CSC258 Project Proposal

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What is the title of your project?

Wormed Garbage Eater

Provide a one-paragraph description of your project.

We design a wormed vacuum to eat garbage in the room. There are three types of trash that are spawned randomly. Users can use Keyboard arrow keys to control the directions of vacuum to catch the garbage. If vacuum hit walls or itself, it gets damaged, a signal is given and it stops working. Each time vacuum catch a trash, the trash will disappear and a new trash will be spawned anywhere else. The points will be accumulated and shown on hex display according to the types of the trash. The length of the wormed vacuum will increment differently when catching different trash, so will the speed of the vacuum. Eventually it becomes faster and the game becomes difficult.

Project Description:

(This is where you describe your project in detail. You can use the Design Case Studies slides as a reference on how to create the following components for your project. All of these components are not compulsory for you to have but most projects usually have these components. They are: high level pseudo code, state diagram, datapath-and-control-CU block diagram, input/output block diagram [Example: <https://www.nandland.com/goboard/images/project10-pong-block-diagram.png>], truth tables etc. These components should be designed and described to show your understanding of your design i.e. how many bits is each input/output, what is the max number your counter can count up to, how many counters/shift registers you need to use etc. A good idea is to get an initial draft of this done and show to your TA in the next lab or during office hours to get feedback.)

It is a simple video game. We will try to use VGA output to design images and make them move across the screen as we needed. Trying to use shift register to store information of the vacuum and enabled when length need to get longer.

We will try counters to generate random numbers for the x, y coordinate for the trash position. We need to figure out a proper finite state machine to control the datapath and using keyboard arrows as its input to keep track of the state of this cleaning job. When vacuum eats more and more trash, its length are getting longer and the game will speed up. We need to figure out a way to implement it. We may use counters or combined with other modules to achieve this functionality. Finally it will be shown on the hex display for the points of garbage eating. Eventually it will collide the wall or itself, the machine will restart.

What will you accomplish for the first milestone?

1. Build the interface, using VGA output to design the background, three types of garbage and the greedy garbage eater.
2. Get the garbage eater moving across the room.
3. Try to build up finite state machine and taking keyboard arrow keys as inputs to control directions.
4. Try to increment the length of the eater.

What will you accomplish for the second milestone?

1. Figure out a way to randomly generate the locations and types of the garbage.
2. Add collision detection to the walls and to the vacuum itself. When the hit the wall and itself, a signal will be given and the cleaning job will restart.

What will you accomplish for the third milestone?

Using counter, adder and register to:

1. Design a score system which add different scores when vacuum eats different type of garbage and shown on the HEX display
2. Identify a way to increment the eater’s length each time a trash is catched according to our unique design.
3. identify a way to speed up the game according to our design.

How does this project relate to material covered in CSC258?

It combines all the materials we learned so far, like counters, adders,

flip\_flops, finite state machine etc. We can combine those pieces to make our own project.

What's cool about this project (to CSC258 students and non-CSC258 students)?

We get the basic idea on how things are implemented on the hardware level. Amazing things can be done by overcoming them. We can use our limited knowledge to make some cool stuff, although it’s simple. But it is a good start.

Why does the idea of working on this appeal to you personally?

For our group Xiaoyu Zhou and Shuo Zhuang:

At first it was a big challenge for both of us to design a video game start with nothing. It is hard to make a project based on just small knowledge pieces. It requires you to fully understand each part and know how to use them to achieve specific functionalities. You need to try a lot of times to find a suitable design. However the best way to learn is to practice and exercise.

After we watching a lot of examples, our group decide to design this “I like garbage” game, it can be done by using the materials we learned so far. At first Xiaoyu Zhou wants to implement a game called

“fog wants to cross river”, but it is not that doable. After deep thinking, we change to “Garbage eater”

We both think it is doable and interesting. It is a good practice and we hope one day we can add more features to it and make it better.