

Robot Drive Motor Characterization Test Plan

PackBot Modernization Project

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14. ABSTRACT A test plan to measure voltage and current of active drive motors on a small robot under repeatable test conditions. Several positive and negative slope conditions are included.					
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Objectives

The purpose of this test is to measure voltage and current of active drive motors under repeatable test conditions. Several positive and negative slope conditions are included.

Requirements

Special equipment

- Datalogger
- Stopwatch
- Ambient temperature measurement device

Site requirements

- Incline surfaces at 15, 20, 25, and 30 degrees with grass or equivalent surface

Procedure

Repeat each of the following test conditions 3 times. This results in 3 separate trials of Test Condition 1, Test Condition 2/3, Test Condition 4/5, Test Condition 6/7, and Test Condition 8/9.

Test Condition 1: Level ground, zero longitudinal inclination

1. Start robot and OCU with current and voltage measurement device for one main drive motor.
2. Record ambient temperature, date and time of test.
3. Using the OCU, drive the robot to an open, flat area with 0 degree slope and set the vehicle speed to Creep.
4. Begin logging.
5. Drive in the forward direction for approximately 15 seconds at full throttle.
6. Pause for approximately 5 seconds.
7. Drive in reverse for approximately 15 seconds at full throttle.
8. Pause for 5 seconds.
9. Set the vehicle speed to Normal.
10. Drive in the forward direction for approximately 15 seconds at full throttle.
11. Pause for approximately 5 seconds.
12. Drive in reverse for approximately 15 seconds at full throttle.
13. Pause for 5 seconds.
14. Set the vehicle speed to Fast.
15. Drive in the forward direction for approximately 15 seconds at full throttle.
16. Pause for approximately 5 seconds.
17. Drive in reverse for approximately 15 seconds at full throttle.
18. Stop logging.

Test Conditions 2 & 3: 15 degree longitudinal inclinations, positive and negative

1. Start robot and OCU with current and voltage measurement device for one main drive motor.
2. Record ambient temperature, date and time of test.
3. Using the OCU, drive the robot to the base of the 15 degree hill and set the vehicle speed to Creep.
4. Begin logging.
5. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
6. Pause for approximately 5 seconds.
7. Drive down hill in reverse for approximately 15 seconds at full throttle.
8. Pause for 5 seconds.
9. Set the vehicle speed to Normal.
10. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
11. Pause for approximately 5 seconds.
12. Drive down hill in reverse for approximately 15 seconds at full throttle.
13. Pause for 5 seconds.
14. Set the vehicle speed to Fast.
15. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
16. Pause for approximately 5 seconds.
17. Drive down hill in reverse for approximately 15 seconds at full throttle.
18. Stop logging.

Test Conditions 4 & 5: 20 degree longitudinal inclinations, positive and negative

1. Start robot and OCU with current and voltage measurement device for one main drive motor.
2. Record ambient temperature, date and time of test.
3. Using the OCU, drive the robot to the base of the 20 degree hill and set the vehicle speed to Creep.
4. Begin logging.
5. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
6. Pause for approximately 5 seconds.
7. Drive down hill in reverse for approximately 15 seconds at full throttle.
8. Pause for 5 seconds.
9. Set the vehicle speed to Normal.
10. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
11. Pause for approximately 5 seconds.
12. Drive down hill in reverse for approximately 15 seconds at full throttle.
13. Pause for 5 seconds.
14. Set the vehicle speed to Fast.
15. Drive up hill in the forward direction for approximately 15 seconds at full throttle.

16. Pause for approximately 5 seconds.
17. Drive down hill in reverse for approximately 15 seconds at full throttle.
18. Stop logging.

Test Conditions 6 & 7: 25 degree longitudinal inclinations, positive and negative

1. Start robot and OCU with current and voltage measurement device for one main drive motor.
2. Record ambient temperature, date and time of test.
3. Using the OCU, drive the robot to the base of the 25 degree hill and set the vehicle speed to Creep.
4. Begin logging.
5. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
6. Pause for approximately 5 seconds.
7. Drive down hill in reverse for approximately 15 seconds at full throttle.
8. Pause for 5 seconds.
9. Set the vehicle speed to Normal.
10. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
11. Pause for approximately 5 seconds.
12. Drive down hill in reverse for approximately 15 seconds at full throttle.
13. Pause for 5 seconds.
14. Set the vehicle speed to Fast.
15. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
16. Pause for approximately 5 seconds.
17. Drive down hill in reverse for approximately 15 seconds at full throttle.
18. Stop logging.

Test Conditions 8 & 9: 30 degree longitudinal inclinations, positive and negative

1. Start robot and OCU with current and voltage measurement device for one main drive motor.
2. Record ambient temperature, date and time of test.
3. Using the OCU, drive the robot to the base of the 30 degree hill and set the vehicle speed to Creep.
4. Begin logging.
5. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
6. Pause for approximately 5 seconds.
7. Drive down hill in reverse for approximately 15 seconds at full throttle.
8. Pause for 5 seconds.
9. Set the vehicle speed to Normal.

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10. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
11. Pause for approximately 5 seconds.
12. Drive down hill in reverse for approximately 15 seconds at full throttle.
13. Pause for 5 seconds.
14. Set the vehicle speed to Fast.
15. Drive up hill in the forward direction for approximately 15 seconds at full throttle.
16. Pause for approximately 5 seconds.
17. Drive down hill in reverse for approximately 15 seconds at full throttle.
18. Stop logging.

Robot Drive Motor Characterization Log Sheet

- a. Test Condition 1: Level ground, zero longitudinal inclination

Date

Time

Ambient Temperature (C):

Data file name:

- b. Test Conditions 2 & 3: 15 degree longitudinal inclinations, positive and negative

Date

Time

Ambient Temperature (C):

Data file name:

- c. Test Conditions 4 & 5: 20 degree longitudinal inclinations, positive and negative

Date

Time

Ambient Temperature (C):

Data file name:

- d. Test Conditions 6 & 7: 25 degree longitudinal inclinations, positive and negative

Date

Time

Ambient Temperature (C):

Data file name:

- e. Test Conditions 8 & 9: 30 degree longitudinal inclinations, positive and negative

Date

Time

Ambient Temperature (C):

Data file name: