Test Protocol

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DOCUMENT HISTORY

Version	Date	Changes made	Sign	Reviewer
0.1	2022-12-01	First draft.	All	GH
1.0	2022-12-07	First version.	All	GH

1 INTRODUCTION

2 G3-IMPLEMENTATION

Test	Description	Pass/Fail	Conclusion
1	Test if the existing module for orientation estimation works with G3.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.
2	Test if the existing module for localization estimation works with G3.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.
3	Test if the face mesh-module works with G3.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.
4	Test if it is possible to save calibration data from the forward-facing camera.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.
5	Test if it is possible to specify which forward-facing calibration data should be used.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.

3 SIMULATION ENVIRONMENT

3.1 Sound physics

Test	Description	Pass/Fail	Conclusion
6	It was tested if it was possible to implement sensor noise with the distributions given in requirements 20-25	Pass	It was possible to implement sensor noise with the given distributions
7	It was tested if it was possible to add sensor noise with the distributions given in requirements 20-25 to IMU and Magnetometer	Partial pass	It was possible to add sensor noise to the IMU. Magnetometer data is unavailable, so it was impossible to add noise to the magnetometer data.
8	Not implemented	-	There is no functionality to add sensor noise to eye tracking data.
9	Not implemented	-	There is no functionality to add sensor noise to an arbitrary sound source in the sim-env.

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3.2 Implementation of new sensors

Test	Description	Pass/Fail	Conclusion
10	It was tested if it is possible to generate and save accelerometer data in the simulation environment.	Pass	It was possible to generate and save accelerometer data.
11	It was tested if it is possible to generate and save gyroscope data in the simulation environment.	Pass	It was possible to generate and save gyrometer data.
12	It was tested if it is possible to generate and save magnetometer data in the simulation environment.	Partial pass	It was possible to generate magnetometer data in the simulation enviroment. But it was impossible to save the data.

3.3 Simulation validation

Test	Description	Pass/Fail	Conclusion
15	It was tested if it is possible to obtain ground truth data for target tracking modules from the sim-env.	Pass	It is possible to generate and save IMU and gaze-vector data from the sim-env. It is also possible to obtain ground truth data about the speakers and users' position in the sim-env.
16	Test if it is possible to obtain ground truth data for newly developed modules from the sim-env.	-	This test was never conducted due to time constraints.
17	It was tested if it was possible to manually set the trajectory of the gaze-vector in the sim-env.	Pass	In path-controller file adding different cases of body and head movement the simulation could be pre-determined.
18	Not tested	-	Due to lack of time this was never tested.

3.4 Usability

Test	Description	Pass/Fail	Conclusion
19	Not implemented	-	No functionality of the GUI has been modified.
20	Not implemented	-	Same as test 19.
21	Not implemented	-	Same as test 19.

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Test	Description	Pass/Fail	Conclusion
22	Test if it is possible to start the sim-env with less than 4 commands	Pass	It is possible to start the sim-env with 1 command.
23	Test if it is possible to start the GUI with less than 4 commands	Pass	It is possible to start the GUI with 1 command.
24	Test if it is possible to start the sim-env with 1 command	Pass	See test 22.
25	Test if it is possible to start the GUI with 1 command	Pass	See test 23.
26	Test if it is possible to modify the behavior of the program when launching the program using flags	Pass	It is possible to launch different simulations by using flags when starting the simulation.
27	Test if the flags in requirement 26 has the desired effect on the program	Pass	The flags have the desired effect.
28	Test if it is possible to implement pre-defined tests when launching the sim-env.	-	This test was never conducted due to time constraints.
29	Test if it is possible to start the tests in test **??** with program flags.	-	This test was never conducted due to time constraints.
30	Test if is possible to make a script that generates all dependencies for the sim-env and app.	Pass	It was possible to make a script that generates all dependencies needed to run all software in the repository.
31	Test if it was possible to make the script in test 30 run with only one command	Pass	It was possible to make the script run with only one command.

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4 EYE TRACKING

4.1 Saccade detection

Test	Description	Pass/Fail	Conclusion
32	Testing the ability to detect saccades with amplitude restriction	Pass	At least 80% of the saccades are detected.
33	Testing the ability to detect saccades.	Pass	Same as above but with slightly lower detection rate.

4.1.1 *Average saccade frequency*

Test	Description	Pass/Fail	Conclusion
34	Testing the ability to calculate the average saccade frequency at constant frequency.	Pass	A satisfactory frequency is calculated.
35	Testing the ability to calculate the average saccade frequency at random frequency.	Pass	A satisfactory is calculated.
36	Testing the ability to calculate the average saccade frequency when the user is listening to one person.	Pass	A frequency under 0.2 [Hz] is calculated.
37	Testing the ability to calculate the average saccade frequency when the user is listening to two persons talking.	Pass	A frequency above 0.2 [Hz] is calculated.

4.2 Fixation detection

Test	Description	Pass/Fail	Conclusion
38	Testing the ability to detect fixations	Pass	Above 90% fixations detected.
39	Testing the ability to display earlier locations with eye fixations.	Fail	Failed to accurately detect directions.

4.3 Smooth pursuit detection

Test	Description	Pass/Fail	Conclusion
40	Testing smooth pursuit detection.	Pass	Detects smooth pursuit within the specified time limit but the event is inaccurately interrupted by both fixations and saccades.

4.4 Listening detection using pupil dilation

Test	Description	Pass/Fail	Conclusion
41	Test of the identification of the environment light level. In order to achieve accurate measurment, the light is distributed homogeneously and the camera is prevented from facing any light sources.	Pass	Even if the test has been passed its difficult to say if this feature is feasible right now with the Tobii glasses G2. The camera dont provides brightness specificly.
42	Test of listening event detection.	Fail	The result was not satisfactory.

4.5 Real-time data

Test	Description	Pass/Fail	Conclusion
43	Test if the data from the eye tracking system is saved without data loss.	Pass	Data is saved without loss.

5 TRACKING AND LOCALIZATION

5.1 Real-time optimization

Test	Description	Pass/Fail	Conclusion
44	Simulate the movement of three targets in the sim-env and estimate its path. Measure the time it takes to preform each update loop in the path estimation and calculate the average time. The test passes if the average time is less than 150 ms.	-	This test was never conducted due to time constraints.
45	Video frame rate from real-time data with SLAM activated is to be measured. Passing test means > 23 fps with no affect on normal functionality.	-	This test was never conducted due to time constraints.
46	If test 47 passed: Detected people exceeds 3 people.	-	This test was never conducted due to time constraints.

5.2 Distance Perception

Test	Description	Pass/Fail	Conclusion
47	The estimates from the new distance perception module will be compared with measurements from Visionen. Passing test means a MSE to the estimated distance from ground truth of 0.2 or lower within a range of 2 meters.	-	This test was never conducted due to time constraints.
48	Eye tracking data is successfully integrated into EKF and SLAM. Passing test means higher or equal accuracy/confidence on prediction.	Pass	
49	Magnetometer data is successfully integrated into EKF and SLAM. Passing test means higher or equal accuracy/confidence on prediction.	-	The requirement connected to this test was renegotiated. The test was therefore not preformed.

5.3 New statistical tracking method

Test	Description	Pass/Fail	Conclusion
50	Simulate movement of three targets using the sim-env according to predetermined paths. Use the data gained to estimate the paths using the existing methods and calculate the estimations accuracy against the ground truth. The test passes if the accuracy is 90% or higher.	-	This test was never conducted due to time constraints.
51	Preform the test in test 50 with the new statistical method. Compare the results of the two tests. The test passes if the accuracy of the new method is equal to or higher than the old method.	-	This test was never conducted due to time constraints.
52	Record data of at least two speakers moving in Visionen using G3. Use the data gained to estimate the paths using the existing methods and calculate the estimations accuracy against the Qualisys measurement. The test passes if the accuracy is 90% or higher.	Pass	No new data was able to be recorded, but old test data fulfilling the requirements was used. The accuracy was within the passing bounds.
53	Preform the test in test 52 with the new statistical method. Compare the results of the two tests. The test passes if the accuracy of the new method is equal to or higher than the old method.	Pass	Both the old and the new method achieved the same accuracy in preformed tests.
54	Preform the test in test 44 with the new statistical method. Compare the results. The test passes if the average time of the new method is lower than the old method.	-	This test was never conducted due to time constraints.