PROJECT THREE: MILESTONE 3 – COVER PAGE

Team Number: | Fri-35

Please list full names and MacID's of all *present* Team Members

Full Name:	MacID:
Joshua Currie	currij15
Harikashan Thayeswaran	thayeswh
Muhammad Danyal Afzal	afzalm7
Buu Ha	hab8

MILESTONE 3 (STAGE 1A) – WORKFLOW PSEUDOCODE (COMPUTATION SUB-TEAM)

Team Number: | Fri-35

You should have already completed this task individually *prior* to Design Studio 15.

1. Write out a pseudocode outlining the *high-level workflow* of your computer program on the following page
   → Only one team member is responsible for this task (not *both*)
   → Be sure to clearly indicate who each code belongs to

We are asking that you submit your work on both worksheets. It does seem redundant, but there are valid reasons for this:
- Each team member needs to submit their pseudocode with the **Milestone Three Individual Worksheets** document so that it can be *graded*
- Compiling your individual work into this **Milestone Three Team Worksheets** document allows you to readily access your team member's work
  - This will be especially helpful when completing *Stage 3* of the milestone

Name: Harikashan Thayeswaran	MacID: thayeswh

*Write out a pseudocode outlining the **high-level workflow** of your computer program in the space below.*

Command Q-arm to return to home position (shoulder and elbow joints)

Command Q-bot to return to its home position (to the edge of yellow-line and face recycling station)

Dispense the container onto sorting station

Rotate the table until the container is under the sensor

The program should now determine what material the container is made of (in this case metal, paper or plastic)

Determine if the material is recyclable or not (based on what material it is [determined above])

If it is recyclable, allow it to be transferred to the recycling station

Determine the other attributes of the container to determine which bin the container needs to be placed in

Position the container in the sorting station for pickup

Create a function to load the container (Q-arm closes gripper on container, moves to Q-bot, then releases gripper)

     Mauver both Q-arm and table in order to transfer the container onto the holder

Create a function to allow the Q-bot to be used to transfer the container from the sorting station (its home position) to the recycling station (using the coloured path with the color sensor)

     Q-bot moves towards the recycling station

    Q-bot differentiates each bin using the color sensor and places container into whichever bin matches containers bin ID

Create a function that allows the Q-bot to deposit the container in the associated bin (which is determined from the color sensor and the different color of each bin)

Release the container into the bin with the linear actuator

Create a function to return the Q-bot and the Q-arm back to its home positions

Return Q-bot back to home position

Return Q-arm back to home position

MILESTONE 3 (STAGE 1B) – WORKFLOW FLOWCHART / STORYBOARD (COMPUTATION SUB-TEAM)

Team Number: Fri-35

You should have already completed this task individually *prior* to Design Studio 15.

1. Only one team member is responsible for this task (not *both*)
2. Copy-and-paste your flowchart or storyboard on the following page
    $\rightarrow$ Be sure to include your Team Number, Name and MacID
3. Take a photo of your flowchart / storyboard
4. Insert your photo as a Picture (Insert > Picture > This Device)

We are asking that you submit your work on both worksheets. It does seem redundant, but there are valid reasons for this:

- Each team member needs to submit their flowchart/storyboard screenshots with the **Milestone Three Individual Worksheets** document so that it can be *graded*
- Compiling your individual work into this **Milestone Three Team Worksheets** document allows you to readily access your team member's work
    - o This will be especially helpful when completing *Stage 3* of the milestone

