

FrostAV: Test Plan

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Contents

1	Test Environment	1
2	Test requirements	1
3	Module Testing	1

1 Test Environment

In order to test the overall system, the car will be placed on a designated circuit. The circuit will be created, with the lane edges defined by tape with a width less than 2 inches. The lanes need to be wider than the width of the car. The circuit will have at least one sign, printed onto paper and placed perpendicular to the floor. Each corner of the circuit must be less than 45°. There will also be automated obstacles placed onto the course which will force the car to stop, and then they will be automatically removed.

2 Test requirements

The car must be able to travel in a lane, approximately parallel to it and remain within its boundaries. If the car leaves the lane then it must promptly return to it. When the car reaches a corner, the car must turn, following the lane boundaries consistently. When presented with an obstacle the car must stop until it is moved away from the car's path. The car must be able to complete a full loop of the circuit.

3 Module Testing

As the car is assembled, each module will be tested individually to ensure that they function as intended. To test the car chassis, the steering servo and motor will be individually tested to ensure that they are functional, and the car will then be tested under remote control to verify that it is functional. For the power system, the voltage regulator will be connected to the battery, and the output voltage will be measured. The voltage must be between 4.75 and 5.25v in order to meet the USB specification. Next, a variable resistor will be connected to the regulator's output to simulate a load. The resistors value will be slowly decreased and the output voltage monitored. The output voltage must remain within 0.25v to be within USB spec.

To test the servo and motor control module, the frequency of the servo and motor controller PWM outputs will be measured to ensure it is at 50 Hz. Next, the module will be commanded through the servo and motor controller's possible range (1ms to 2ms pulse width) and the output will be measured to ensure the correct PWM values are being sent.