

Testing

<https://canvas.iastate.edu/courses/85384/files/16815872?wrap=1>

4.1 Unit Testing

ID	Units	Description	Tools
U.1	Car controller	Ensure that the car consistently operates using the same PWM signals.	Oscilloscope
U.2.1	Car	Test to make sure the car can maintain a consistent speed set by our Microcontrollers	Speed gun
U.2.2	On car speed tracking	Verify our on board measurement system matches externally measured speed	Speed gun, hall effect sensor or gps
U.2.3	Car Battery	Test how long the car battery lasts	
U.3.1	Computer vision	Verify that our computer vision solution recognizes only the lines we want	Camera, Jetson-nano
U.3.2		Verify that our computer vision solution make accurate decisions based on information passed in	Camera, Jetson-nano
U.4	App	Test that our app can calculate correct pace speed for given information	
U.5	MicroControllers	Ensure microcontrollers work	

4.2 Interface testing

ID	Name	Description	Tools
IF.1	MC	Test that the MC system can send driving instructions to car	Mock API
IF.2	App	Verify that the app can send out valid instructions through bt low energy	
IF.3	Computer vision	Ensure that the Computer vision system can send driving decisions to the Car	

4.3 Integration test

ID	Name	Description	Tools
IG.1	MC to Car	Test that the MC system can send driving instructions to car and the car follows them correctly	
IG.2	Computer vision to MC	Ensure that the Computer vision system can send driving decisions to the MC system that forwards them to the Car	
IG.3	App to MC/MC to App	Ensure that the application can send valid instructions for the MC to process and pass on to the	

		Car and that the MC can send back valid information about battery life and speed	
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4.4 System testing

ID	Name	Description	Tools	Reference
S.1	Autonomous Driving	The car can drive at a constant speed around a track with no external assistance.		U.3.1, U.3.2, U2.2, U2.1, IG.1, IG.2
S.2	App to Car	Testing that we can send information from the app to the car, and the car drives as expected		U.4, IF.2, IG.3
S.3	Rabbit	Send a full workout program to the Rabbit and verify it completes the workout without leaving the track		S.2, S.1

4.5 Regression Testing

ID	Name	Description	Tools
R.1	Basic Car Driving	Test that we can send a basic drive forward instructions to the Car whenever we make an update to the app	
R.2	Computer Vision Accuracy	As we are developing computer vision, ensure that it consistently is making accurate decisions	

R.2.1	Computer Vision Line accuracy	Ensure that the computer vision solution can accurately identify lines	
R.3	App Instructions	Ensure that the app consistently sends accurate workout data through bt low energy	

4.6 Acceptance Testing

Number	Area	FR/NFR/Constraint	Requirement	Test method
1.1.1	Rab	FR	estop	Start the rabbit hit the estop
1.1.2	Rab	FR	Acceleration	Measure the performance of real runners using an accelerometer to find performance
1.1.3	Rab	FR	App control	Change options in the app and make sure the rabbit changes its behavior
1.2.1	Rab	NFR	Battery life	Run the system for a hour going through routines
1.2.2	Rab	NFR	Match Pace	Measure the top speed of the rabbit ensure it is above 27.77 miles per hour https://www.britannica.com/story/how-fast-is-the-worlds-fastest-human
1.3.1	Rab	Constraint	Cost	Put together a cost estimate of all parts and components and estimated expenses as well as a profit

				percentage and ensure it is less than 1000 dollars
2.1.1	App	FR	Options (NFR?)	Are the options available
2.2.1	App	NFR	Input Response	Measure the response time of various inputs and take the average
2.3.1	App	Constraint	App Availability	Is the app on both IOS and Android
3.1.1	Nav	FR	Lane following	95% of tests have the robot stay in the lane

4.7 Security Testing (If applicable)

4.8 Results

Test results to be added: