# Final Report

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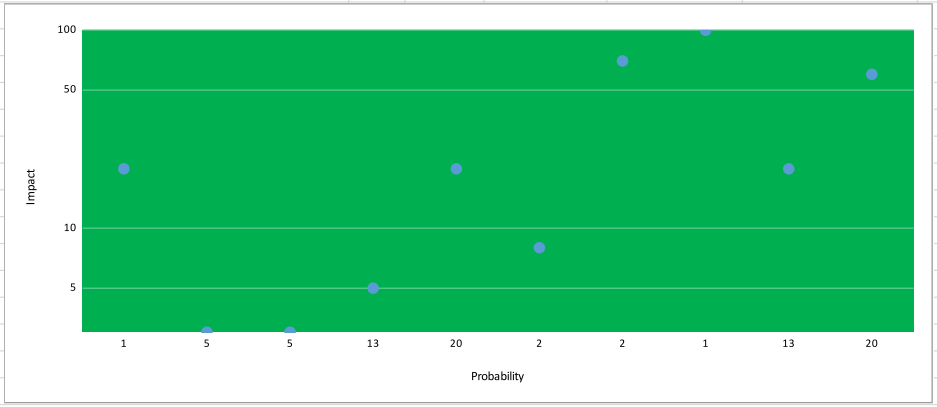
| Functional Tests Passed | | |
| Setup: The game is in progress, with the drone approaching a hole without the quantum disruptor activated.Trigger: The drone's center moves over the hole. Expected Result: The game immediately ends, displaying a loss message on the LCD screen. The red LED may flash to indicate game over. | PASSED | If a hole is hit one of the lives is lost. If 3 holes are hit the game ends |
| Setup: A game session is nearing completion, with only one waypoint remaining.Trigger: Navigate the drone to the final waypoint within the time limit.Expected Result: Upon reaching the last waypoint, the game displays a win message along with the final score, factoring in the time taken and waypoints reached. | PASSED | If the final waypoint is reached the end win screen is displayed with time remaining for player |
| | | |
| Sumary of Functionality and Deliverables | | |
| I have a working game that randomizes a maze and has 2 waypoints. My disruptor works and is on a timer. When the disruptor turns on 2 LEDs turn on. There is a start and end screen and the win conditions work. | | |
| It took me 135% of the time I expected it to. This is about 1.5 x the amount of time I allotted. I did not meet all the deliverables perfectly thus it would likely take me about 2x the amount of time allotted to actually meet all the project goals. | | |
| The LED task took a lot longer than expected. This is likely due to the fact that I did not fully think through how I would turn on and off the LEDs and under what conditions. This took me multiple iterations to figure out. | | |
| | | |
| Physics | | |
| I integrated the acceleration to get velovitty over time. This was then integrated over time to get position. This was then used to determine the location on the ball on the screen. This runs into issues when the board is turned to far to one side for too long.  It will sometimes miss the rotation back.  I chose to center the location of the tilt on the ball to avoid the over tilt jumping ball condition. | | |
| Data Configuring | | |
| I had to reconfigure some of the values in order to make the ball roll more smoothly. I also edited some of the times to make the game feel more playable. | | |
| Next steps | | |
| I would spend time to make the LEDs work with the disruptor. I would add a time bar to the screen to make the disruptor ready. I would add more interesting graphics to the game | | |
| Bonus Features | | |
| The probability of holes disappearing every second is .5. The maze is always solvable and data structures are used for the holes and walls. | | |

