5 Testing

Testing is an **extremely** important component of most projects, whether it involves a circuit, a process, power system, or software.

The testing plan should connect the requirements and the design to the adopting test strategy and instruments. In this overarching introduction, given an overview of the testing strategy. Emphasize any unique challenges to testing for your system/design.

5.1 Unit Testing

What units are being tested? How? Tools?

The Stopwatch will be tested by activating the stopwatch by breaking the laser connection to start the Stopwatch at the same time a timer will be started for 2 minutes. When the timer ends the laser connection will be broken again to stop the Stopwatch. The time on the Stopwatch will be compared to the 2-minutes time to see how close it is, and this test will be done serval times to make sure the results are consistent.

We also have the retainment walls as a unit and the Stopwatch to keep track of the racers' time as a unit. The retainment walls will be tested by using an RC car with the same dimensions as the ones used by the race teams to run into the wall and make the track wide enough for the RC car to pass.

For our project, we are considering each trap as a unit. We have the following types of tracks: Physical Traps, Cybersecurity Traps, and Electronically Complex Traps. Our method for testing will include both functional and stress testing of each trap. This will be completed to ensure that each unit performs as intended and is also able to be passed by the RC cars created by the other teams. This testing will involve simulated hacking attempts against the cars (jamming), stress testing of the moving parts, and validation of physical trap mechanisms. As for the tools that will be used to perform these tests, we will be using a multimeter to ensure everything is functioning properly when it come to anything electrical and hardware-based.

5.2 Interface Testing

What are the interfaces in your design? Discuss how the composition of two or more units (interfaces) are being tested. Tools?

The interfaces in our design are between the traps and the RC cars, the track and the RC car, and the track and the traps. These interfaces will be rigorously tested to guarantee seamless communication between each unit. For instance, the interaction between the RC car and the faraday cage must affect the car enough to where it can still drive forward and not stop the car completely. To complete these tests, we will have to work with one of the RC car teams to borrow their cars and make sure that the cars can pass each trap.

5.3 Integration Testing

What are the critical integration paths in your design? Justification for criticality may come from your requirements. How will they be tested? Tools?

We will place each unit onto the track and test that each unit's functionality has been maintained.

5.4 System Testing

Describe system level testing strategy. What set of unit tests, interface tests, and integration tests suffice for system level testing? This should be closely tied to the requirements. Tools?

Traps in the system will work towards a common goal without interacting with each other directly. Each trap will act as its own autonomous system in the total track system. The trap systems will trigger using separate timers attempting to stop oncoming RC cars. Visual cues and IDE's will be used to confirm systems and their code is running smoothly. In addition, a multimeter will be used on electrical components to test that they are working.

5.5 Regression Testing

How are you ensuring that any new additions do not break the old functionality? What implemented critical features do you need to ensure do not break? Is it driven by requirements? Tools?

Each of the traps is independent of the other. Each component of the traps will not be reliant on others. To make sure that new components do not destroy the functionality of the unit, we would either:

- **Make sure that we finalize every component within the trap to ensure that we do not have to add any more additions.**
- **We would have to take the whole unit apart of the track and add the new additions. To make sure the functionality is not interrupted.**

5.6 Acceptance Testing

How will you demonstrate that the design requirements, both functional and non-functional are being met? How would you involve your client in the acceptance testing?

Acceptance testing will involve demonstrating that both our functional and non-functional requires are met. This will include us showcasing the effectiveness of the traps, the accuracy of the stopwatch, and the overall track performance. We encourage our client to be involved in acceptance tests to ensure that the design aligns with his expectations.

5.7 Security Testing (if applicable)

5.8 Results

We currently do not have test results.