

Team D FVD - CuBi

Objective: Validate all of CuBi's subsystems to meet all the performance requirements.

Location: Cyert Center for Early Education (*tentative*). It will have obstacles like chairs placed in the area. The area will be closed with walls created by furniture. Carpets in the area will have a maximum thickness of 1.2 cm.

Equipment: 10 tennis ball-sized toys, CuBi, box, any necessary replacements for any major subsystems which are at high risk of breaking, AprilTag

Setup:

1. Before testing, Team D will have already created a 2D map of the walls of the room.
2. Third-party places 10 toys at least 10 cm away from obstacles (including walls) at any location they want.
3. Team CuBi will place a box with AprilTag at the starting location. This will designate where the toys will be placed by the end of the *20 minutes*. Toys will be placed in a box.
4. CuBi is placed in the designated starting position.

Procedure:

#	Description	Performance Measures
1	Launch CuBi.	
2	CuBi starts to explore the room and perform SLAM to add static obstacles to 2D map of the room.	90% of the reachable area should be mapped by the robot
3	CuBi performs local planning to traverse the room while avoiding the obstacles it sees.	Avoid 75% of the obstacles
4	Whenever CuBi sees a toy, it uses its manipulator to pick it up.	Manipulator should pick up toy within 5 attempts
5	CuBi should be able to drop the clutter at the designated position marked with AprilTag accurately.	The success rate of dropping should be more than 90%.
6	CuBi will reset its odometry every time it drops off a toy.	Will localize indoors with accumulated error < 10% per 20 minutes of operation.
7	CuBi should be able to pick most of the toys off the ground.	At least 80% of the toys should be picked up by CuBi
8	CuBi should be able to clean up 20m ² area in a reasonable time.	It should pick eight out of ten toys in less than 20 minutes

