagree

16. Appendix C - Task Performance Questionnaire

Question 1: “How many drone pilots are present in the data shown to you?”

Question 2: “How many flights per pilot are shown in the visualization?”

Question 3: “Are you able to find the highest inspection point available in terms of elevation?
What is the value of Y axis at that point?”

Question 4: “What was the inspection time for Pilot 2 Flight 1?”

Question 5: “Could you please move the drone at any inspection point you want (A/G/H)?”

Question 6: “Could you please select a specific Pilot’s drone flight and analyze/visualize all the data (Drone Data, Mouse Data, Play the flight path to check the viewer) of that flight?”

Open ended question 1: “What’s your first expression about the tool?”

Open ended question 2: “Do you have any suggestions or improvement area/areas of this tool?”

17. Appendix D – Demographic Questionnaire

Please indicate your level of agreement to the follow statements:

1. Overall, this application was easy to perform the task.

- (a) Strongly agree
- (b) Agree
- (c) Neutral
- (d) Disagree
- (e) Strongly disagree

2. I enjoyed using this application.

- (a) Strongly agree
- (b) Agree
- (c) Neutral
- (d) Disagree
- (e) Strongly disagree

3. I was able to complete my tasks efficiently.

- (a) Strongly agree
- (b) Agree
- (c) Neutral
- (d) Disagree
- (e) Strongly disagree

4. I would use this application again.

- (a) Strongly agree
- (b) Agree
- (c) Neutral
- (d) Disagree
- (e) Strongly disagree

5. What did you like most about this application?