| Deliverable | Est Time | Total Time | Notes | | Total Est Time | Total project time | | LogHours | LogDate | Summaary Work |
|---|---|---|---|---|---|---|---|---|---|---|
| LCD Task | 2 | 4.5 | DONE! | | 22 | 30 | | 3 | 4/3/24 | Generated project and started transfering needed functions and etc from lab 7. Got the screen to run a demo and all tasks are set up waiting to be filled |
| Physics Task | 6 | 8.6 | DONE! some glitches like goasting through walls at high speeds | | | | | 3 | 4/5/24 | Worked on Gyro task. Got some reads working. Not sure yet if the whole thing is working or not |
| Quantum Burst Task | 4 | 4.2 | This works but is not times correctly | | Amount Complete EST | | | 3 | 4/9/24 | Updated the LCD driver to the newer one with the DMA, implemented the correct physics for ball movement, and got the gyro working |
| LED Task | 3 | 6 | This is not meeting project goals perfectly. | | 136.3636364 | | | 2 | 4/11/24 | I got the RNG working and attemtped to build a maze function. The maze function didnt work at all |
| Obstical Task | 5 | 6 | DONE! Added a rondomized robability on when the holes appear for fun | | | | | 5 | 4/19/24 | I got my LEDs working and button working = |
| ~~Gyro Read Task~~ | - | - | This task became obsolute and the gyro read was moved to the physics.current time spent migrated to the physics task | | | | | 2 | 4/23/24 | Buildingout the quantum burst task and working on maze some more |
| Build out data structs | 1 | 0.5 | | | | | | 4 | 4/24/24 | The maze now works!! But it is not random |
| Build out ISR Routines | 1 | 0.2 | This took like 0 time lol | | | | | 8 | 4/29/24 | Maze is random. Button is now linked to a timer and the LEDs . Game is now playable |

| Item | P | I | Risk (P*I) | Recognized | Mitigated/ Resolved | ROAM | How |
|---|---|---|---|---|---|---|---|
| My new part-time internship sucks up too much of my time | 1 | 20 | 20 | 21-Mar-24 | Mitigated | M | My start date isnt untill this project should be all but done |
| My board stops working | 5 | 3 | 15 | 21-Mar-24 | Mitigated | A | I can buy a new one quickly and easily if this happens |
| I loose my computer and my project work | 5 | 3 | 15 | 5-Apr-24 | Mitigated | M | All my work is backed up to the cloud |
| I cannot update my screen fast enough to be game like | 13 | 5 | 65 | 5-Apr-24 | Mitigated | M | I updated my LCD driver to one that uses the DMA and it is much much faster |
| I cannot generate a maze | 20 | 20 | 400 | 11-Apr-24 | Mitigated | A | I am gonna make this happen at office hours next week |
| I run out of room on my board for how large my code is | 2 | 8 | 16 | 11-Apr-24 | Mitigated | A | This will likely not happen I have plenty of space left |
| I loose the cord to program my board | 2 | 70 | 140 | 19-Apr-24 | Mitigated | M | I have multiple cords now |
| A meteor crashes into my house | 1 | 100 | 100 | 19-Apr-24 | Mitigated | A | This most likely will not happen and if it does I have bigger fish to fry |
| I loose my code | 13 | 20 | 260 | 26-Apr-24 | | | |
| I cannot make it to the demo | 20 | 60 | 1200 | 26-Apr-24 | | | |



| UnitTest | Tested | P/F? |
| --- | --- | --- |
| Dummy gyro angles are fed into the physics engine algorithm with differing ball weights and the ball velocities x and y are calculated | | |
| Dummy button press flags are sent at different times to the qunatem task code. This will determin wheather the code enables quantum tunneling depending on where it is in the charge cycle | | |