Name: Joshua Currie	MacID: currij15

Program workflow flowchart:

```
                          ┌─────────────┐
                          │    Start    │
                          └──────┬──────┘
                                 │
                                 ▼
┌──────────────────┐   ┌───────────────────────────────┐
│                  │   │ Determine container attributes │
│ Go to next       │──▶│ at sorting station:            │
│ container        │   │ -plastic, paper, or metal      │
│                  │   │ -contaminated or non           │
└──────────────────┘   │  contaminated                  │
      ▲                └───────┬───────────────┬────────┘
      │                        │               │
      │                        ▼               ▼
      │          ┌──────────────────┐  ┌──────────────────┐
      │          │ Container with   │  │ Container with   │
      │          │ same ID as those │  │ different ID     │
      │          │ on Q-bot hopper  │  │ than those on    │
      │          │ or the hopper is │  │ Q-bot hopper     │
      │          │ emtpy            │  └────────┬─────────┘
      │          └────────┬─────────┘           │
      │                   ▼                      │
      │          ┌──────────────────┐           │
      │          │ Q-arm picks up   │           │
      │          │ container and    │           │
      │          │ transfers to     │           │
      │          │ hopper on Q-bot  │           │
      │          └──┬───────────┬───┘           │
      │             │           │               │
      │             ▼           ▼               │
      │  ┌──────────────┐  ┌──────────────┐     │
      │  │ less than 3   │  │ 3 containers │    │
      │  │ containers on │  │ on Q-bot or  │    │
      └──│ Q-bot and     │  │ total mass   │    │
         │ total mass on │  │ on Q-bot     │    │
         │ Q-bot is less │  │ exceeds 90   │    │
         │ than 90 grams │  │ grams        │    │
         │ (including new│  │ (including   │    │
         │ container)    │  │ new container)│   │
         └──────────────┘  └──────┬───────┘    │
                                  ▼             │
                        ┌──────────────────┐    │
                        │ Q-bot transfers  │    │
                        │ and deposits     │◀───┘
                        │ containers to    │
                        │ respective bins  │
                        │ at the recycling │
                        │ station          │
                        └────────┬─────────┘
                                 ▼
                        ┌──────────────────┐
                        │ Q-bot returns to │
                        │ sorting station  │
                        └────────┬─────────┘
                                 ▼
                        ┌──────────────────┐
                        │       End        │
                        └──────────────────┘
```
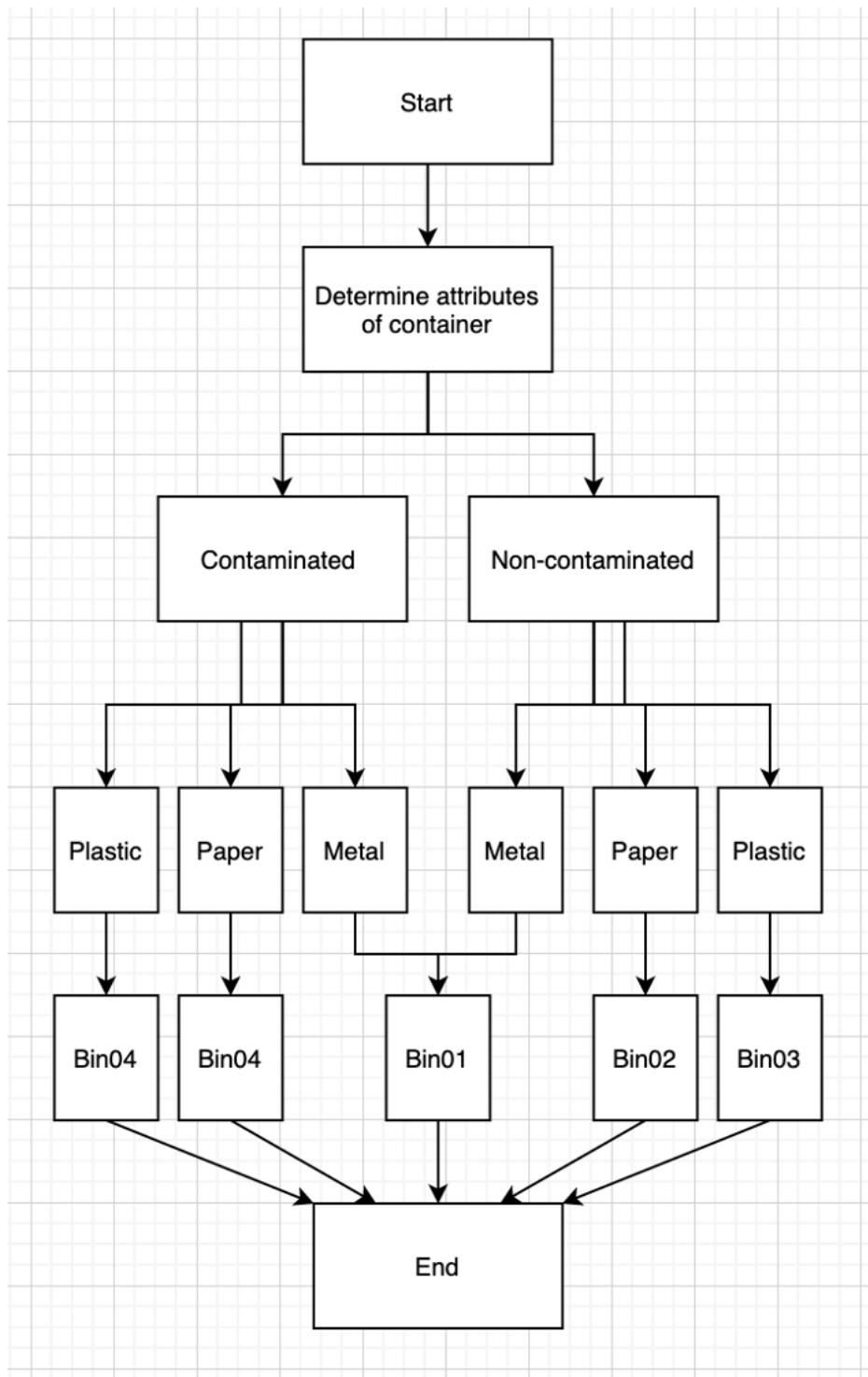
Container distribution workflow:

```
                            ┌─────────────┐
                            │    Start    │
                            └──────┬──────┘
                                   │
                                   ▼
                         ┌───────────────────┐
                         │ Determine attributes │
                         │    of container    │
                         └─────────┬─────────┘
                                   │
                    ┌──────────────┴──────────────┐
                    ▼                              ▼
          ┌──────────────────┐          ┌──────────────────┐
          │   Contaminated   │          │ Non-contaminated │
          └──────────────────┘          └──────────────────┘
            │      │      │                │      │      │
            ▼      ▼      ▼                ▼      ▼      ▼
        ┌──────┐┌──────┐┌──────┐      ┌──────┐┌──────┐┌──────┐
        │Plastic││Paper││ Metal │      │ Metal ││Paper││Plastic│
        └──┬───┘└──┬───┘└──┬───┘      └──┬───┘└──┬───┘└──┬───┘
           │       │       │             │       │       │
           ▼       ▼       ▼             ▼       ▼       ▼
        ┌──────┐┌──────┐┌──────┐      ┌──────┐┌──────┐┌──────┐
        │Bin04 ││Bin04 ││Bin01 │      │Bin01 ││Bin02 ││Bin03 │
        └──┬───┘└──┬───┘└──┬───┘      └──┬───┘└──┬───┘└──┬───┘
            \      |       |            |       /      /
             \     |       ▼            ▼      /      /
              ────────────┌───────────────┐──────────
                          │      End      │
                          └───────────────┘
```

MILESTONE 3 (STAGE 2) – DETAILED SKETCHES (MODELLING SUB-TEAM)

Team Number: | Fri-35

You should have already completed this task individually *prior* to Design Studio 15.

1. Copy-and-paste each sub-team member's detailed sketch on the following pages (1 sketch per page)
   → Be sure to indicate each team member's Name and MacID

We are asking that you submit your work on both worksheets. It does seem redundant, but there are valid reasons for this:

- Each team member needs to submit their detailed sketches with the **Milestone Three Individual Worksheets** document so that it can be *graded*
- Compiling your individual work into this **Milestone Three Team Worksheets** document allows you to readily access your team member's work
  - o This will be especially helpful when completing *Stage 4* of the milestone

Better Sketches
Wednesday, January 27, 2021   8:46 PM

crate

rung

180° angle constraint (min)

fixed pivot point of box

mate constraint between linkage & rung, 1 DoF (rotational)

baseplate

linear actuator

mate constraint between actuator and linkage

connecting bar

pivot point (1 dof)

fixed pivot point of linkage

mate constraint between actuator and baseplate

bar connecting linkages

linear actuator

screw mated on linkage to rotate

mate constraint between connecting bar and linkages
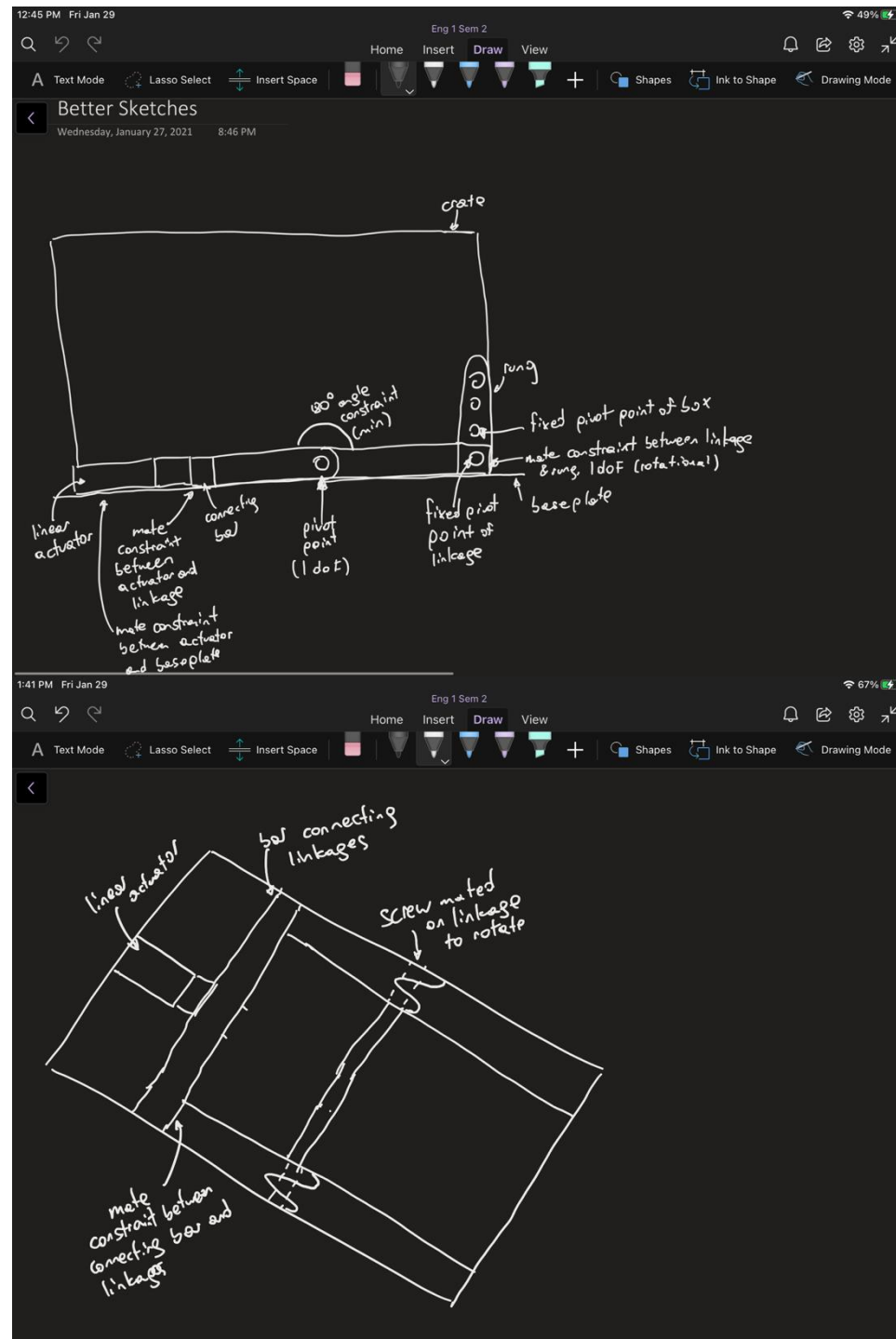
Name: Muhammad Danyal Afzal	MacID: afzalm7

