

## TEST CASE

Group Name: Exploration

Group Members: Collin, Amit, Rodney

Test Case Name: Lost!

Behavior Test Case is Designed to Test

The robot has no idea where it is and is unable to localize

Robot's Initial State (Internal or External Aspects)

- Some position on local map
- Unknown position on global map
- In exploration mode

Nominal Conditions (i.e., Conducive to Success)

- Plenty of battery life
- Breadcrumb or fiducial discovered
- We know where we are not
- Brick found

Anomalous Conditions (i.e., Conducive to Failure)

\* Possibly manipulation, when homing, saw something anomalous & went to wrong place

\* Large errors in the initial map

\* Localization has false positive, puts robot in wrong place

\*

## TEST CASE

**Group Name:** Brick Detection

**Group Members:** Shannon , Nick

**Test Case Name:** Partially Obscured Brick

**Behavior Test Case is Designed to Test**

What happens when a brick is partially obscured

**Robot's Initial State (Internal or External Aspects)**

Brick in view, but half blocked by bush.

Robot in explore mode.

**Nominal Conditions (i.e., Conducive to Success)**

Clear terrain near bush

Good lighting.

No other brick colored objects

**Anomalous Conditions (i.e., Conducive to Failure)**

Brick buried in bush

Poor lighting

Other brick colored objects.

## DESIRED OUTCOME (NOMINAL)

**Group Name:** Brick Detection

**Group Members:** Shannon, Nick

**Test Case Name:** Partially Obscured Brick

**Preconditions** Robot in explore mode

Brick partially hidden behind a bush

Clear terrain near bush

No other brick-colored objects

**Desired Behavior** Robot senses closer/~~around~~ around bush to investigate brick and re-evaluate

### Postconditions

Either:

- (1) Object confirmed as brick
- (2) Object confirmed non-brick
- (3) Further evaluation occurs

**DESIRED OUTCOME (ANOMALOUS)**

**Group Name:**

**Group Members:**

**Test Case Name:**

**Preconditions**

~~Brick buried in bush~~

Unpassable terrain near bush

**Desired Behavior** ~~see~~ Robot recognizes that terrain is unpassable and abandons brick

**Postconditions** Continue exploration

## TEST CASE

**Group Name:** Brick Pickup

**Group Members:** Matt H, Ricky W.

**Test Case Name:** Brick Pickup against wall

**Behavior Test Case is Designed to Test**

Gripping brick and placing it in hopper, when brick is against a wall

**Robot's Initial State (Internal or External Aspects)**

- Camera over brick
- Transferred control to manip.
- Not full on bricks

**Nominal Conditions (i.e., Conducive to Success)**

Good alignment with brick  
Strong grip + good friction

**Anomalous Conditions (i.e., Conducive to Failure)**

wet/slippy brick

Feeble grip (battery?)

Brick in corner

## TEST CASE

Group Name: Homing

Group Members: Brett Mitchell, Marta Luczynska, Greg Belote

Test Case Name: 1

Behavior Test Case is Designed to Test Robot can successfully return to hayer

Robot's Initial State (Internal or External Aspects)

Robot has acquired desired # of bricks

Nominal Conditions (i.e., Conducive to Success)

- Sufficient battery power to traverse minimal path back home (minimal path includes 'fudge factor' to allow for delays in local movement due to obstacles)
- Global map w/ Robot and home locations marked.
- Able to move
- Robot knows it has desired number of bricks

Anomalous Conditions (i.e., Conducive to Failure)

- HLL Underestimates distance home (perhaps due to obstacles that greatly delay journey home.)
- Not a path home
- unable to move
- lack of localization
- robot doesn't know how many bricks it has

## DESIRED OUTCOME (NOMINAL)

Group Name: Homing

Group Members: Brett Mitchell, Marta Luczynska, Greg Belote

Test Case Name: Return to hangar

### Preconditions

- Robot has acquired desired # of bricks
- has good battery power
- able to move
- $\exists$  path name
- global map. w/ home and robot position (localized).
- robot ~~knows~~ knows it has acquired desired # of bricks.

### Desired Behavior

Robot returns to hangar by:

- realizing it has acquired desired # of bricks  $\{ \# \text{ HLL} \}$
- $\{ \text{HLL} \}$  tells  $\{ \text{Planner} \}$  to plan path home
- $\{ \text{Reactive} \}$  executes path home avoiding unforeseen obstacles.

### Postconditions

Robot is at the hangar, ready to build the structure.  
or unload current bricks and get more.

## DESIRED OUTCOME (ANOMALOUS)

**Group Name:** Homing

**Group Members:** Brett Mitchell, Marta Luczynska, Greg Belote

**Test Case Name:** Return to hangar

### Preconditions

- Case 1:  
- not sufficient battery power
- Case 2:  
- ~~no~~ a path home
- Case 3:  
- unable to move
- Case 4:  
- lack of localization
- Case 5: doesn't  
- Robot ~~knows~~ it has required # of bricks.

### Desired Behavior

- Case 1:  
- attempt to get home by any means possible  
- high speed home  
- HLL gives control to only modules that are needed to get home.
- Case 2:  
- get as close to home as possible  
- retry planning from new location (i.e. maybe obstacle has moved).
- Case 3:  
- ~~wait~~ wait until able to move  
- try moving in all dir.
- Case 4:  
- explore until localized
- Case 5:  
- keeps getting more bricks (?)

### Postconditions

- Case 1:  
- get home! (fast!!)
- Case 2:  
- re-plan path + get home!
- Case 3:  
- re-plan path and go home!
- Case 4:  
- ~~get~~ localized and go home!
- Case 5:  
- keep getting more bricks (not go home!) (?)  
(Find out how exactly we will keep track of how many bricks we have. we want to avoid above behavior (i.e. not going home even if we have enough bricks) as much as possible).



## TEST CASE

**Group Name:** Construction

**Group Members:** velezj, amora

**Test Case Name:** Construction

**Behavior Test Case is Designed to Test**

We can add a brick to a structure (may be empty)

**Robot's Initial State (Internal or External Aspects)**

have sufficient battery

have N blocks stored

**Nominal Conditions (i.e., Conducive to Success)**

No dynamic obstacles appear onto build site

Structure is where we think it is

Structure is in state we left it.

> trucker can take another brick

we know where we are in respect to structure

ground is "friendly"

**Anomalous Conditions (i.e., Conducive to Failure)**

not above

## DESIRED OUTCOME (NOMINAL)

Group Name: Construction

Group Members: Velez, Amora

Test Case Name: Construction

### Preconditions

init state

we are at build site, & distance

we ~~has~~ have  $N$  blocks  $N \geq 1$

we have enough battery

Robot fully functional

### Desired Behavior

Brick is added to structure, unless error.

Error is detected and signaled.

~~Brick is not used and stored for later use~~

~~if stack collapses, then we must use the 1 brick~~

### Postconditions

Either: structure extended

or we ~~have~~ know an error happened  
~~and did not waste brick~~

## DESIRED OUTCOME (ANOMALOUS)

**Group Name:**

**Group Members:**

**Test Case Name:**

**Preconditions**

**Desired Behavior**

*Error reported*

**Postconditions**

*unknown state of structure  
might or might not have the brick still*