| FunctionalTests | Tested | P/F? |
|---|---|---|
| 1. Gyroscope Response Test | | |
| Setup: The STM32F429i-DISC1 board is mounted on a stable platform with the gyroscope initialized and connected to the LCD for angle display. Trigger: Manually tilt the board in a known direction by a specific angle.Expected Result: The LCD updates to accurately display the new angle of tilt corresponding to the direction and magnitude of the board's movement. | | |
| | | |
| 2. Maze Generation and Display Test | | |
| Setup: The game is initiated with default configuration settings for maze generation.Trigger: Press the start button to begin a new game session.Expected Result: A new maze is generated with randomized walls and holes within the constraints of the configuration settings. The maze is correctly displayed on the LCD screen, showing the start and end points clearly. | | |
| | | |
| 3. Quantum Disruptor Activation Test | | |
| Setup: During an active game session with the drone positioned adjacent to a wall.Trigger: Press the user button to activate the quantum disruptor.Expected Result: The drone moves through the wall unimpeded for a brief period, as indicated by a visual change or marker on the LCD screen. The energy store decreases accordingly. | | |
| | | |
| 4. Energy Store Recharge Rate Test | | |
| Setup: The game is in progress with the energy store partially depleted.Trigger: Wait without activating the quantum disruptor.Expected Result: The energy store gradually increases at the predefined recharge rate until it is fully recharged, as indicated by the green LED's brightness level. | | |
| | | |
| 5. LED Indicators Test | | |
| Setup: The game starts with a fully charged energy store.Trigger: The quantum disruptor is activated, depleting the energy store below the minimum activation energy.Expected Result: The green LED displays the energy store's status by dimming correspondingly. The red LED flashes at a rate proportional to the time remaining for the energy store to recharge to the minimum activation energy level. | | |
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| 6. Physics Engine Accuracy Test | | |
| Setup: The game is in progress, with the drone navigating through the maze.Trigger: Tilt the board at various angles to simulate gravity-induced acceleration in different directions.Expected Result: The drone's movement on the LCD screen accurately reflects the physical simulation of the board's tilt, including speed and direction changes. | | |
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| 7. Trap Detection and Game Over Test | | |

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| 8. Waypoint Navigation and Win Condition Test | | |
| Setup: A game session is nearing completion, with only one waypoint remaining.Trigger: Navigate the drone to the final waypoint within the time limit.Expected Result: Upon reaching the last waypoint, the game displays a win message along with the final score, factoring in the time taken and waypoints reached. | | |

| Valid Modified Fibonacci values |
|---|
| 1 |
| 2 |
| 3 |
| 5 |
| 8 |
| 13 |
| 20 |
| 40 |
| 70 |
| 100 |

## Where the project stands WK1

This week I did the project planning, created my task diagram, and identified 2 cutting points for unit testing.  Everything should be fully contained in this Google Sheets and this and the code will be uploaded every week to github

## Where the project stands WK2

This week I updated my task diagram. I worked on my LCD task and my gyro task primarily. I enounterd a timing issue with my read values so I might end up using a message que instead of just a mutex pushing values into a struct. The LCD is working well and I got to a point where I have a circle sometimes moving across the screen inconsistantly depending on how I move the board.

I compled 26% of my estimated time for the project to be complete. This feels inacurate as I am unsure if some of the functionality of the gyro is working the way I expect it to. I spent 6 hours on what I estimated should take me 3 hours. So far I have taken 2X the amount of time I should have and I still have a lot of work left to do for those tasks.

# Week 3

This week I managed to get my RNG, Gyro, and most of my physics tasks working properly. I even attempted to get my maze generation task working but that did not end up working like I expected it too. Will most likely go into office hours next week to fix that.

I have completed 50 % of my estimated project. This feels slightly inaccurate but I am very close to a very playable game. Since the deletion of my Gyro task and the migration of that time to the physics task. I am currently on pace to have completed 1 to 1 the work that I expected to complete in the given timeframe

# Week 4

This week I managed to get my LED and button working properly. Now I just have to get them to work together in the quantum burst task. I am saving the map generation for later. That shit is hard af.

I have completed 72 % of my estimated project. This is very wrong as I still have a lot of work left to do to meet project goals. Next week will be a lot of work.  I am starting to run over the expected workload again. But expect to at the minimum meet the project goals for a playable game.

# Week 5

This week I worked on getting my quantum burst task running with the use of my working button. It is now in a place that sort of reaches the program requirments. I need to however link it to the LEDs which I have yet to do. I also worked on getting my maze and collision detectioin working. These both work but not to the level I want. Right now the game is almsot playable and I have solevd most of the major issues

I have completed 100 % of my estimated project. I have not yet met all project goals and the game is not yet playable. I need another 5 to 10 hours to get it where It really needs to be.  I anticipate to be about 1.5x the amount of work I expected it to be at the begining of the project. Therfore taking me about 30 hours to complete.