Insert screenshot(s) of your detailed sketch below.
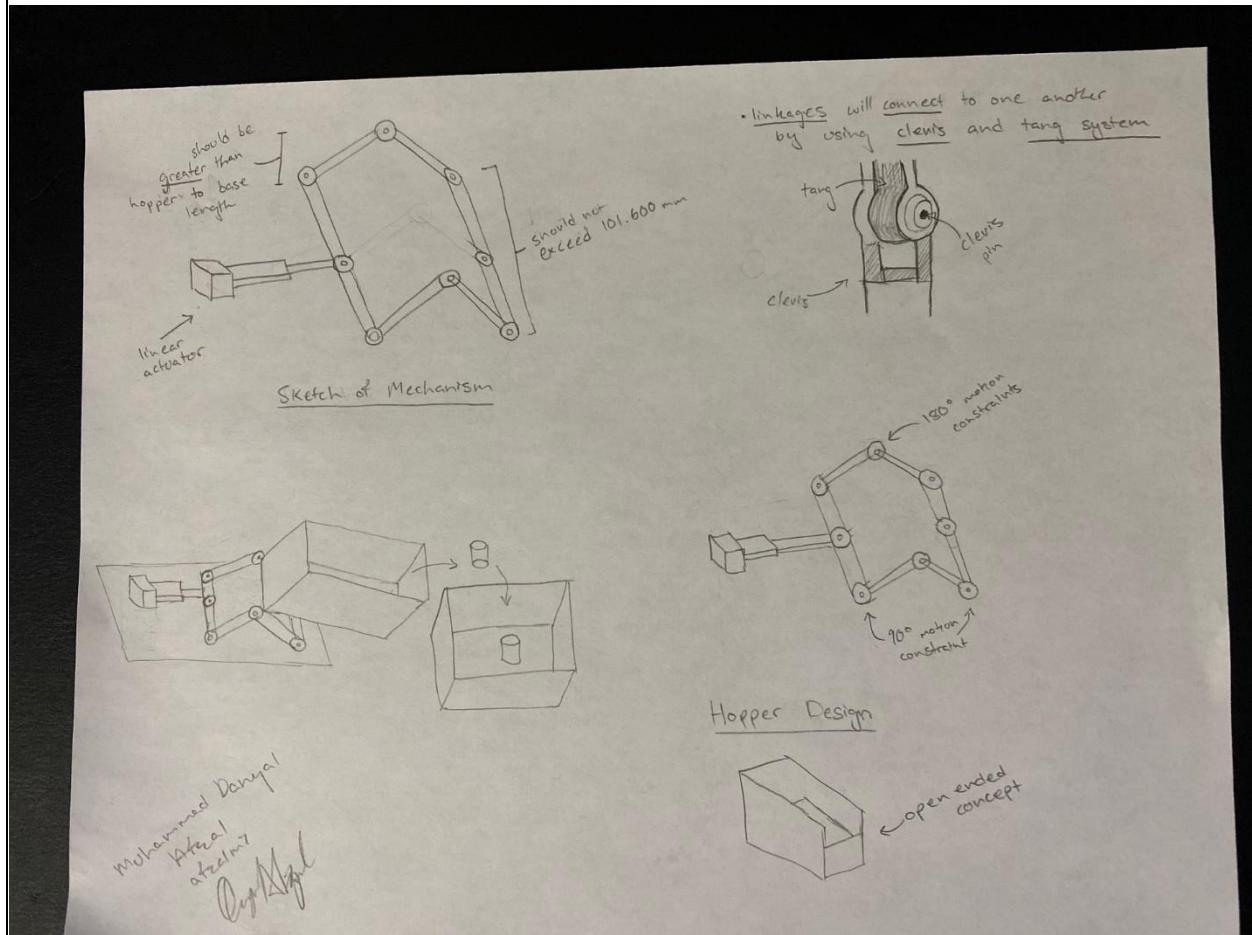
*If you are in a sub-team of 3, please copy and paste the above on a new page.

