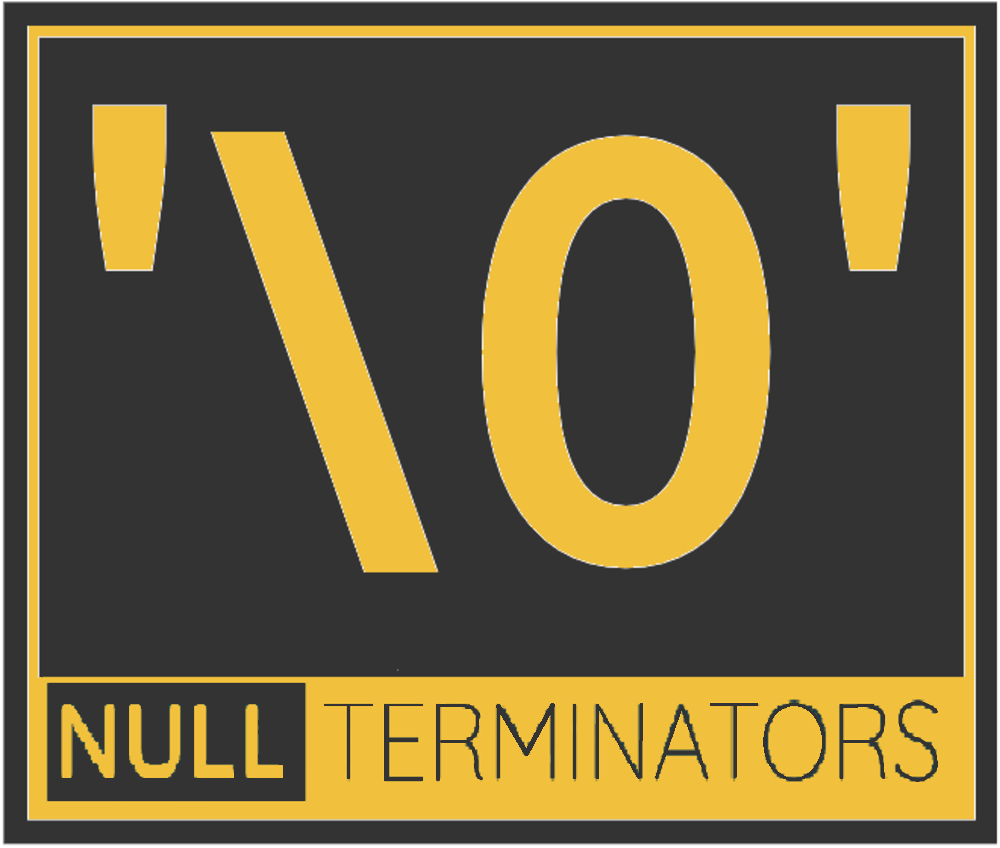
ATICS -

Automated Toolbox Inventory Control System

Testing

Null Terminators

Version: 1





Senior Project Requirement Specifications

CptS 421/423

WSU Tri-Cities

1710 Crimson Way, Richland, WA 99354

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Automated Toolbox Inventory Control System

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**Table of Contents**

[**Introduction 5**](#_mbwjn6eqaew5)

[**Logic Testing 6**](#_omjxo9nvpl5i)

[Drawer 0 6](#_a73p7tpvx4m2)

[drawer316\_0.avi No Rotation 6](#_1two3w66ctd)

[drawer316\_0.avi Rotate up to 2 degrees in either direction in .25 degree increments 7](#_mcogypk8u56d)

[drawer316\_1.avi No Rotation 7](#_p02ixdnnq0xc)

[drawer316\_1.avi Rotate up to 2 degrees in either direction in .25 degree increments 8](#_gd2gwl6467y8)

[drawer316\_2.avi No Rotation 8](#_yf15syuzjdz0)

[drawer316\_2.avi Rotate up to 2 degrees in either direction in .25 degree increments 9](#_j53oyagjr4kw)

[drawer316\_3.avi No Rotation 9](#_ilzpuxt8cv1j)

[drawer316\_3.avi Rotate up to 2 degrees in either direction in .25 degree increments 9](#_p0nqioehskqa)

[drawer316\_4.avi No Rotation 10](#_wecgih9bpb5b)

[drawer316\_4.avi Rotate up to 2 degrees in either direction in .25 degree increments 10](#_8vox5wbkrjhb)

[drawer316\_5.avi No Rotation 11](#_8h4t13gnowbj)

[drawer316\_5.avi Rotate up to 2 degrees in either direction in .25 degree increments 11](#_qm0hh2coc9be)

[drawer316\_6.avi No Rotation 12](#_hj4uzvxf6ttm)

[drawer316\_6.avi Rotate up to 2 degrees in either direction in .25 degree increments 12](#_16lqzun91ak0)

[drawer316\_7.avi No Rotation 12](#_yuiv5vha1ec1)

[drawer316\_7.avi Rotate up to 2 degrees in either direction in .25 degree increments 13](#_rcersth1um3w)

[drawer316\_8.avi No Rotation 13](#_bhjnrv3l2ski)

[drawer316\_8.avi Rotate up to 2 degrees in either direction in .25 degree increments 13](#_o10louancmo1)

[Drawer 0 Modified input 14](#_gk80unk4jxw2)

[drawer316\_0.avi No Rotation 14](#_kueotvck47o5)

[drawer316\_1.avi No Rotation 15](#_l6hd2jowan2x)

[drawer316\_2.avi No Rotation 15](#_bxgitgqzi16d)

[drawer316\_3.avi No Rotation 15](#_raww9ojlplxa)

[drawer316\_4.avi No Rotation 16](#_a6shnyk3rgw1)

[drawer316\_5.avi No Rotation 16](#_i0r8h13dbp8n)

[drawer316\_6.avi No Rotation 17](#_1ipmf2i5ixvl)

[drawer316\_7.avi No Rotation 17](#_2axs88p42pe9)

[drawer316\_8.avi 17](#_oehmt3he5q58)

[Drawer 1 18](#_339wrdlzav19)

[drawer330\_0\_0.avi No rotation 18](#_h0ry2l4ydjsi)

[drawer330\_0\_1.avi No rotation 19](#_8wo0ep2xecjo)

[drawer330\_0\_2.avi No rotation 19](#_up1zfbc1t769)

[drawer330\_0\_3.avi No rotation 20](#_mugw7k5nhu0r)

[drawer330\_0\_4.avi No rotation 21](#_y04ip9z7lwof)

[Drawer 2 21](#_cjx8o1sgcu6a)

[drawer330\_1\_0.avi Sockets 22](#_gq18qx59ug1h)

[drawer330\_1\_0.avi wrenches, plier and extra tool 23](#_mqr2hjhkgwyl)

[drawer330\_1\_1.avi Sockets 24](#_l99exn2k6o2v)

[drawer330\_1\_1.avi wrenches, plier and extra tool 25](#_bpa0kd0onmv)

[drawer330\_1\_2.avi Sockets 26](#_fxyhoue3cqux)

[drawer330\_1\_2.avi wrenches, plier and extra tool 27](#_lj2zjdbfbckf)

[drawer330\_1\_2.avi Sockets part 2 27](#_yd0frs1asisv)

[drawer330\_1\_2.avi wrenches, plier and extra tool part 2 28](#_9mhcdopnvbre)

[drawer330\_1\_3.avi Sockets 29](#_of3igbl1dxug)

