

Requirements

1 Project Requirements

- 1.1 The total cost of the project including, but not limited to, the following shall not exceed \$2,500.
 - 1.1.1 Labor.
 - 1.1.2 Prototypes.
 - 1.1.3 Final product.
 - 1.1.4 Unforeseen costs.

2 Operation Requirements

- 2.1 The mower must be battery powered.
 - 2.1.1 The battery must be rechargeable.
- 2.2 The mower must be autonomous as outlined in requirement 4.
- 2.3 The mower must be started manually.
- 2.4 A home base will be provided for the mower, which will serve as...
 - 2.4.1 the starting point for mowing operations.
 - 2.4.2 the ending point for mowing operations.
 - 2.4.3 the charger for the mower's batteries.
- 2.5 Operational safety requirements are outlined in requirement 6.

3 User Interaction Requirements

- 3.1 The user may issue the following commands to the mower.
 - 3.1.1 Begin mowing operations, as specified in requirement 4.5.
 - 3.1.2 Map terrain, as specified in requirement 4.4.
 - 3.1.3 Stop immediately, as specified in requirement 4.3.
 - 3.1.4 Return to base, as specified in requirement 4.2.
- 3.2 The base will provide the following state information to the user.
- 3.3 Current battery level in percentage.
- 3.4 Battery is charging.
- 3.5 Battery has completed charging.
- 3.6 Battery level is low.
 - 3.6.1 Battery level is considered to be low when the mower cannot complete its operation before power is exhausted.
- 3.7 Mowing operation is in progress.
- 3.8 Mower operation has been forcefully stopped because of a violation in requirements outlined in requirements 5 and 6.
 - 3.8.1 If the mower has been stopped, the cause of the stop.

4 Autonomous Functions Requirements

- 4.1 The mower must return to base when battery level is low.
- 4.2 Return to base.
 - 4.2.1 The mower must immediately disengage cutting device.
 - 4.2.2 The mower must navigate to base.
 - 4.2.3 The mower must connect itself to the charger.
- 4.3 Stop immediately.
 - 4.3.1 The mower must immediately disengage cutting device.
 - 4.3.2 The mower must brake to a complete stop.
 - 4.3.3 The mower must cut all power.
- 4.4 Map terrain.
 - 4.4.1 ...
 - ⋮
- 4.5 Begin mowing.
 - 4.5.1 ...
 - ⋮

5 Operating Environment Requirements

- 5.1 The product's components must be able to operate normally within an environment that
 - 5.1.1 is above XX degrees Fahrenheit
 - 5.1.2 is below XX degrees Fahrenheit
- 5.2 The product's components must not become inoperable due to constant exposure to conditions within the limits specified in requirement 5.
- 5.3 The mower will comply with the following standards for "weather proofing."
 - 5.3.1 Standard XXX.
 - 5.3.2 Standard YYY.
 - 5.3.3 Standard ZZZ.
- 5.4 The mower will only traverse ground which it detects is less than 33% incline as measured across its wheel base (from center to center of the wheels).
- 5.5 The mower will only traverse spaces which it detects to be greater than
 - 5.5.1 XX inches in length.
 - 5.5.2 XX inches in width.
 - 5.5.3 XX inches in height.

6 Safety Requirements

- 6.1 The mower must stop immediately (requirement 4.3) when...
 - 6.1.1 it senses an "undefined obstacle" in its path.

- 6.1.2 it senses moving objects entering its “safety bubble.”
- 6.1.3 an emergency kill switch on mower unit is pressed.
- 6.1.4 an emergency kill switch on the base / control panel is pressed.
- 6.2 The mower will sound an alarm when removed from its configured boundaries.
- 6.3 The mower will cease to function when removed from its configured boundaries.

7 Product Configuration Requirements

- 7.1 All of the below must be configurable one or more times.
- 7.2 Operating boundaries
 - 7.2.1 The user can set boundaries for the mower.
 - 7.2.2 Boundary is defined as a line the mower will not cut grass across.
 - 7.2.3 The user must configure a set of boundaries which comprise a closed shape in order for the mower to operate.
- 7.3 Desired height of grass after cut.
 - 7.3.1 Must be measurable by the mower.
 - 7.3.2 Must be adjustable to a minimum of XX inches.
 - 7.3.3 Must be adjustable to a maximum of XX inches.

8 Mowing Requirements

- 8.1 A mowing operation will be complete when the following conditions are met.
 - 8.1.1 At least 98% of the configured area (requirement 7.2) has been cut, not including areas subject to limitations outlined in requirements 5.4 and 5.5.
 - 8.1.2 The height of the grass which has been cut is accurate to plus or minus 0.XX inches of the desired height (requirement 7.3).