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ECEN 3753
3 MAY 2023

Project Report - Final

In Class Demonstration

As of this week, whatever I had for my project was final and ready for in class demonstrations. For my demonstration, I believe I display all of the test requirements efficiently and without issue through my own interpretation of the assignment.

During the demonstration, I was asked to present at least 2 functional tests to show. The first test was to display how the platform interacts with the environment depending on the speed. For this test, I would move the platform at a slow speed. When colliding with the boundaries, the platform would bounce off, retaining its speed but moving in the opposite direction. We also test the platform at its maximum speed. This time, the platform collision should send an event flag out to end the game.

The second test was a demonstration of the charging and shooting mechanic. The platform is programmed to shoot a projectile at a variable velocity. On the button press, the shot will start charging and cap out at a certain point. On the button release, the projectile will be fired depending on the amount of time the button was held down. The projectile will do one of the three things: collide with the platform on weak shots, collide with the fortress, or go past the boundaries.

Current State

Most of the deliverables I set out to do were completed. I managed to have a playable game outputted to the LCD screen and I was able to make my objects move in a parabolic model. Something I wasn't able to complete was the PWM, as I ran out of time and was unable to implement it into my program.

Task	Est. Effort	% of Est.	Act. Effort	Status
LCD Screen	5	10%	16%	Completed
Physics	20	40%	26%	Completed
PWM LED	12	24%		In Progress
Implementation	13	26%	44%	Complete

- Completed 90% of my currently-scoped, estimated work (45 hr estimated for work completed thus far, 50 hr estimate)
- Used 104% of the budgeted total-project time. (52 time spent, of 50 hr estimate).
- For the work that has been completed, I took 1.15x (52/45) as much time as I estimated.

In-scope Work Items

LCD Screen:

Completed

Expect Time: 5 hours

Actual Time: 7 hours

Physics Model:

Completed. The physics model served to be more simple than I anticipated. Instead of calculating the position of an object, I found that it would be easier to calculate the velocity and change the position accordingly.

Expect Time: 20 hours

Actual Time: 13 hours

PWM LED

My plan was to use the Low Energy Timer to aid with making my PWM. Unfortunately, I ran out of time and this item was not completed in time

Conclusion:

This project served to test my skills developed in this class and my overall ability to problem solve. For gravity, I found that using the given values would be too extreme. To remedy this, I scaled down values as I saw fit to make my game a bit more playable.

If given more time, my goal would be to complete the PWM. This would give a clear indication of how much power would be released for the shot. I would also add a better interface and menu so that players can better navigate and operate my program.

Test Plan and Result:

Week 1:

One aspect of the code I want to test is using the LCD screen and updating it in real time. My plan is to move a pixel as if it was a cannon shot. This way I can isolate the physics engine when I am debugging and testing it. This is also a good time to test different aspects of the physics, such as bouncing and movement in general.

Week 2:

One test I wanted to test was getting the LCD screen working. This includes displaying to the LCD, making designs, and moving objects on the screen. There's still a few aspects that I wish to test more, but for the most part, I got many of these tests to work.

Week 3:

The physics engine is giving me more problems than I would like it to. Making the pixel move in a parabolic shape proved to be even harder than I expected. For the next week, I hope to focus solely on getting the physics to work properly.

Week 4:

This week proved to be a challenging time for the project. Very little progress was made and there is very little time left until the deadline. I was too busy with other classes and was not able to put much time into the project. My projected time need is very behind, so I intend to spend more time this week to try to get as much as my project done as I can.

Current State:

Week 1:

Currently, this project is in very early stages of development. This includes reading over documentation, assessing requirements and potential risk, and coming up with a plan to tackle our problem space. As stated in the project description, there are many decisions left on the table for us to decide on. This includes how the game should be designed and managed. There were certain aspects that were required for the game, so those were laid out beforehand too.

Week 2:

This week, my main focus was working with the LCD screen. I wasn't quite sure how to use the screen prior to this week, so I spent a lot of time learning to operate it. I felt that it was important to get this module down before continuing. Going forward, I hope that this commitment will aid me with the rest of my project.

The physics model is something that I expect will take me a long amount of time. With the LCD working, I believe that taking the extra amount of time to get the LCD will help reduce the time I spent coding the physics.

Week 3:

  Some progress in the physics have been made, but not enough for it to be considered completed. This week's plan is to continue working on the task. I have consider different alternatives in the case that I am not able to complete the task

Week 4:

  About the same as last week. The physics is more or less the same with the other parts in the same place.

In-scope Work Items

       LCD Screen

This week was mainly used to focus on understanding the LCD screen and how to code to it. There's still different functions I want to test before I move on, so there's still work that needs to be done on it. As of right now, I was able to move a pixel across the screen. As I continue to work on this module, I want to make the pixel bounce off walls.

       Physics Model

With the LCD Screen module progress, I can now comfortably start working on the physics for our game. As of now, I have the equations I will use laid out. One problem that has come up is converting the units of measurement of meters to pixels. I plan to use next week to calculate the conversions and test them.

       PWM LED

No change

Task	Est. Effort	% of Est.	Act. Effort	Status
LCD Screen	5	10%	16%	Completed
Physics	20	40%		In Progress
PWM LED	12	24%		Standby
Implementation	13	26%		Standby

**Summary Effort & Time Estimates**

Previous Week:

- Completed 15% of my currently-scoped, estimated work (7.5hr estimated for work completed thus far, 50 hr estimate)

- Used 16% of the budgeted total-project time. (8 hr time spent, of 50 hr estimate).

- For the work that has been completed, I took 1.07x (8/7.5) as much time as I estimated.
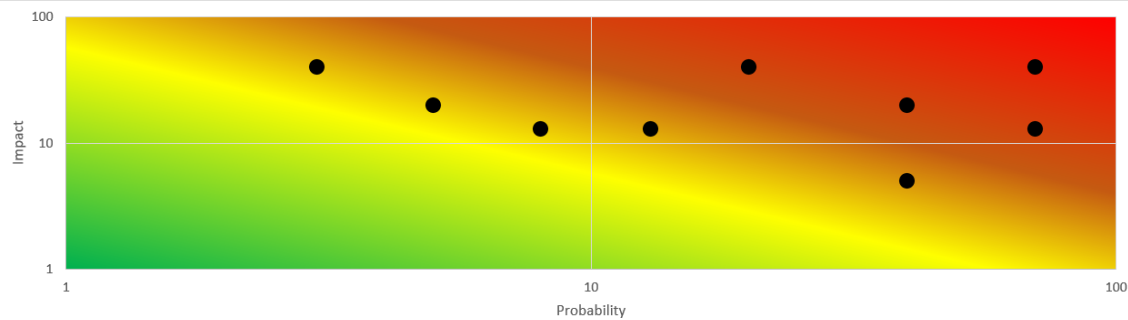

Current Week:

- Completed 18% of my currently-scoped, estimated work (9 hr estimated for work completed thus far, 50 hr estimate)

- Used 24% of the budgeted total-project time. (12 time spent, of 50 hr estimate).

- For the work that has been completed, I took 1.3x (12/9) as much time as I estimated.