[drawer330\_1\_3.avi wrenches, plier and extra tool 30](#_2v6w5mklt8wr)

[drawer330\_1\_3.avi Sockets part 2 31](#_9xfpijv17xfl)

[drawer330\_1\_3.avi wrenches, plier and extra tool part 2 32](#_l01xzr7gl9m6)

[Drawer 3 33](#_3bbjx4xdihgk)

[45\_fishsp\_0.avi 34](#_s0onu4fj97uq)

[45\_fishsp\_1.avi 34](#_jxvdzv1j5czj)

[45\_fishsp\_2.avi 35](#_qin3ui4o31hh)

[45\_fishsp\_3.avi 36](#_ji3td3rxwwvq)

[45\_fishsp\_4.avi 37](#_534my2nhdf1)

[45\_fishsp\_5.avi 37](#_ielhuy2tl7t1)

[45\_fishsp\_6.avi 38](#_6o66iljutk7v)

[45\_fishsp\_7.avi 39](#_p12h1vxk2bnd)

[45\_fishsp\_8.avi 40](#_254unv6ynhx6)

[45\_fishsp\_9.avi 40](#_daxno6o3c55y)

[45\_fishsp\_10.avi 41](#_dg84z7zcexiq)

[**API, Database, and Webserver and Live footage Integration Testing 42**](#_hdw1jol9q518)

[API and Database integration testing 42](#_fugvw7y97xzo)

[Webserver integration testing 44](#_ekol5bx9zau8)

[Live footage testing 45](#_351uf7mzpo38)

[**Final Testing 46**](#_q0ugh0aqblu1)

[finaltestingd1\_0.avi 46](#_r9352gxj92xm)

[finaltesting2\_0.avi 47](#_r1ubhr1swew3)

[finaltesting2\_1.avi 47](#_1pjkkzbv1973)

[finaltesting2\_2.avi 48](#_tn311fxutdif)

[Finalteseting2\_3.avi 48](#_7imuhirx253q)

[Finaltesting3\_0.avi 49](#_hffcixpmqzxj)

[finaltestingd3\_1.avi 50](#_tfdhy3f8g51v)

[finaltestingd3\_2.avi 52](#_y8cpzsa6a7ik)

[finaltestingd4\_0.avi 53](#_c18fw5qno17p)

[finaltestingd4\_1.avi 54](#_8g4kont0x704)

[hiline demo before (Drawer 1) 55](#_ljog8mkvnxee)

[hiline demo during (Drawer 1) 55](#_md8qken8ixts)

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# Introduction

This document contains the results of testing performed on the application to ensure ATICS meets the requirements specification. There are 3 major parts to the document: the logic testing, the live footage integration testing; and the final testing of the entire system with shadow boxes. The logic testing checks to see how well the program performs in general with detecting the status of tools and drawers. The live footage integration testing demonstrates the performance of the entire program including the API, database, file server, and live footage streaming from the camera.The final testing was done with a proper shadowbox in order to determine the accuracy of the program in as realistic of a setting as possible. Each test case includes the expected result of the test, the actual result and whether the program passed or failed.

# Logic Testing

These tests are designed to see how accurate the program is at detecting which drawer was open, whether tools were checked in or out, and whether or not there were any errors. This testing was done using a modified version of the program before integration with the database, and webserver. Bash scripts were used to run these tests, using the -test and -record modes built into ATICS. These tests are only to see if it is giving the correct output for whether tools are checked in, out and if there are errors. Some of the tests may have been discarded due to an issue with the input itself - the affected tests will be clearly noted as such. Comments will be made on issues seen when looking at the recorded videos as a whole, but these comments are not to be considered as actual tests that get a pass/fail, as there are far too many frames to comment by hand. Small modifications may have been made throughout testing that do not affect results, because of how long it takes to run tests. For example adding timestamps to the tool check in/ checkout events. The accuracy does decrease if there are shadows over the tools. Overall an accuracy of 63% was observed when including Drawer 0, and an accuracy of 65.2% only including the modified inputs tests on Drawer 0. The accuracy will likely improve with a more stable test setup.

## Drawer 0

The test videos were taken with colored cardboard and personal tools that were on hand. The set of tools included a mallet, 2 different types of pliers, and a hammer. Overall the box was very unstable and rotated noticeably or shifted up and down between tests. All tools had symbols and all tools were of a type recognizable by the tool classifier. Because of this instability I will be ignoring anything other than the last record in this set of testing. One thing to note across videos is that it is very easy for the sides of the box to be confused as an extra tool. Without rotation it passed 26 out of 45 - about 57% of tests. With rotation it passed about 26.5 out of 45 - about 58% of tests, although some of the failures recorded on this run were tests which had passed previously.

### drawer316\_0.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | Checkout | Pass |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkout | Checkout | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 5/5 Passed |

### 

### drawer316\_0.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | Checkout | Pass |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkout | Checkout | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 5/5 Passed |

### drawer316\_1.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkout | Fail |
| 2 red pliers | Checkin/None | Checkout | Fail |
| 3 hammer | Checkin/None | Checkout | Fail |
| 5 mallet | Checkin/None | Checkout | Fail |
| extra tool | None | None | Pass |
|  |  |  | 1/5 |

The box seemed to rotate quite a bit in this instance. It looks like the similarity thresholds ended up being very close a lot of the time.

### drawer316\_1.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/deferred |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkout | Fail |
| 2 red pliers | Checkin/None | Checkout | Fail |
| 3 hammer | Checkin/None | Checkout | Fail |
| 5 mallet | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 2/5 |

So the rotation did improve one of the results, although it did take quite a bit longer to run.

### drawer316\_2.avi No Rotation

| Tool | expected output | output given | Pass/Fail/deferred |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 5/5 |

The checked in ones say that they are checked in but the last frame is showing that they are error. A possible cause might be that I can’t get the last frame of the drawer being open.

### drawer316\_2.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | wrong tool | Fail |
| 2 red pliers | Checkout | CheckOut | Pass |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | CheckOut | Pass |
| extra tool | None | detected, crescent wrench | Fail |
|  |  |  | 3/5 |

### drawer316\_3.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkin/None | Checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 4/5 |

The hammer is showing an error in the video, but in the output record it isn't saying anything. So I assume I just can’t find the last frame.

### drawer316\_3.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkin/None | Checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | CheckOut | Pass |
| extra tool | None | detected, SocketSolo | Fail |
|  |  |  | 3/5 |

### drawer316\_4.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | Checkout | Pass |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkin/None | Checkout | Fail |
| 5 mallet | Checkin/None | Checkout | Fail |
| extra tool | None | None | Pass |
|  |  |  | 3/5 |

### 

### drawer316\_4.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | CheckOut | Pass |
| 2 red pliers | Checkout | CheckOut | Pass |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | None | Pass |
|  |  |  | 4/5 |

### drawer316\_5.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | Checkout | Fail |
| 2 red pliers | Error | Checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | Checkout | Fail |
| extra tool | detected, ratchet | None | Fail |
|  |  |  | 1/5 |

### drawer316\_5.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | Checkout | Fail |
| 2 red pliers | Error | Checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | Checkin/None | Pass |
| Extra tool | detected, ratchet | detected 3, tape measure, handsaw, and crescent wrench | discarded, .5 to passing since it did detect something in the right spot, even if it couldn’t figure out it was one thing and a ratchet |
|  |  |  | 2.5/5 |

### drawer316\_6.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | CheckOut | Fail |
| 2 red pliers | Checkin/None | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | None | Pass |
|  |  |  | 2/5 |

### drawer316\_6.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | CheckOut | Fail |
| 2 red pliers | Checkin/None | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | None | Pass |
|  |  |  | 2/5 |

### drawer316\_7.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | CheckOut | Fail |
| 2 red pliers | Error | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None\* | None | Pass |
|  |  |  | 2/5 |

\*There is an extra tool but since it is on top of other tools, it should just show an error on the tool which is being occluded.

### drawer316\_7.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | CheckOut | Fail |
| 2 red pliers | Error | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | Checkin/None | Pass |
| extra tool | None\* | None | Pass |
|  |  |  | 3/5 |

\*There is an extra tool but since it is on top of other tools, it should just show up error on the tool it is on top of.

### drawer316\_8.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | CheckOut | Fail |
| 2 red pliers | Checkin/None | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | None | Pass |
|  |  |  | 3/5 |

### drawer316\_8.avi Rotate up to 2 degrees in either direction in .25 degree increments

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | CheckOut | Fail |
| 2 red pliers | Checkin/None | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | detected, crescent wrench | Fail |
|  |  |  | 2/5 |

## Drawer 0 Modified input

Drawer 0 was modified to see if higher accuracy could be achieved by changing the templates to have less of the white space around the tool even if that meant cutting up part of the tool.30/45 = 66% so it passed 4 or 5 more tests than it did before, which isn’t bad considering some of the issues are coming from the instability of the setup used to run these tests.

### drawer316\_0.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | Checkout | Pass |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkout | Checkout | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 5/5 Passed |

### 

### drawer316\_1.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkout | Fail |
| 2 red pliers | Checkin/None | Checkout | Fail |
| 3 hammer | Checkin/None | Checkout | Fail |
| 5 mallet | Checkin/None | Checkout | Fail |
| extra tool | None | None | pass |
|  |  |  | 1/5 |

The box seemed to rotate quite a bit in this instance. It looks like the similarity thresholds ended up being very close a lot of the time.

### drawer316\_2.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Error | Fail |
| 2 red pliers | Checkout | Checkout | Pass |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | Checkout | Pass |
| extra tool | None | 1, crescent wrench | Fail |
|  |  |  | 4/5 |

The checked in ones say that they are checked in but the last frame is showing that they are error. It might just be that I can’t get the last frame of the drawer being open though.

### drawer316\_3.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkin/None | checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkout | checkout | Pass |
| extra tool | None | 1, socket solo | Fail |
|  |  |  | 4/5 |

The hammer is showing as error in the video, but in the output record it is not saying anything. So I assume I just can’t find the last frame.

### drawer316\_4.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkout | CheckOut | Pass |
| 2 red pliers | Checkout | CheckOut | Pass |
| 3 hammer | Checkin/None | CheckOut | Fail |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | None | None | Pass |
|  |  |  | 3/5 |

### 

### drawer316\_5.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | Checkin/None | Fail |
| 2 red pliers | Error | CheckOut | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | detected, ratchet | 1 detected, ratchet | Pass |
|  |  |  | 2/5 |

### drawer316\_6.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkin/None | Chekcout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 4/5 |

### drawer316\_7.avi No Rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Error | error | Pass |
| 2 red pliers | Error | error | Pass |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | CheckOut | Fail |
| extra tool | 1 detected,ratchet | 2 detected, socket solo, plier | Fail |
|  |  |  | 3/5 |

### drawer316\_8.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 black pliers | Checkin/None | Checkin/None | Pass |
| 2 red pliers | Checkin/None | checkout | Fail |
| 3 hammer | Checkin/None | Checkin/None | Pass |
| 5 mallet | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 4/5 |

## Drawer 1

This drawer contained mallets and pliers. The pliers are in a plastic container. In two of the test cases all 11 tests were discarded because there was something blocking part of the tool, so failure of the tests are considered to be because of error in the input. 53 tests in total were conducted with 20 being discarded. 32 /53 = 60% is the accuracy when no test cases are discarded. 22/(53-20) = .66% accuracy when test cases are discarded. There were some issues with these videos in general such as the plastic being reflective, and therefore changing by a large margin when there were shadows across it, as well as the styrofoam around mallet 1 and mallet 2 changing how they looked from the outset. If those tests are removed then 7/9 =77% test cases are passed.

### drawer330\_0\_0.avi No rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 0 plier 0 | Checkout | Checkout | Pass |
| 2 plier 1 | Checkout | Checkin/None | Fail |
| 3 plier 2 | Checkout | Checkin/None | Fail |
| 5 plier 3 | Checkout | Checkin/None | Fail |
| 6 plier 4 | Checkout | Checkout | Pass |
| 9 mallet 1 | Checkout | Checkout | Pass |
| 11 plier 5 | Checkout | Checkout | Pass |
| 13 mallet 2 | Checkout | Checkout | Pass |
| 14 mallet 3 | Checkout | Checkout | Pass |
| 15 mallet 4 | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 8/11 |

### drawer330\_0\_1.avi No rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 0 plier 0 | Checkin/None | Error | Fail |
| 2 plier 1 | Checkin/None | Error | Fail |
| 3 plier 2 | Checkin/None | Checkin/None | Pass |
| 5 plier 3 | Checkin/None | Checkin/None | Pass |
| 6 plier 4 | Checkin/None | Error | Fail |
| 9 mallet 1 | Checkin/None | Checkin/None | Pass |
| 11 plier 5 | Checkin/None | Checkin/None | Pass |
| 13 mallet 2 | Checkin/None | Checkout | Fail |
| 14 mallet 3 | Checkout | Checkin/None | Fail |
| 15 mallet 4 | Checkout | Checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 6/11 |

The symbols were covered up a few times during this process, which is why there are so many drawer openings and closings.

### drawer330\_0\_2.avi No rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 0 plier 0 | Checkin/None | Checkout | Fail/discarded |
| 2 plier 1 | Checkin/None | Checkout | Fail/discarded |
| 3 plier 2 | Checkin/None | Checkout | Fail/discarded |
| 5 plier 3 | Checkin/None | Checkin/None | pass/discarded |
| 6 plier 4 | Checkin/None | Checkin/None | pass/discarded |
| 9 mallet 1 | Checkin/None | Checkin/None | pass/discarded |
| 11 plier 5 | Checkin/None | Checkout | Fail/discarded |
| 13 mallet 2 | Checkin/None | Checkin/None | pass/discarded |
| 14 mallet 3 | Checkout | Checkin/None | Fail/discarded |
| 15 mallet 4 | Checkout | Checkout | Pass/discarded |
|  |  |  | 5/10 |

All tests were discarded because white board was blocking the view of the drawer so all template matches were against tools that were partially covered.

### drawer330\_0\_3.avi No rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 0 plier 0 | Checkin/None | Checkout | Fail/discarded |
| 2 plier 1 | Checkin/None | Checkout | Fail/discarded |
| 3 plier 2 | Checkin/None | Checkout | Fail/discarded |
| 5 plier 3 | Checkin/None | Checkin/None | Pass/discarded |
| 6 plier 4 | Checkin/None | Checkin/None | Pass/discarded |
| 9 mallet 1 | Checkin/None | Checkin/None | Pass/discarded |
| 11 plier 5 | Checkin/None | Checkout | Fail/discarded |
| 13 mallet 2 | Checkin/None | Checkin/None | Pass/discarded |
| 14 mallet 3 | Error | Checkin/None | Fail/discarded |
| 15 mallet 4 | Error | Error | Pass/discarded |
|  |  |  | 5/10 |

All tests were discarded because white board was blocking the view of drawer so all template matches were against tools that were partially covered.

