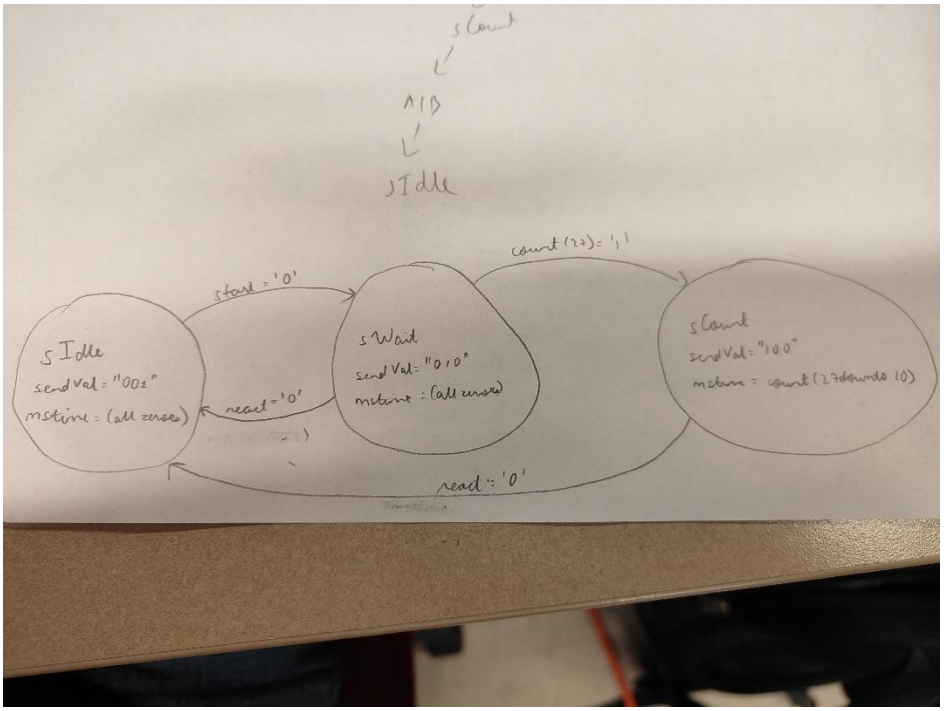
Project 3: Reaction Timer

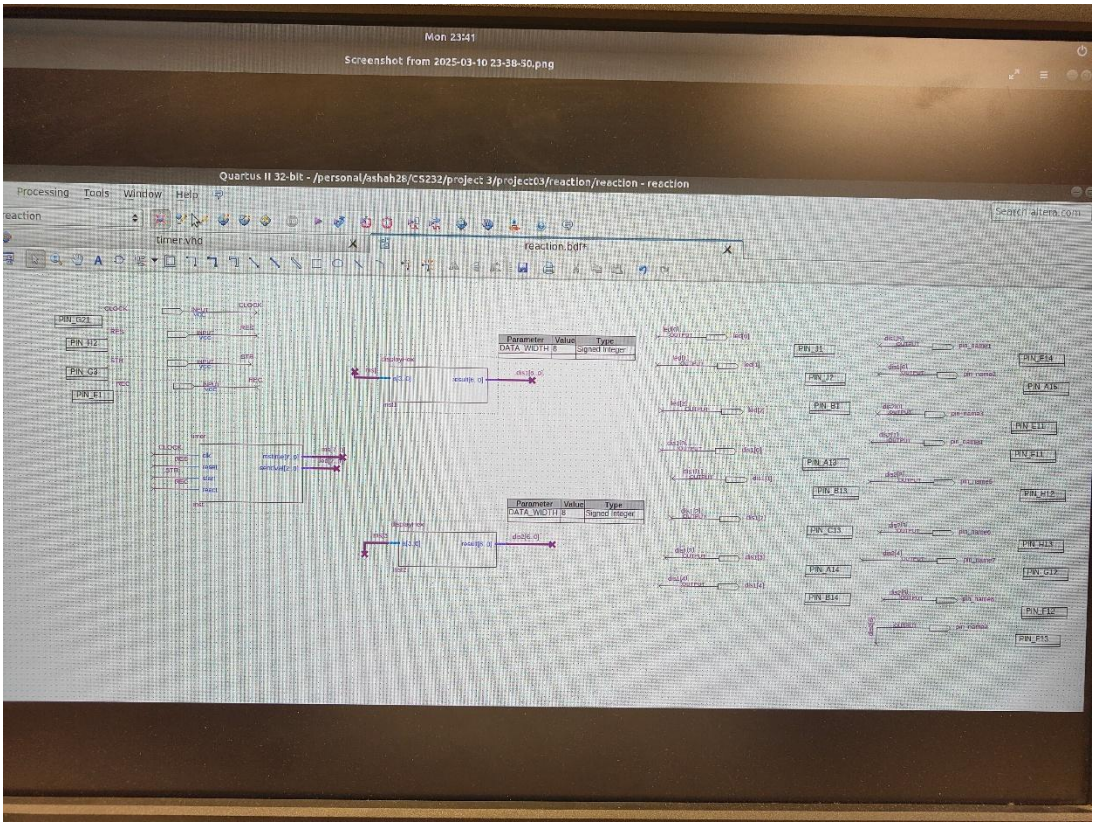
This project allowed us to explore sequential circuits by allowing us to build a state machine circuit that tests our reaction time.

First, as the building block of our circuit, I started with the state machine description in a pictorial format for efficient understanding.



This is a very simple design that explores 3 states with 3 inputs. It also glows up some leds to showcase what state we are currently in. It outputs the mstime variable which is fed to our hexadecimal display panel to show the time it took for us to react to the leftmost led glowing.

All of this logic is build on the timer.vhd file which is itself a moore machine. I use this file as a driver for the overall inputs and which outputs its values to two hexadecimal display drivers to output the number of milliseconds it took to respond to.



This is the top-level design file which consists of all the drivers we wrote combined into one single reaction tester project. We can see the timer being used to connect all of the inputs while its outputs are fed directly to the display driver files.

For this circuit, we also have a lot of outputs as we need 7*2 for the double display panels and 3 more to display the current state.

Proof of Work:

Finally, I have included a video file demonstrating the board working well using the circuit I designed. I simply tried the two cases, when I respond to the counter before it goes off and the other case which is the normal case of playing the game according to the rules. The video demonstrates both of these conditions and thus we are able to verify that the circuit works properly.

Reflection:

Thus, this project allowed us to explore sequential circuits in a fun and interesting way. I tried implementing the dual player system but due to time constraints, was unable to completely write it nor showcase my partial progress. Regardless, sequential circuits are an amazing circuit design type allowing dynamic interactive systems.