Team Number: | Fri-35

1. As a team, write out the pseudocode or create a flowchart for the indicated tasks in the space below.
   → If creating a flowchart, complete your flowchart on a separate sheet of paper, take a photo of your sketch and insert photo as a Picture (Insert > Picture > This Device)

Dispense Container

Call function to randomly dispense container onto sorting station (Bottle ID and table mass):

Create a list from 1-6 and shuffle the list

Use a for loop to iterate through each index of the randomized list and dispense one at a time

Rotate the table until the container is under the sensor

Determine the container attributes that differentiates the container and its bin destination

Return attributes

Load Container

Write a function to load container onto hopper:

If there's less than 3 containers on the hopper"
If mass of hopper + mass of container is less than 90 grams:

Rotate table to get container in front of Q-arm

Q-arm closes gripper on container

Q-arm moves to the position above the q-bot that the container is supposed to be on (the holder)

Q-arm releases gripper and container goes onto holder

Q-arm return to home position (all the joints)

Else

Call transfer container function

Transfer Container

Write a function to move the container to recycling station with Q-bot and stop directly adjacent to the correct bin:

Q-bot moves towards the recycling station:

Use while statement to check if bin color matches with bin id, call the deposit container function, and if it does not match with the bin ID, you skip over the bin and move onto the next bin

Deposit Container

Write a function to deposit container in respective bin by rotating the hopper:

Release the container into the bin with the linear actuator

Return Q-bot back to home position

Return Home

Create a return home function:

Return Q-bot back to home position

Return Q-arm back to home position

MILESTONE 3 (STAGE 4) – PRELIMINARY MODELLING (MODELLING SUB-TEAM)