### drawer330\_0\_4.avi No rotation

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 0 plier 0 | Checkin/None | Checkin/None | Pass |
| 2 plier 1 | Checkin/None | Checkin/None | Pass |
| 3 plier 2 | Checkin/None | Checkin/None | Pass |
| 5 plier 3 | Checkin/None | Checkin/None | Pass |
| 6 plier 4 | Checkin/None | error | Fail |
| 9 mallet 1 | Checkin/None | Checkin/None | Pass |
| 11 plier 5 | Checkin/None | error | Fail |
| 13 mallet 2 | Checkin/None | Checkin/None | Pass |
| 14 mallet 3 | Checkin/None | Checkin/None | Pass |
| 15 mallet 4 | Checkin/None | checkout | Fail |
| extra tool | none | none | Pass |
|  |  |  | 8/11 |

## Drawer 2

Because there are so many tools, they will be divided into sockets and wrenches. One of the wrenches was not put into the list of tools. There are no symbols on the tools. Overall it looks like the sockets do not work with the current method of having the “socket not present” template just being the bottom of the box.If looking at the first video it does look like ATICS is identifying them individually so long as you are putting them back properly does work, but that is only really seen from drawer330\_1\_0.avi since it was put back incorrectly every other time. For wrenches in a wrench set it does look like you can identify them individually, however either because of errors in the input or because issues with camera perspective, it doesn’t work very well with a partially open drawer. It is also difficult to tell if the reason for passing the tests is because the person blocked all three symbols as they were closing it, causing it to be split into two. Sockets passed 47/126 test which is about 37% of the time, if you ignore the cases where the case was tilted it passes 20 /42 = 47%. For the rest of the drawer it was 84.5/114 = .74

### drawer330\_1\_0.avi Sockets

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | Checkin/None | Error | Fail |
| 2 socket 2 | Checkin/None | Checkin/None | Pass |
| 3 socket 3 | Checkin/None | Checkin/None | Pass |
| 4 socket 4 | Checkin/None | Checkin/None | Pass |
| 5 socket 5 | Checkin/None | Checkin/None | Pass |
| 6 socket 6 | Checkin/None | Checkin/None | Pass |
| 7 socket 7 | Checkin/None | Checkin/None | Pass |
| 8 socket 8 | Checkin/None | Checkin/None | Pass |
| 10 socket 9 | Checkin/None | Checkin/None | Pass |
| 11 socket 10 | Checkin/None | Checkin/None | Pass |
| 14 socket 11 | Checkin/None | Checkin/None | Pass |
| 15 socket 12 | Checkin/None | Checkin/None | Pass |
| 16 socket 13 | Checkin/None | Checkin/None | Pass |
| 17 socket 14 | Checkin/None | Checkin/None | Pass |
| 18 socket 15 | Checkin/None | Checkin/None | Pass |
| 20 socket 16 | Checkin/None | Checkin/None | Pass |
| 21 socket 17 | Checkin/None | Checkin/None | Pass |
| 22 socket 18 | Checkin/None | Checkin/None | Pass |
| 23 socket 19 | Checkin/None | Checkin/None | Pass |
| 24 socket 20 | Checkin/None | Checkin/None | Pass |
| 25 socket 21 | Checkin/None | Checkin/None | Pass |
|  |  |  | 20/21 |

### drawer330\_1\_0.avi wrenches, plier and extra tool

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | Checkin/None | checkout | Fail |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | Checkin/None | Checkin/None | Pass |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | Checkin/None | Checkin/None | Pass |
| 28 wrench set 2 | Checkin/None | Checkin/None | Pass |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | Checkin/None | Pass |
| 31 wrench set 5 | Checkin/None | Checkin/None | Pass |
| 32 wrench set 6 | Checkin/None | Checkin/None | Pass |
| 33 wrench set 7 | Checkin/None | Checkin/None | Pass |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | Checkin/None | Pass |
| 38 wrench set 12 | Checkin/None | Checkin/None | Pass |
| 39 wrench set 13 | Checkin/None | Checkin/None | Pass |
| 40 wrench set 14 | Checkin/None | Checkin/None | Pass |
| extra tool | detected, cresent wrench | detected, cresent wrench | Pass |
|  |  |  | 18/19 |

The symbols were occasionally completely blocked by the person moving tools, so only look at the last one.

### drawer330\_1\_1.avi Sockets

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | checkout | error | Fail |
| 2 socket 2 | checkout | error | Fail |
| 3 socket 3 | checkout | error | Fail |
| 4 socket 4 | checkout | error | Fail |
| 5 socket 5 | checkout | error | Fail |
| 6 socket 6 | checkout | error | Fail |
| 7 socket 7 | checkout | error | Fail |
| 8 socket 8 | checkout | error | Fail |
| 10 socket 9 | checkout | error | Fail |
| 11 socket 10 | checkout | error | Fail |
| 14 socket 11 | checkout | error | Fail |
| 15 socket 12 | checkout | error | Fail |
| 16 socket 13 | checkout | error | Fail |
| 17 socket 14 | checkout | error | Fail |
| 18 socket 15 | checkout | error | Fail |
| 20 socket 16 | checkout | error | Fail |
| 21 socket 17 | checkout | error | Fail |
| 22 socket 18 | checkout | error | Fail |
| 23 socket 19 | checkout | error | Fail |
| 24 socket 20 | checkout | error | Fail |
| 25 socket 21 | checkout | error | Fail |
|  |  |  | 0/21 |

### drawer330\_1\_1.avi wrenches, plier and extra tool

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | Checkin/None | Checkin/None | Pass |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | checkout | Checkin/None | fail |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | checkout | Checkin/None | fail |
| 28 wrench set 2 | Checkin/None | checkout | fail |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | Checkin/None | Pass |
| 31 wrench set 5 | Checkin/None | checkout | fail |
| 32 wrench set 6 | checkout | checkout/error | fail |
| 33 wrench set 7 | Checkin/None | checkout | fail |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | checkout | fail |
| 38 wrench set 12 | Checkin/None | Checkin/None | Pass |
| 39 wrench set 13 | Checkin/None | Checkin/None | Pass |
| 40 wrench set 14 | Checkin/None | error | fail |
| extra tool | None | detect 4, pliers and tapemeasure | fail |
|  |  |  | 10/19 |

Look at last record and the one above it since closing the drawer was split into two. It looksl ike it is noting the ends of the socket set which are outside the template as extra tools.

### drawer330\_1\_2.avi Sockets

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | Checkin/None | error | fail |
| 2 socket 2 | Checkin/None | error | fail |
| 3 socket 3 | Checkin/None | error | fail |
| 4 socket 4 | Checkin/None | error | fail |
| 5 socket 5 | Checkin/None | error | fail |
| 6 socket 6 | Checkin/None | error | fail |
| 7 socket 7 | Checkin/None | error | fail |
| 8 socket 8 | Checkin/None | error | fail |
| 10 socket 9 | error | error | pass |
| 11 socket 10 | Checkin/None | error | fail |
| 14 socket 11 | Checkin/None | error | fail |
| 15 socket 12 | error | checkout | fail |
| 16 socket 13 | Checkin/None | error | fail |
| 17 socket 14 | Checkin/None | error | fail |
| 18 socket 15 | Checkin/None | error | fail |
| 20 socket 16 | Checkin/None | error | fail |
| 21 socket 17 | Checkin/None | error | fail |
| 22 socket 18 | Checkin/None | error | fail |
| 23 socket 19 | Checkin/None | error/checkout | fail |
| 24 socket 20 | Checkin/None | error | fail |
| 25 socket 21 | Checkin/None | error | fail |
|  |  |  | 1/21 |

It should be noted that the case for the sockets was very noticibly put in crooked which is probably why they are all errors .

