**TEAM 45 PROJECT 3 POC SPECIFICATIONS**

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| **Customer Need** | **Technical Need** | **Technical Requirement** | **Target Value** | **Current Performance** |
| **TASK 1: MOBILITY IN OBSTACLE-FREE AREA** | | | | |
| Move quickly | Time to travel 1 foot in a straight line | Travels 1 foot in < 1 second | Travels 1 foot in < 0.5 seconds | Travels 1 foot in 0.5 second |
| Move straight | Travel to a specified location via a straight line and stop with marker over a specified point | Marker < 2 inches from point | Marker < 0.5 inches from point |  |
| Make tight turns | Turning radius -- radius of the smallest circular path the ALV can follow | Radius < 5 inches | Radius < 3 inches |  |
| Can follow a path that turns | Travel to a specified location via a path with at least 1 turn immediately before the location and stop with marker over a specified point | Marker < 2 inches from point | Marker < 0.5 inches from point |  |
| Move over a large distance | Minimum distance able to travel without breaking | Minimum distance > 20 feet | Minimum distance > 25 feet | Minimum distance > 6 feet |
| **TASK 2: NAVIGATE USING GPS SIGNAL/ SURROUNDING OBSTACLES** | | | | |
| Stops at a given destination | The ALV stops within a small distance of given location | Distance < 3 inches | Distance < 1 inch |  |
| Navigate around surrounding obstacles | Distance from edge of obstacle to edge of ALV while maneuvering around obstacle | Distance < 5 inches | Distance < 2 inches |  |
| Can estimate its current coordinates | Distance from where the robot is to where it thinks it is | Distance is less than 10 cm | Distance is less than 5 cm |  |
| Can estimate its current direction | Difference in degrees of where the robot is facing versus where it thinks it is facing | Degree difference is less than 30 degrees | Degree difference is less than 10 degrees |  |
| Can navigate along a straight path | Distance offset from a straight path 5 feet long | Distance < 5 inches | Distance < 2 inches |  |
| Can navigate around corners | Distance offset from a circular path of radius 3 feet | Distance < 5 inches | Distance < 2 inches |  |
| Can turn to face next checkpoint | Difference in angle between a randomly selected checkpoint and where the robot is facing after orienting itself | Angle < 10 degrees | Angle < 5 degrees |  |
| Troubleshoots if ALV runs into an obstacle it cannot overcome | Time to re-route around obstacles ALV cannot overcome | Time < 5 seconds | Time < 2 seconds |  |
| **TASK 3: ABILITY TO TRAVERSE SMALL OBSTACLES** | | | | |
| Overcome small hazards | Height of obstacle AVL able to overcome | Able to overcome obstacles of height > 10 mm | Able to overcome obstacles of height > 20 mm | Able to overcome obstacles of height > 6 mm |
| Move quickly to overcome hazards | Time to travel 1 foot while overcoming obstacle with maximum height 10 mm | Travels 1 foot < 2 seconds | Travels 1 foot < 1 second | Travels 1 foot in 0.5 seconds |
| Traverse a variety of obstacles and terrain | Time to travel 1 foot while traversing irregular terrain (squishy, slippery, rough, uphill, downhill, uneven, etc.) | Travels 1 foot < 2 seconds | Travels 1 foot < 1 second | Travels 1 foot in 0.5 seconds |
| **TASK 4: LOCATE BEACON AND STOP AT IT** | | | | |
| Locate and stop at beacon | Distance from the center of where antenna would be placed to the center of the beacon | Distance < 1 foot | Distance < 6 inches |  |
| Make known that a beacon location has been identified | Time to beep 3 times after correctly identifying (i.e. stopping at) a beacon | Time < 1 second | Time < 0.5 seconds |  |
| **TASK 5: TRANSPORT AND DROP ANTENNA IN PROPER ORIENTATION** | | | | |
| Can carry multiple antenna | Distance can walk fully loaded | Can walk at least 10 feet with 600 grams loaded onto the robot without falling over | Can walk at least 20 feet with 800 grams loaded onto the robot without falling over |  |
| Can place antenna close to drop point | Distance from a drop off point to the closest part of the box to drop off location | Can drop antenna off 0 inches away from the drop off point | Can drop antenna off 0 inches away from the drop off point |  |
| Can place antenna in proper orientation | Number of antenna that are placed with the correct side facing up | Can drop all 3 antenna in the correct orientation | Can drop all 3 antenna in the correct orientation | Drops 0 / 3 antenna in correct orientation |
| Can disengage | Distance the robot can move away from a drop off point after unloading an antenna package within 30 seconds | Can move 2 cm away from the antenna after unloading it | Can move 3 cm away from the antenna after unloading it | Can move 50 cm away from the antenna after unloading it |
| Does not drop antenna en route to destinations | Distance the ALV can travel without losing any antenna | Can travel at least 10 feet fully loaded without losing any antenna | Can travel at least 20 feet fully loaded without losing any antenna |  |
| **TASK 6: UTILIZE GPS TRACKING SOFTWARE** | | | | |
| Can display its current coordinates | Distance from where the robot is to where it thinks it is | Distance is less than 10 cm | Distance is less than 5 cm |  |
| Can recognize invalid coordinates | Time to recognize invalid coordinates | Time < 10 seconds | Time < 5 seconds |  |
| Can handle different types of errors | Errors ALV can handle | ALV can handle errors < 16 (i.e. 2, 4, 8) | ALV can handle errors >= 32 (i.e. 2, 4, 8, 16, 32) |  |
| Can determine its direction | Difference in degrees of where the robot is facing versus where it thinks it is facing | Degree difference is less than 30 degrees | Degree difference is less than 10 degrees |  |
| Can receive GPS coordinates | Time to receive and display GPS coordinates | Takes less than 10 seconds to receive and display the correct GPS coordinates | Takes less than 5 seconds to receive and display the correct GPS coordinates |  |