Customer Need	Technical Need	Technical Requirement	Target Value	Current Performance
Mobility Demonstration				
Move fast	The robot's average velocity is greater than Harris Corporation's stated minimum velocity.	Measure the distance the robot moves every 60 seconds. This distance should be at least 18 feet. (Average velocity is > 0.3 feet/second)	The measured distance the robot moves after one minute intervals should be at least 36 feet. (Average velocity is > 0.6 feet/second)	Our robot moves 14.28 feet in one minute (an average velocity of 0.238 feet/ second).
Move straight	The amount of deviation from the desired path of the robot should be a small distance.	The ratio between the deviation of the robot perpendicular to the desired path (distance between the center of the robot and the center of the desired path) and the distance the robot has traveled should be less than 0.2.	The ratio between the deviation of the robot perpendicular to the desired path (distance between the center of the robot and the center of the desired path) and the distance the robot has traveled should be less than 0.1.	The calculated ratio (deviation to distance) is 1. (After moving a distance of 3.17 feet, the robot was 3.17 feet away from the desired path.)
Line Follow				
Follow a line	The amount of deviation between the center of the line and the center of the robot should be a small distance.	The ratio between the deviation of the robot perpendicular to the line (distance between the center of the robot and the center of the line) and the distance the robot has traveled should be less than 0.2.	The ratio between the deviation of the robot perpendicular to the line (distance between the center of the robot and the center of the line) and the distance the robot has traveled should be less than 0.1.	TBD
Find a line	The robot must be able to detect a black solid, dotted, and/or dashed line within a small amount of time.	Time to find line (if robot has deviated or line is broken) < 5 seconds	TBD	N/A
Obstacle Traversal				

Overcome obstacles	The robot must be able to overcome small obstacles in its path.	The robot can overcome obstacles 0.5 inches tall or shorter.	The robot can overcome obstacles 1 inch tall or shorter.	N/A
Move quickly over irregular terrain	Robot must move over irregular terrain (squishy, slippery, rough, uphill, downhill, uneven, etc.) without slowing its pace.	Measure the distance the robot moves every 60 seconds. This distance should be at least 18 feet. (Average velocity is > 0.3 feet/second)	The measured distance the robot moves after one minute intervals should be at least 30 feet. (Average velocity is > 0.5 feet/second)	N/A
Bin Drop-Off Location				
Locate bin drop-off points	Robot must stop at bin drop-off points.	Distance between the center of the robot at its stop and the center of the bin drop off circle < radius of the circle.	Distance between the center of the robot at its stop and the center of the bin drop off circle < half the radius of the circle.	N/A
Make known that a bin drop-off point has been identified.	The robot must beep three times once the bin drop-off location has been identified.	The time between the robot's stop at the drop-off point and first identification beep must be less than 3 seconds.	The time between the robot's stop at the drop-off point and first identification beep must be less than 1 second.	N/A
Lift, Transport, and Drop Bin				
Lift a bin	Robot must be able to pick up the bins.	Weight able to lift > 125 grams	Weight able to lift > 250 grams	N/A
Transport quickly	Robot must be able to move with weight of bin without slowing pace.	Measure the distance the robot moves every 60 seconds. This distance should be at least 18 feet. (Average velocity is > 0.3 feet/second)	The measured distance the robot moves after one minute intervals should be at least 36 feet. (Average velocity is > 0.6 feet/second)	N/A

Transport a bin	Robot must be able to move a minimum distance while carrying bin.	Distance moved with bin > 50 feet (estimated distance to drop off point from the original bin position)	Distance moved with bin > 100 feet (twice the estimated distance to drop off point from the original bin position)	N/A
Prevent dropping of the bin.	Robot must be able to transport the bins without dropping the bins at unwanted locations.	The robot can successfully carry the bins to their respective drop-off points 70% of the time.	The robot can successfully carry the bins to their respective drop-off points 100% of the time.	N/A
Drop a bin.	Robot must be able to accurately set down bins.	Distance between center of bin in its final location and center of bin drop-off circle < radius of the circle	Distance between center of bin in its final location and center of bin drop-off circle < half of the radius of the circle	N/A
Disengage from the bin and continue its tasks.	Robot must quickly lose contact with bin once it has been properly placed and continue around the path.	The time the robot takes to disengage from the bin and begin to continue around the path without the bin < 10 seconds.	The time the robot takes to disengage from the bin and begin to continue around the path without the bin < 5 seconds.	N/A
Bin Identification				
Identify the organic materials.	Robot must be able to identify the bin containing the organic materials, knowing that the bin will have a mass of 55-75 grams.	The robot will measure the bin mass twice (once when it has been picked up, and a second time when it reaches the drop-off circle). The difference between these two measurements should be < 5 grams.	The robot will measure the bin mass twice (once when it has been picked up, and a second time when it reaches the drop-off circle). There should be no difference between these two measurements.	N/A
Identify the	Robot must be able to identify the bin	The robot will measure the bin mass twice (once when it	The robot will measure the bin mass twice (once when it	N/A

ceramic materials.	containing the ceramic materials, knowing that the bin will have a mass of 85-105 grams.	has been picked up, and a second time when it reaches the drop-off circle). The difference between these two measurements should be < 5 grams.	has been picked up, and a second time when it reaches the drop-off circle). There should be no difference between these two measurements.	
Identify the metallic materials.	Robot must be able to identify the bin containing the metallic materials, knowing that the bin will have a mass of 115-135 grams.	The robot will measure the bin mass twice (once when it has been picked up, and a second time when it reaches the drop-off circle). The difference between these two measurements should be < 5 grams.	The robot will measure the bin mass twice (once when it has been picked up, and a second time when it reaches the drop-off circle). There should be no difference between these two measurements.	N/A
Identify bins quickly	Robot must be able to determine the contents of the bins in a small amount of time.	Time to determine bin < 5 seconds	Time < 1 second	N/A
Display the identified material	Robot must display the material that it has identified on the screen.	The robot displays the correct material type 75% of the time	The robot displays the correct material type 90% of the time.	N/A