### drawer330\_1\_2.avi wrenches, plier and extra tool

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | error | Checkin/None | Fail |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | Checkin/None | Checkin/None | Pass |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | error | Checkin/None | Fail |
| 28 wrench set 2 | Checkin/None | Checkin/None | Pass |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | Checkin/None | Pass |
| 31 wrench set 5 | Checkin/None | Checkin/None | Pass |
| 32 wrench set 6 | error | Checkin/None | Fail |
| 33 wrench set 7 | Checkin/None | Checkin/None | Pass |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | Checkin/None | Pass |
| 38 wrench set 12 | Checkin/None | Checkin/None | Pass |
| 39 wrench set 13 | Checkin/None | error | Fail |
| 40 wrench set 14 | Checkin/None | error | Fail |
| extra tool | detected, crescent wrench | None | Fail |
|  |  |  | 12/19 |

### drawer330\_1\_2.avi Sockets part 2

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | Checkin/None | Checkin/None | Pass |
| 2 socket 2 | Checkin/None | Checkin/None | Pass |
| 3 socket 3 | Checkin/None | Checkin/None | Pass |
| 4 socket 4 | Checkin/None | Checkin/None | Pass |
| 5 socket 5 | Checkin/None | Checkin/None | Pass |
| 6 socket 6 | Checkin/None | Checkin/None | Pass |
| 7 socket 7 | Checkin/None | Checkin/None | Pass |
| 8 socket 8 | Checkin/None | Checkin/None | Pass |
| 10 socket 9 | Checkin/None | error | fail |
| 11 socket 10 | Checkin/None | Checkin/None | Pass |
| 14 socket 11 | Checkin/None | Checkin/None | Pass |
| 15 socket 12 | Checkin/None | error | fail |
| 16 socket 13 | Checkin/None | Checkin/None | Pass |
| 17 socket 14 | Checkin/None | Checkin/None | Pass |
| 18 socket 15 | Checkin/None | Checkin/None | Pass |
| 20 socket 16 | Checkin/None | Checkin/None | Pass |
| 21 socket 17 | Checkin/None | Checkin/None | Pass |
| 22 socket 18 | Checkin/None | Checkin/None | Pass |
| 23 socket 19 | Checkin/None | Checkin/None | Pass |
| 24 socket 20 | Checkin/None | Checkin/None | Pass |
| 25 socket 21 | Checkin/None | Checkin/None | Pass |
|  |  |  | 19/21 |

It should be noted that the case for the sockets was very noticeably put in crooked but they are still checked in according to the video.

### drawer330\_1\_2.avi wrenches, plier and extra tool part 2

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | Checkin/None | Checkin/None | Pass |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | Checkin/None | Checkin/None | Pass |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | Checkin/None | Checkin/None | Pass |
| 28 wrench set 2 | Checkin/None | Checkin/None | Pass |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | error | Fail |
| 31 wrench set 5 | Checkin/None | error | Fail |
| 32 wrench set 6 | Checkin/None | error | Fail |
| 33 wrench set 7 | Checkin/None | Checkin/None | Pass |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | Checkin/None | Pass |
| 38 wrench set 12 | Checkin/None | Checkin/None | Pass |
| 39 wrench set 13 | Checkin/None | Checkin/None | Pass |
| 40 wrench set 14 | Checkin/None | Checkin/None | Pass |
| extra tool | detected, crescent wrench | detected, tape measure | pass .5 |
|  |  |  | 15.5/19 |

### 

### drawer330\_1\_3.avi Sockets

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | Checkin/None | Checkin/None | Pass |
| 2 socket 2 | Checkin/None | error | Fail |
| 3 socket 3 | Checkin/None | error | Fail |
| 4 socket 4 | Checkin/None | error | Fail |
| 5 socket 5 | Checkin/None | error | Fail |
| 6 socket 6 | Checkin/None | error | Fail |
| 7 socket 7 | Checkin/None | error | Fail |
| 8 socket 8 | error | error | Pass |
| 10 socket 9 | Checkin/None | error | Fail |
| 11 socket 10 | error | error | Pass |
| 14 socket 11 | Checkin/None | error | Fail |
| 15 socket 12 | error | error | Pass |
| 16 socket 13 | Checkin/None | error | Fail |
| 17 socket 14 | error | eror | Pass |
| 18 socket 15 | Checkin/None | error | Fail |
| 20 socket 16 | Checkin/None | error | Fail |
| 21 socket 17 | Checkin/None | error | Fail |
| 22 socket 18 | error | error | Pass |
| 23 socket 19 | Checkin/None | error | Fail |
| 24 socket 20 | Checkin/None | error | Fail |
| 25 socket 21 | error | error | Pass |
|  |  |  | 7/21 |

### drawer330\_1\_3.avi wrenches, plier and extra tool

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | Checkin/None | Checkin/None | Pass |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | Checkin/None | error | Fail |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | Checkin/None | Checkin/None | Pass |
| 28 wrench set 2 | Checkin/None | Checkin/None | Pass |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | Checkin/None | Pass |
| 31 wrench set 5 | Checkin/None | Checkin/None | Pass |
| 32 wrench set 6 | Checkin/None | Checkin/None | Pass |
| 33 wrench set 7 | Checkin/None | Checkin/None | Pass |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | Checkin/None | Pass |
| 38 wrench set 12 | Checkin/None | error | Fail |
| 39 wrench set 13 | Checkin/None | error | Fail |
| 40 wrench set 14 | Checkin/None | error | Fail |
| extra tool | detect, crescent wrench | None | Fail |
|  |  |  | 14 /19 |

### drawer330\_1\_3.avi Sockets part 2

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 socket 1 | Checkin/None | error | Fail |
| 2 socket 2 | Checkin/None | error | Fail |
| 3 socket 3 | Checkin/None | error | Fail |
| 4 socket 4 | Checkin/None | error | Fail |
| 5 socket 5 | Checkin/None | error | Fail |
| 6 socket 6 | Checkin/None | error | Fail |
| 7 socket 7 | Checkin/None | error | Fail |
| 8 socket 8 | Checkin/None | error | Fail |
| 10 socket 9 | Checkin/None | error | Fail |
| 11 socket 10 | Checkin/None | error | Fail |
| 14 socket 11 | Checkin/None | error | Fail |
| 15 socket 12 | Checkin/None | error | Fail |
| 16 socket 13 | Checkin/None | error | Fail |
| 17 socket 14 | Checkin/None | error | Fail |
| 18 socket 15 | Checkin/None | error | Fail |
| 20 socket 16 | Checkin/None | error | Fail |
| 21 socket 17 | Checkin/None | error | Fail |
| 22 socket 18 | Checkin/None | error | Fail |
| 23 socket 19 | Checkin/None | error | Fail |
| 24 socket 20 | Checkin/None | error | Fail |
| 25 socket 21 | Checkin/None | error | Fail |
|  |  |  | 0/21 |

It should be noted that the case for the sockets was very noticeably put in crooked which is probably why they are all errors .

### 

### drawer330\_1\_3.avi wrenches, plier and extra tool part 2

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 9 wrench 1 | Checkin/None | Checkin/None | Pass |
| 12 wrench 2 | Checkin/None | Checkin/None | Pass |
| 13 wrench 3 | Checkin/None | error | Fail |
| 26 red plier | Checkin/None | Checkin/None | Pass |
| 27 wrench set 1 | Checkin/None | Checkin/None | Pass |
| 28 wrench set 2 | Checkin/None | Checkin/None | Pass |
| 29 wrench set 3 | Checkin/None | Checkin/None | Pass |
| 30 wrench set 4 | Checkin/None | Checkin/None | Pass |
| 31 wrench set 5 | Checkin/None | Checkin/None | Pass |
| 32 wrench set 6 | Checkin/None | Checkin/None | Pass |
| 33 wrench set 7 | Checkin/None | Checkin/None | Pass |
| 34 wrench set 8 | Checkin/None | Checkin/None | Pass |
| 35 wrench set 9 | Checkin/None | Checkin/None | Pass |
| 36 wrench set 10 | Checkin/None | Checkin/None | Pass |
| 37 wrench set 11 | Checkin/None | Checkin/None | Pass |
| 38 wrench set 12 | Checkin/None | Checkin/None | Pass |
| 39 wrench set 13 | Checkin/None | error | Fail |
| 40 wrench set 14 | Checkin/None | error | Fail |
| extra tool | detect, crescent wrench | None | Fail |
|  |  |  | 15/19 |

## Drawer 3

This drawer was made up of screwdrivers and pliers. The crescent wrenches were put in a red container that was somewhat reflective. The screwdriver handles also had red on them. The accuracy is 110.5/150 =73%. Looking at just the screwdrivers the accuracy is 74/88 =84%, looking at just the pliers the accuracy is 37.5/55 = 68%

### 45\_fishsp\_0.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | Checkin/None | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | checkout | Fail |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | checkout/error | Fail |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | None | 2 detected, pliers, socket set | Fail |
|  |  |  | 12/15 |

### 45\_fishsp\_1.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | checkout | checkout | Pass |
| 3 img152 | checkout | checkout | Pass |
| 4 img152 | checkout | checkout | Pass |
| 5 img705 | checkout | checkout | Pass |
| 6 img770 | checkout | checkout | Pass |
| 7 img778 | checkout | checkout | Pass |
| 8 img845 | checkout | checkout | Pass |
| 9 img871 | checkout | checkout | Pass |
| 11 img871 | checkout | error | Fail |
| 13 img871 | checkout | error | Fail |
| 14 img871 | checkout | checkout | Pass |
| 15 img871 | checkout | error | Fail |
| 16 img871 | checkout | error | Fail |
| 17 img871 | checkout | error | Fail |
| extra tool | None | None | Pass |
|  |  |  | 10/15 |

Drawer closing was segmented so look at multiple records.

### 45\_fishsp\_2.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | Checkin/None | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | CheckOut | Fail |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | Checkin/None | Pass |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 14/15 |

### 45\_fishsp\_3.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | checkout | checkout/error | .5 |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | Checkin/None | Pass |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | checkout | checkout/error | .5 |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | Checkin/None | Pass |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | checkout | Checkin/None | Fail |
| extra tool | None | None | Pass |
|  |  |  | 13/15 |

In this case it appears that the screwdriver was not considered to be visible.

### 45\_fishsp\_4.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | error | Fail |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | Checkin/None | Pass |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | error | Fail |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | Checkin/None | Pass |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | error | Fail |
| extra tool | None | 2 detected, tapemeasure | Fail |
|  |  |  | 11/15 |

### 45\_fishsp\_5.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | Checkin/None | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | checkout | Fail |
| 6 img770 | Checkin/None | error | Fail |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | error | Fail |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | error | Fail |
| 13 img871 | Checkin/None | error/checkout | Fail |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | error/checkout | Fail |
| 16 img871 | Checkin/None | error | Fail |
| 17 img871 | checkedout | error | Fail |
| extra tool | detected, plier | none | Fail |
|  |  |  | 6/15 |

### 45\_fishsp\_6.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Error | error | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | Checkin/None | Pass |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | error | Checkin/None | Fail |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | error | Fail |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | Checkin/None | Pass |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | error | Checkin/None | Fail |
| 17 img871 | error | error | Pass |
| extra tool | detected,plier | detected, tape measure | Fail |
|  |  |  | 11/15 |

### 45\_fishsp\_7.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | Checkin/None | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | error | Fail |
| 5 img705 | Checkin/None | checkout | Fail |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | error | Fail |
| 13 img871 | Checkin/None | error/checkout | Fail |
| 14 img871 | Checkin/None | error | Fail |
| 15 img871 | Checkin/None | error | Fail |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 9/15 |

### 45\_fishsp\_8.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | checkout | CheckOut | Pass |
| 3 img152 | Checkin/None | error | Fail |
| 4 img152 | checkout | error/CheckOut | .5 |
| 5 img705 | Checkin/None | CheckOut | Fail |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | checkout | Checkin/None | Fail |
| 9 img871 | Checkin/None | Checkin/None | Pass |
| 11 img871 | Checkin/None | Checkin/None | Pass |
| 13 img871 | Checkin/None | CheckOut | Fail |
| 14 img871 | Checkin/None | error | Fail |
| 15 img871 | Checkin/None | Checkin/None | Pass |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 9.5/15 |

### 45\_fishsp\_9.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | Checkin/None | Pass |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | CheckOut | Fail |
| 6 img770 | Checkin/None | Checkin/None | Pass |
| 7 img778 | Checkin/None | Checkin/None | Pass |
| 8 img845 | Checkin/None | Checkin/None | Pass |
| 9 img871 | Checkin/None | error | Fail |
| 11 img871 | Checkin/None | error | Fail |
| 13 img871 | Checkin/None | error | Fail |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | error | Fail |
| 16 img871 | Checkin/None | error | Fail |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | None | None | Pass |
|  |  |  | 9/15 |

### 45\_fishsp\_10.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 2 img152 | Checkin/None | CheckOut | Fail |
| 3 img152 | Checkin/None | Checkin/None | Pass |
| 4 img152 | Checkin/None | Checkin/None | Pass |
| 5 img705 | Checkin/None | error | Fail |
| 6 img770 | Checkin/None | error | Fail |
| 7 img778 | error | error/CheckOut | .5 |
| 8 img845 | Checkin/None | error | Fail |
| 9 img871 | error | error/CheckOut | ,5 |
| 11 img871 | Checkin/None | error | Fail |
| 13 img871 | Checkin/None | error | Fail |
| 14 img871 | Checkin/None | Checkin/None | Pass |
| 15 img871 | Checkin/None | error/CheckOut | Fail |
| 16 img871 | Checkin/None | Checkin/None | Pass |
| 17 img871 | Checkin/None | Checkin/None | Pass |
| extra tool | detected, pier | None | Fail |
|  |  |  | 6/15 |

# API, Database, and Webserver and Live footage Integration Testing

## API and Database integration testing

| Test | Expected result | Result | Pass/fail/discarded |
| --- | --- | --- | --- |
| update\_tools | tool statuses in database changed | status was changed | Pass |
| update events drawer 2 userID 0 | events uploaded to database with correct location, userID, and Event added successfully printed to terminal | Event added successfully! printed and  64 | 2 | 71 | 2024-04-19 13:15:44 | 5 | 0 | NULL put into database | Pass |
| update events fail | print Failed to add event. Make sure EventToolID and EventDrawerLocation (Foreign keys) are actually in the database already. to terminal | Failed to add event. Make sure EventToolID and EventDrawerLocation (Foreign keys) are actually in the database already. | Pass |
| get drawers toolbox 0 | drawers of toolbox 0 retrieved | drawers of toolbox 0 retrieved | Pass |
| get tools drawers 2 | tools of drawer 2 retrieved | tools of drawer 2 retrieved | Pass |
| get tools no tools retrieved | runtime error : 'No tools found for the specified drawer ID | No tools found for the specified drawer ID | Pass |
| get drawers no drawers in toolbox | runtime error : ‘No drawers found for the specified box number’ | No drawers found for the specified box number | Pass |
| upload drawer(makeDrawer\_1.py) | drawer uploads to database | Drawer added successfully! | Pass |
| upload tool (makeDrawer\_1.py) | tool uploads to database | Tool added successfully! | Pass |
| upload tool with invalid ToolDrawer ID (makeDrawer\_1.py) | tool upload to database fail: print Failed to add tool. Make sure ToolDrawerID is actually in the drawers table to terminal | Failed to add tool. Make sure ToolDrawerID is actually in the drawers table. Status code: 400  Error message from server: {  "error": "1452 (23000): Cannot add or update a child row: a foreign key constraint fails (`hiline\_tool\_database`.`Tools`, CONSTRAINT `Tools\_ibfk\_1` FOREIGN KEY (`ToolDrawerID`) REFERENCES `Drawer` (`DrawerID`))"  } | Pass |
| sql database shutdown | Close program runtime error | Runtime error: Closing program, Error in retriving drawers: ('Connection aborted.', RemoteDisconnected('Remote end closed connection without response')) | Pass |
|  |  |  | 11/11 |

## Webserver integration testing

| Test | Expected result | Result | Pass/fail/Discarded |
| --- | --- | --- | --- |
| incorrect file location | runtime error | Error in processing frame: HTTP Error 404: Not Found and Closing program: local variable 'oldtools' referenced before assignment | Pass |
| correct file location | no runtime errors | no runtime errors | Pass |
| correct file location with database integrated | no runtime errors | no runtime errors | Pass |
| incorrect file location with database integrated | runtime error | Error in processing frame: HTTP Error 404: Not Found and Closing program: local variable 'oldtools' referenced before assignment | Pass |
| apache server not up | runtime error | runtime error: Error in processing frame: <urlopen error [Errno 111] Connection refused> | Pass |
| IP address not local host | no runtime errors | no runtime errors | Pass |
|  |  |  | 6/6 |

## Live footage testing

| Test | Expected result | Result | Pass/fail/discarded |
| --- | --- | --- | --- |
| correct start signal | program stops waiting for start signal closes current connection and starts retrieving footage | program stops waiting for start signal and starts retrieving footage | Pass |
| incorrect start signal | program does nothing or if connection broken gives error closing the program | closing program [Errno 32] Broken pipe | Pass |
| stop signal with true | program stops waiting for stop signal closes conection and gets the endTimeStamp | program stops waiting | Pass |
| incorrect stop signal | program does nothing | program does nothing | Pass |
| stop signal with false | program does nothing | program does nothing | Pass |
| rtsp stream location not streaming | file not found error | FileNotFound Unable to open RTSP stream rtsp://admin:NullTerminat0r2%24@192.168.0.17/onvif1 | Pass |
| heartbeat check | heartbeat signal sent to connected client | heartbeat signal ‘I am alive’ was sent | Pass |
|  |  |  | 7/7 |

# Final Testing

Overall accuracy 143/170 = 84%. Drawer 1 which is made up of pliers is 22/24 = 91%. Drawer 2 which contains mallets and wrenches is 16/24 =66%. It should also be noted on drawer 2 that no templates were recropped so some of the templates showed parts of other tools in them. Drawer 3 was mostly sockets and it has an accuracy of 77/90 = 85%. It should be noted however that in the debugging video the sockets did appear to be error a lot of the time even if that was not the case in the last frame that it though the drawer was open and saw the certain socket. Drawer 4 was mostly crescent wrenches and resulted in an accuracy of 28/32=87%. It should be noted that the wrenches produced errors a lot of the time in the video even if that was not the case in the last frame even though it was open. There were also only 3 cases of a wrong tool being placed in this entire set of testing.

### finaltestingd1\_0.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| Medium Channel Locks | checkout | checkout | Pass |
| Red Handle Channel Locks | checkout | checkout | Pass |
| Large Channel Locks | checkout | checkout | Pass |
| img345 | checkout | checkout | Pass |
| Needle Nose Pliers | checkout | checkout | Pass |
| img360 | checkout | checkout | Pass |
| img377 | checkout | checkout | Pass |
| extra tool | None | None | None |
|  |  |  | 8/8 |

# 

### finaltesting2\_0.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img200 | checkout | checkout | Pass |
| img187 | checkout | checkout | Pass |
| Small Crescent Wrench | checkout | checkout | Pass |
| Medium Crescent Wrench | checkout | checkout | Pass |
| Large Crescent Wrench | checkout | checkout | Pass |
| extra tool | None | 1 detected, ratchet | fail |
|  |  |  | 5/6 |

### finaltesting2\_1.avi

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img200 | checkin/none | checkin/none | Pass |
| img187 | checkout | checkout | Pass |
| Small Crescent Wrench | checkout | checkout | Pass |
| Medium Crescent Wrench | checkin/none | checkout | Fail |
| Large Crescent Wrench | checkin/none | checkout | Fail |
| extra tool | None | None | Pass |
|  |  |  | 4/6 |

### finaltesting2\_2.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img200 | error | checkin/none | Fail |
| img187 | error | checkin/none | Fail |
| Small Crescent Wrench | checkout | checkout | Pass |
| Medium Crescent Wrench | checkin/none | checkout | Fail |
| Large Crescent Wrench | checkin/none | error | Fail |
| extra tool | None | None | Pass |
|  |  |  | 2/6 |

### Finalteseting2\_3.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img200 | checkin/none | checkin/none | Pass |
| img187 | checkin/none | checkin/none | Pass |
| Small Crescent Wrench | checkout | checkout | Pass |
| Medium Crescent Wrench | checkin/none | checkout | Fail |
| Large Crescent Wrench | checkin/none | checkin/none | Pass |
| extra tool | None | None | Pass |
|  |  |  | 5/6 |

# 

### Finaltesting3\_0.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| Long Ratchet 71 | checkout | checkout | Pass |
| Short Ratchet 70 | checkout | checkout | Pass |
| Sockets 69 | checkout | checkout | Pass |
| Socket 83 | checkout | checkout | Pass |
| Socket 82 | checkout | checkout | Pass |
| Socket 81 | checkout | checkout | Pass |
| Socket 80 | checkout | checkout | Pass |
| Socket 79 | checkout | checkout | Pass |
| Socket 78 | checkout | checkout | Pass |
| Socket 77 | checkout | checkout | Pass |
| Socket 76 | checkout | checkout | Pass |
| Socket 75 | checkout | checkout | Pass |
| Socket 74 | checkout | checkout | Pass |
| Socket 73 | checkout | checkout | Pass |
| Socket 72 | checkout | checkout | Pass |
| Socket 62 | checkout | checkout | Pass |
| Socket 61 | checkout | checkout | Pass |
| Socket 60 | checkout | checkout | Pass |
| Socket 59 | checkout | checkout | Pass |
| Socket 57 | checkout | checkout | Pass |
| Socket 56 | checkout | checkout | Pass |
| Socket 55 | checkout | checkout | Pass |
| Socket 54 | checkout | checkout | Pass |
| Extender 68 | checkout | checkout | Pass |
| Extender 67 | checkout | checkout | Pass |
| Extender 66 | checkout | checkout | Pass |
| Extender 65 | checkout | checkout | Pass |
| Extender 64 | checkout | checkout | Pass |
| Extender 63 | checkout | checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 30/30 |