Data Flow Diagram (tentative):
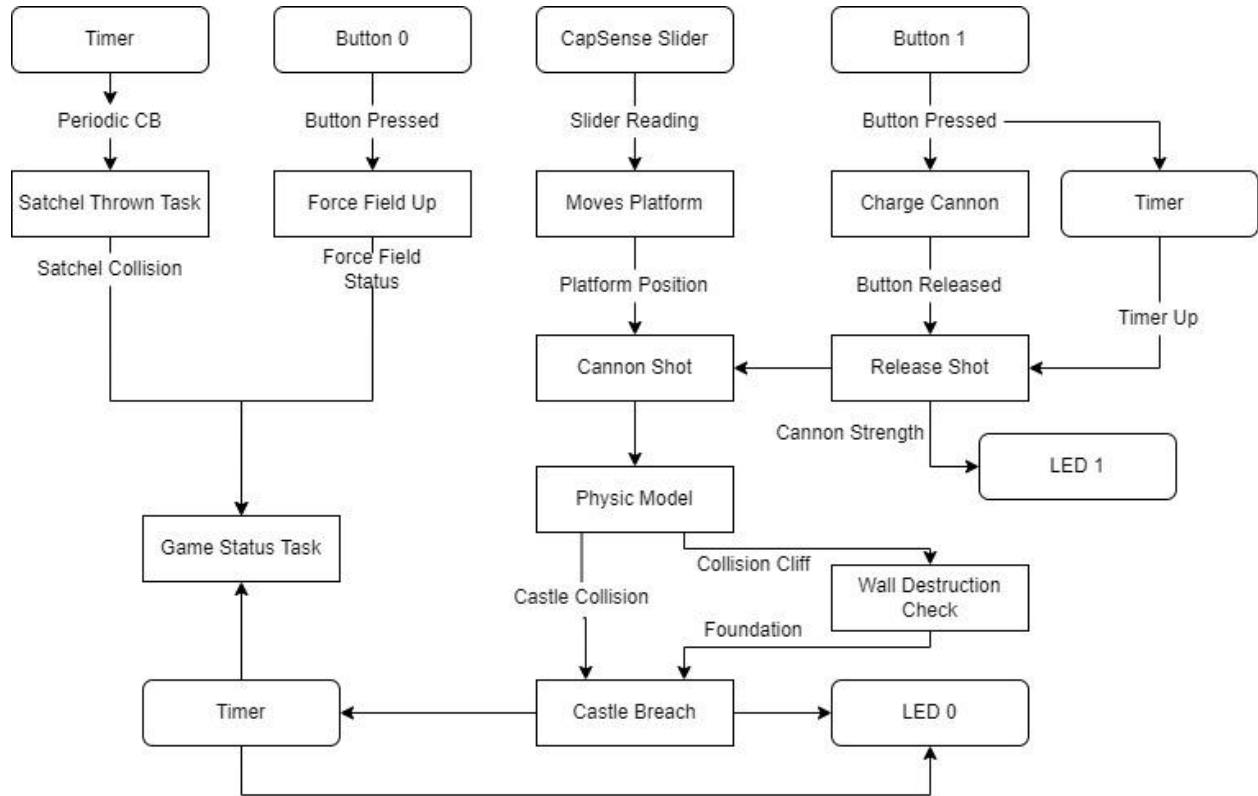
Risk Registers

Item	P	I	Risk (P*I)	Recognized	Mitigated/ Resolved	ROAM	How
I catch CoViD	3	40	120	14-Jan-21	Mitigated	M	learned instructor has extension possible
equipment stops working	5	20	100	14-Jan-21		O	make sure everythings working, check up often
Busy with other classes	70	40	2800	23-Mar-21		O	Lay out schedule of rest of semester for all classes/make plan
will get stuck/don't know how to move on	40	20	800	23-Mar-21	Mitigated	M	attend office hours/talk to classmates
unable to attend offices hours	70	13	910	23-Mar-21	Resolved	R	(see row 5) contact TA/John via Slack
unclear of instructions	20	40	800	23-Mar-21		O	start making diagrams/ask for help if problems or holes found
too ambitious	8	13	104	23-Mar-21	Mitigated	M	if behind on project, consider changing the scope to be more reasonable
fall behind schedule	13	13	169	23-Mar-21	Mitigated	M	assess what needs to be done/adjust schedule accordingly
project's not fully functional	40	5	200	23-Mar-21		A	understand that mistakes will happen, as long as I comprehended and lear

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equipment stops working	5	20	100	14-Jan-21		O	make sure everythings working, check up often
Busy with other classes	70	40	2800	23-Mar-21		O	Lay out schedule of rest of semester for all classes/make plan
will get stuck/don't know how to move on	40	20	800	23-Mar-21	Mitigated	M	attend office hours/talk to classmates
unable to attend offices hours	70	13	910	23-Mar-21	Resolved	R	(see row 5) contact TA/John via Slack
unclear of instructions	20	40	800	23-Mar-21		O	start making diagrams/ask for help if problems or holes found
Physics model difficulties	70	40	2800	21-Apr-21		O	trouble moving objects on LCD screen, seek help