

Small Robot Mission Profiles

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Executive Summary

This document contains small robot mission profiles for use in testing and development. The profiles contain a description of terrain, distance, time, and activities in a sequential order.

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Introduction

To properly test and develop small robots, descriptions of standard tests were established. These tests take the form of typical / worst case missions that the robots need to perform in the real world. In each mission profile, an explanation of the mission type is included containing assumptions and history.

A “small robot” is defined for this document as an unmanned ground asset either teleoperated, semi-autonomously, or autonomously operated weighing between 6 kg and 57 kg. This weight includes the robot and everything attached to it physically, including on-vehicle power sources, but does not include the Operator Control Unit (OCU). This class of robot comprises the overwhelming majority of the fielded unmanned ground systems currently in Iraq and Afghanistan.

Since a mission profile contained in this document may be the combination of several “real world” missions that are closely related or similar in robot performance needs, the missions are numbered and not given a descriptive name.

Mission Profiles

Mission 1

Background

This mission profile combines the basic tasks of the following in-theater missions:

- Short-range Surveillance
- Short-range Reconnaissance
- Improvised Explosive Device (IED) investigation
- Checkpoint inspection
- Route clearance
- Engineering detonation in place

These are all currently Line of Sight (LOS) missions or teleoperated applications.

Profile

All traveling is done at an average speed of 4 kph, while transmitting full color video back to the OCU. If run continuously, this entire test should be completed within 40 minutes. It is acceptable to run the test non-continuously (piecemeal), but each step should be kept intact and the power source(s) must not be replenished between steps.

OCU shall be kept at standoff distance of approximately 100 m from the robot during the test.

Ambient temperature of 25° C, +/- 5° C, clear conditions, less than 10 kph wind.

1. Robot picks up a 2.0 kg weight and carries it.
2. Robot travels 100 m over a pea gravel road gravel surface.
3. Robot travels 60 m on loose, sandy surface.
4. Robot travels 20 m over rocks or crushed concrete of an average size of approximately 75 mm diameter.
5. Robot travels 10 m uphill on grass or dirt at 30% slope. The total height will be approximately 4.5 m.
6. Robot travels 10 m downhill (negative obstacle) on grass at 30% slope. The total depth will be approximately 4.5 m.
7. Repeat steps 5 and 6 four more times for a total of five times (100 m of total distance traveled).
8. Robot drops 2.0 kg weight.
9. Robot travels 20 m over an asphalt or concrete surface and climbs over two obstacles 0.1 m in height and spaced 9 m apart and approximately 0.2 m in width, as seen in Table 1.

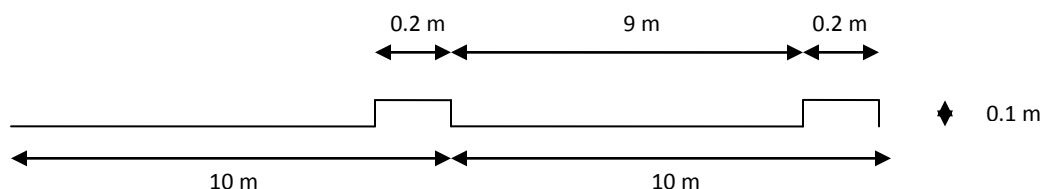


Table 1: Mission 1 Step 7 Obstacle Diagram

10. Robot manipulates arm for 5 minutes by continuously executing set poses, if available, or some repeatable motion sequences otherwise.

Mission 2

Background

This mission is an anticipated long-range surveillance and reconnaissance mission.

Profile

Not defined at this time.

Appendices

Appendix A: Acronyms

IED: Improvised Explosive Device

LOS: Line of Sight

OCU: Operator Control Unit

TARDEC: Tank Automotive Research, Development, and Engineering Command