**Zed Mini Distance Estimation Experiment**

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**Overview**

The Zed Mini distance estimation project (Unity version 2019.1.5f1) consists of 42 trials. Three game objects (a male avatar, large yellow cube, and red cylinder) are all placed at 7 distances (25m, 50m, 100m, 200m, 300m, 400m, and 500m) twice. This experiment requires the subject to verbally relay their estimate of the object’s distance, along with the difficulty of said estimate (on a scale from 1-10 with 1 being extremely easy and 10 being extremely difficult). All the data gathered from this process will be written to a csv file named after the subject ID.

**Setting up the Experiment**

*Green Screen Setup*

The first step in running this experiment is properly setting up the green screen. This is imperative, because the green screen recognition software is greatly improved when the green screen is properly positioned and as taught as possible.

1. First locate both tripods, then completely extend the first section of both tripods. The tripods should be placed near the computer so that the subject won’t be bothered by the ZED’s short cord length. (NOTE: Make sure both tripods have 4 green screen clips attached)
2. Next locate the green screen on the long pipe that attaches to the tripods. If possible, you can place the pipe on the already extended tripods (one side at a time). If this isn’t possible lower the tripods, attach the green screen, then raise the tripods.
3. Next you will use the green screen clips to make sure that the screen is taught between the two tripods
4. Finally find at least three weights (I currently use dumbbells) and place them at the bottom of the green screen. This is VERY IMPORTANT as their must be as few wrinkles in the green screen as possible to improve recognition. (NOTE: Make sure the green screen doesn’t interfere with the Vive’s tracking)

*Experimental Setup*

Once the green screen is properly setup, I recommend testing the experiment to make sure the ZED’s recognition is working with the green screen. Plug the ZED into a USB 3.0 port and make sure the Vive is turned on and tracking. Start Unity Hub and select the “Zed” project (Make sure the version is 2019.1.5f1!). A little bit of jittering is likely to be present, but if it becomes uncomfortable, restart the experiment and see if that improves the stability. Also, make sure the correct paths to the output folders are in the experiment script (line 167 in OnApplicationQuit()) and csvParseFile script (located in the Zed folder).

1. Before the experiment begins make sure the height of the person in the environment is correct. If they are too tall or too short you will have to adjust the Y position of the ZED\_Rig\_Stereo manually.
2. Also, if the person is facing at an incorrect angle when the experiment is started, you will have to change the Y rotation of the ZED\_Rig\_Stereo manually. (NOTE: This is likely to be required unless a standardized location of the green screen is established)

**Conducting the Experiment**

*Phase 1*

Phase 1 occurs as soon as you start the experiment. In this phase, the subject will be presented with all three objects in front of them. They are allowed to look at these objects for as long as they want. When they decide to move to phase 2 hit the “Next Phase” button on the left side of the UI. (Make sure to put the Subject ID in the top left corner!)

*Phase 2*

In Phase 2 the subject is presented with two red cubes at 10m apart from each other. They will be asked to estimate the distance between these two objects in feet, yards, or meters. Record their estimation in the top right corner (Make sure to select the correct unit of measure from the dropdown menu). Once they give you a distance estimation and you properly record it in the top left, tell them that the cubes are 10 meters apart and press the “Next Phase” button.

*Phase 3*

Phase 3 is the main phase of the experiment. It consists of the 42 trials explained in the overview above. Here is how you navigate the experiment using the UI.

1. You will initially prompt the subject, “Please estimate in feet, yards, or meters, how far you think the object is from you.”
2. When a subject gives you their distance estimation you will record the value the same way as you did in Phase 2. Remember to make sure you have the correct value selected in the dropdown menu.
3. Next ask the subject, “On a scale from 1 to 10, with 1 being extremely easy and 10 being extremely difficult, how easy or hard was it to estimate that distance.”
4. You will then put their difficulty estimation (from 1-10) in the bottom right input box.
5. When you have successfully put the data into the two boxes you will then press the submit button to record the subject’s estimation (NOTE: If one of the boxes (or both boxes) don’t have data, or have 0 for the data, when the submit button is pressed it won’t work) (IMPORTANT: If the subject can’t see the object or the trial becomes invalid, put a negative number in both boxes)
6. After you press the submit button you should see two red text boxes appear that say “Data Submitted!”. This means that you have successfully recorded the data and are complete with the trial.
7. To move to the next trial, hit the right arrow key. (NOTE: If you would like to redo a previous trial, press the left arrow key to go backwards to the previous trial.)

After the last trial you will not be able to proceed and you can quit the scene to end the experiment. All data will be written to a csv file when the experiment is ended.

**Finding the Experiment**

*GitHub*

This project is located at <https://github.com/taylorsmith1/ZedMini.git> on GitHub. This project uses Git LFS, which will require a $5 per month fee on GitHub to access and properly clone the repository.

More information on Git LFS is located at:

* <https://git-lfs.github.com/>
* <https://www.atlassian.com/git/tutorials/git-lfs>
* <https://help.github.com/en/articles/configuring-git-large-file-storage>

*Locally*

This project is also located locally on the green computer at “D:\Users\Robert\Desktop\Zed Mini\ZedMini\Zed”. To open the project simply start Unity Hub and select this folder with the appropriate version of Unity.

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If you have any questions / comments about this experiment please feel free to contact me:

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