

HYBRID TEST

GROUP 4

2nd December 2016
Version 4

Abstract

This test aimed to determine whether the swinging collector/grabber hybrid design could reliably collect and grab blocks at various positions and orientations in front of the robot. It was determined that the design is able to successfully collect and grab the blocks in all reasonable positions, and all orientations except when the block is at a 45 degree angle with the device.

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1 BACKGROUND

1.1 Edit History

Jake Zhu: 2016-10-28, Initial set up

Jake Zhu: 2016-11-05, Made testing case based on time to test efficiency and created a separate document for each design.

Jake Zhu: 2016-11-05, Idea scrapped. Hardware team wants qualitative data. Merged all the Hybrid Tests.

Quentin and Ben: 2016-11-06, Tested and completed everything except conclusion.

Jake Zhu: 2016-11-07, Finished up conclusion.

Benjamin Willms: 2016-11-13, Edited all sections to better represent the test that was performed.

Benjamin Willms: 2016-11-14, Edited the software version to reflect the new names of the java files, and added the abstract.

1.2 Test Information

Tester: Quentin and Ben

Author: Quentin, Ben and Jake

Hardware Version: Swinging Collector/Grabber Hybrid

Software Version: CollectingGrabbingTest.java, ExitThreadForCollectingGrabbingTest.java

2 GOAL

To determine whether the swinging collector/grabber hybrid can collect, pick up, and drop the blocks.

3 PROCEDURE

Setup

1. Build a prototype of each design.
2. Attach the prototype to the brick.

3. Write code so that the hybrid will swing its arms shut at the push of a button, and open the arms at the push of another button.

3.1 Collecting Test

1. Set the java code to turn the motor 100-110 degrees from its initial position
2. Set the arms in the furthest open position
3. Place the blocks at random locations and orientations in front of the hybrid.
4. Press the close button
5. While the arms are swinging shut, slowly move the hybrid towards the block, pushing it before the arms completely shut
6. Observe whether the block is successfully oriented to 0 degrees, and placed flush with the hybrid

3.2 Grabbing Test

1. Set the java code to turn the motor 190 degrees from its initial position
2. Set the arms in the furthest open position
3. Place the blocks at random positions flush with the hybrid (to simulate that the block was already collected successfully).
4. Press the close button
5. While the arms are swinging shut, slowly move the hybrid forward, to ensure that the grabbing does not change the blocks position with respect to the hybrid overly much.
6. Observe whether the block is successfully grabbed by lifting the hybrid into the air after the motor has stopped turning.
7. If the block can be successfully lifted, press the open button to release the block.

4 EXPECTED RESULTS

4.1 Collecting

It is expected that the hybrid will successfully orient the blocks to 0 degrees, and keep them flush with the hybrid in every case.

4.2 Grabbing

It is expected that the hybrid will grab the blocks with enough strength to lift them in all cases.

5 TEST REPORT

5.1 Collecting

Trial	Success?
1	True
2	True
3	True
4	True
5	True
6	True
7	True
8	True
9	False
10	True

The swinging arm hybrid worked as we expected. The only issue is when the brick is oriented at a 45 degree angle. This prevented the forward motion of the hybrid from turning the block, and resulted in the arms grabbing the 2 corners of the block instead of collecting it.

5.2 Grabbing

Trial	Success?
1	True
2	True
3	True
4	True
5	True
6	True
7	True
8	True
9	True
10	True

The hybrid successfully grabbed the block at any reasonable (within the range of error of collection) position flush with itself.

6 CONCLUSION

The idea behind the swinging arm hybrid is to use the arms in order to push the block into the right position and then use the swinging arms to grab the brick. The issue with the collecting portion is when the block is at a 45 degree angle. We will have to consider the case when the block is at 45 degrees because we do not want that issue affecting our robot during the competition. Our grabbing mechanism works well because it was able to grab the block once it was collected correctly.

7 ACTION

Because this design was successful, it should be implemented in a future hardware version.

8 DISTRIBUTION

Hardware Team