# 

### finaltestingd3\_1.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| Long Ratchet 71 | error | checkin/none | Fail |
| Short Ratchet 70 | checkin/none | checkout | Fail |
| Sockets 69 | checkin/none | checkin/none | Pass |
| Socket 83 | checkin/none | checkout | Fail |
| Socket 82 | checkin/none | checkout | Fail |
| Socket 81 | checkin/none | checkin/none | Pass |
| Socket 80 | checkin/none | checkin/none | Pass |
| Socket 79 | checkin/none | checkin/none | Pass |
| Socket 78 | checkin/none | checkin/none | Pass |
| Socket 77 | checkin/none | checkout | Fail |
| Socket 76 | checkin/none | checkin/none | Pass |
| Socket 75 | checkin/none | checkin/none | Pass |
| Socket 74 | checkin/none | checkin/none | Pass |
| Socket 73 | checkin/none | checkin/none | Pass |
| Socket 72 | checkin/none | checkout | Fail |
| Socket 62 | checkin/none | checkin/none | Pass |
| Socket 61 | checkin/none | checkin/none | Pass |
| Socket 60 | checkin/none | checkin/none | Pass |
| Socket 59 | checkin/none | checkin/none | Pass |
| Socket 57 | checkin/none | checkout | Fail |
| Socket 56 | checkin/none | checkin/none | Pass |
| Socket 54 | checkin/none | checkin/none | Pass |
| Socket 53 | checkin/none | checkin/none | Pass |
| Extender 68 | checkin/none | checkin/none | Pass |
| Extender 67 | checkout | checkout | Pass |
| Extender 66 | checkout | checkout | Pass |
| Extender 65 | checkout | checkout | Pass |
| Extender 64 | checkin/none | checkout | Fail |
| Extender 63 | checkin/none | checkin/none | Pass |
| extra tool | None | None | Pass |
|  |  |  | 22/30 |

### finaltestingd3\_2.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| Long Ratchet 71 | checkout | checkin/none | Fail |
| Short Ratchet 70 | checkin/none | checkin/none | Pass |
| Sockets 69 | checkin/none | checkin/none | Pass |
| Socket 83 | checkin/none | checkin/none | Pass |
| Socket 82 | checkin/none | checkin/none | Pass |
| Socket 81 | checkin/none | checkin/none | Pass |
| Socket 80 | checkin/none | checkin/none | Pass |
| Socket 79 | checkin/none | checkin/none | Pass |
| Socket 78 | checkin/none | checkin/none | Pass |
| Socket 77 | checkin/none | checkin/none | Pass |
| Socket 76 | checkin/none | checkin/none | Pass |
| Socket 75 | checkin/none | checkin/none | Pass |
| Socket 74 | checkin/none | checkin/none | Pass |
| Socket 73 | checkin/none | checkin/none | Pass |
| Socket 72 | checkin/none | checkin/none | Pass |
| Socket 62 | checkin/none | checkin/none | Pass |
| Socket 61 | checkin/none | checkin/none | Pass |
| Socket 60 | checkin/none | checkin/none | Pass |
| Socket 59 | checkin/none | error | Fail |
| Socket 57 | checkin/none | checkin/none | Pass |
| Socket 56 | checkin/none | checkin/none | Pass |
| Socket 55 | checkin/none | checkin/none | Pass |
| Socket 54 | checkin/none | error | Fail |
| Extender 68 | checkin/none | checkin/none | Pass |
| Extender 67 | checkout | checkout | Pass |
| Extender 66 | checkout | checkout | Pass |
| Extender 65 | checkout | checkout | Pass |
| Extender 64 | checkin/none | checkout | Fail |
| Extender 63 | checkin/none | error | Fail |
| extra tool | None | 1 detected crescent wrench | Fail |
|  |  |  | 25/30 |

# 

### finaltestingd4\_0.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 wrench1 | checkout | checkout | Pass |
| 2 wrench2 | checkout | checkout | Pass |
| 3 wrench3 | checkout | checkin/none | Fail |
| 4 wrench4 | checkout | checkout | Pass |
| 5 wrench5 | checkout | checkout | Pass |
| 6 wrench6 | checkout | checkout | Pass |
| 7 wrench7 | checkout | checkout | Pass |
| 8 wrench8 | checkout | checkout | Pass |
| 9 wrench9 | checkout | checkout | Pass |
| 10 wrench10 | checkout | checkout | Pass |
| 11 wrench11 | checkout | checkout | Pass |
| 12 wrench12 | checkout | checkin/none | fail |
| 13 ratchet13 | checkout | checkout | Pass |
| 20 img482 | checkout | checkout | Pass |
| 21 img482 | checkout | checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 14/16 |

### finaltestingd4\_1.avi

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| 1 wrench1 | checkin/none | checkin/none | Pass |
| 2 wrench2 | checkin/none | checkin/none | Pass |
| 3 wrench3 | checkin/none | checkin/none | Pass |
| 4 wrench4 | checkin/none | checkin/none | Pass |
| 5 wrench5 | checkout | checkin/none | Fail |
| 6 wrench6 | checkin/none | checkin/none | Pass |
| 7 wrench7 | checkout | checkout | Pass |
| 8 wrench8 | checkout | checkout | Pass |
| 9 wrench9 | checkin/none | checkin/none | Pass |
| 10 wrench10 | checkout | checkin/none | Fail |
| 11 wrench11 | checkin/none | checkin/none | Pass |
| 12 wrench12 | checkin/none | checkin/none | Pass |
| 13 ratchet13 | checkout | checkout | Pass |
| 20 img482 | checkin/none | checkin/none | Pass |
| 21 img482 | checkin/none | checkin/none | Pass |
| extra tool | None | None | Pass |
|  |  |  | 14/16 |

### 

### hiline demo before (Drawer 1)

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img345 | checkout/none | checkout/none | Pass |
| img346 | checkin | checkin | Pass |
| img356 | checkout/none | checkout/none | Pass |
| img360 | checkout/none | checkout/none | Pass |
| img377 | checkin | checkout/none | Fail |
| img385 | checkout/none | checkout/none | Pass |
| img387 | checkin | checkin | Pass |
| img389 | checkin | checkin | Pass |
| extra tool | None | None | Pass |
|  |  |  | 7/8 |

### hiline demo during (Drawer 1)

### 

| Tool | expected output | output given | Pass/Fail/discarded |
| --- | --- | --- | --- |
| img345 | checkout/none | checkout/none | Pass |
| img346 | checkin/none | checkin/none | Pass |
| img356 | checkout/none | checkout/none | Pass |
| img360 | checkout/none | checkout/none | Pass |
| img377 | checkin/none | checkout | Fail |
| img385 | checkout/none | checkout/none | Pass |
| img387 | checkin/none | checkin/none | Pass |
| img389 | checkout | checkout | Pass |
| extra tool | None | None | Pass |
|  |  |  | 7/8 |

# 