Team Number: | Fri-35

1. As a team, create solid models of the various components of your device in Autodesk Inventor, based on the detailed sketches.
    → Take multiple screenshots of each solid model you create
    → Insert your photo(s) as a Picture (Insert > Picture > This Device)
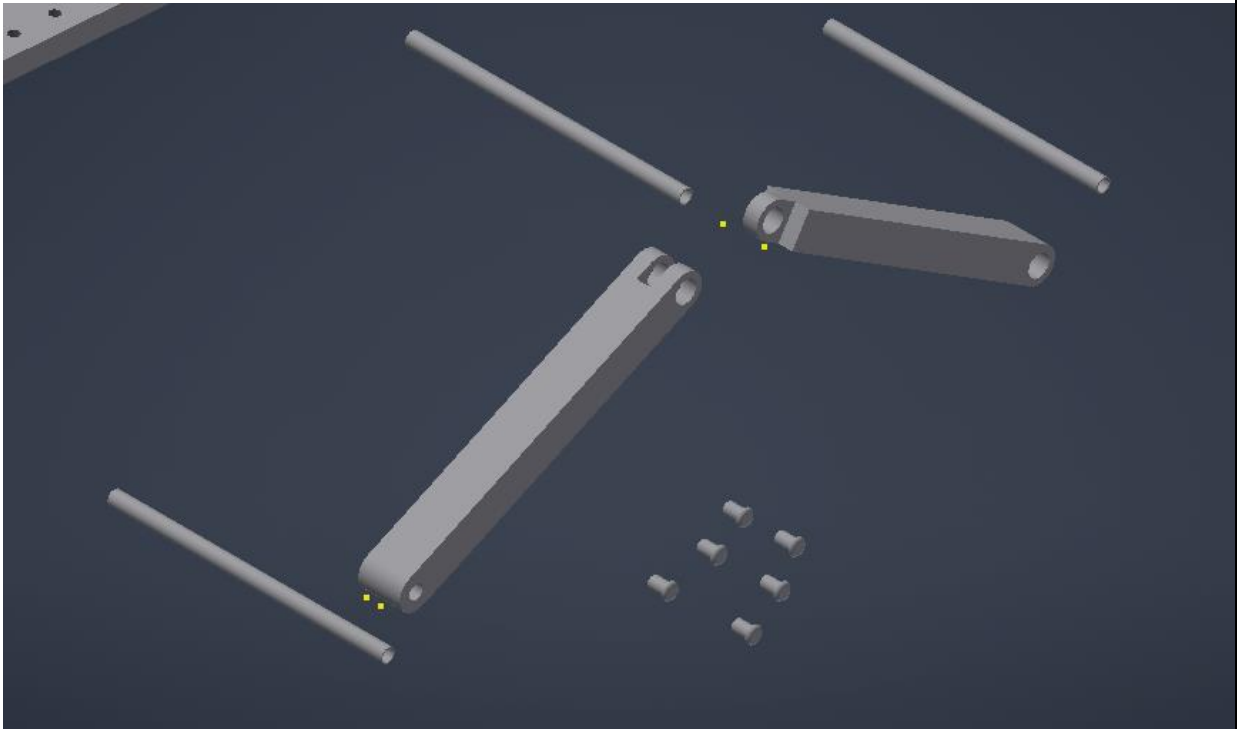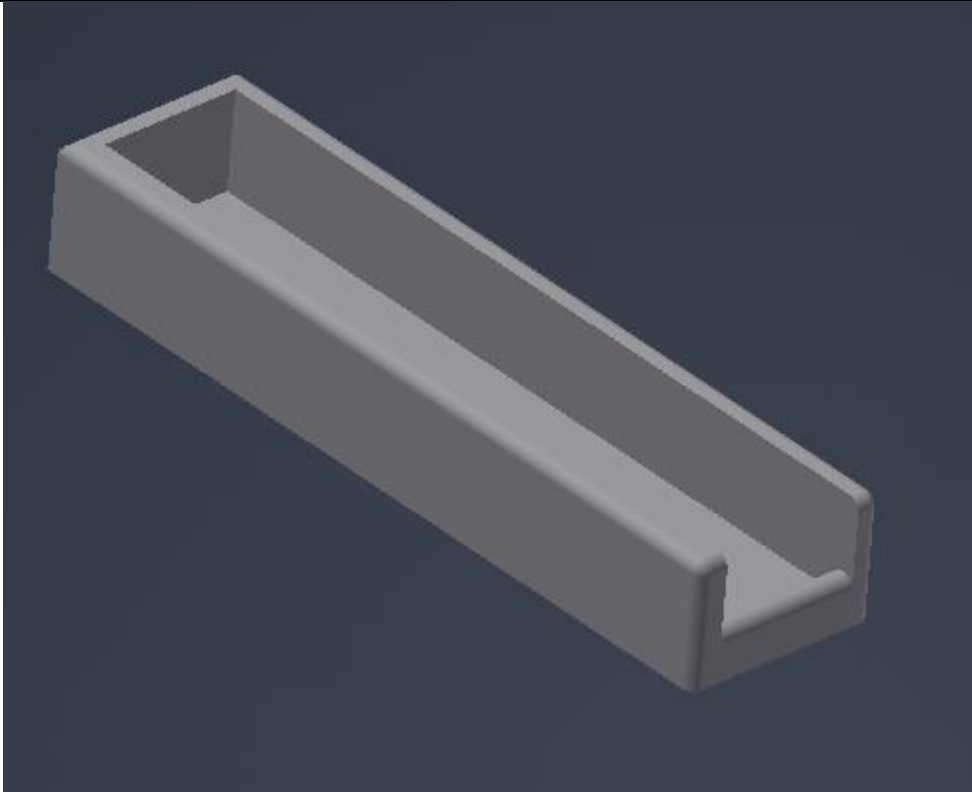   → **<u>Do not include more than *two* solid modelling screenshots per page</u>**
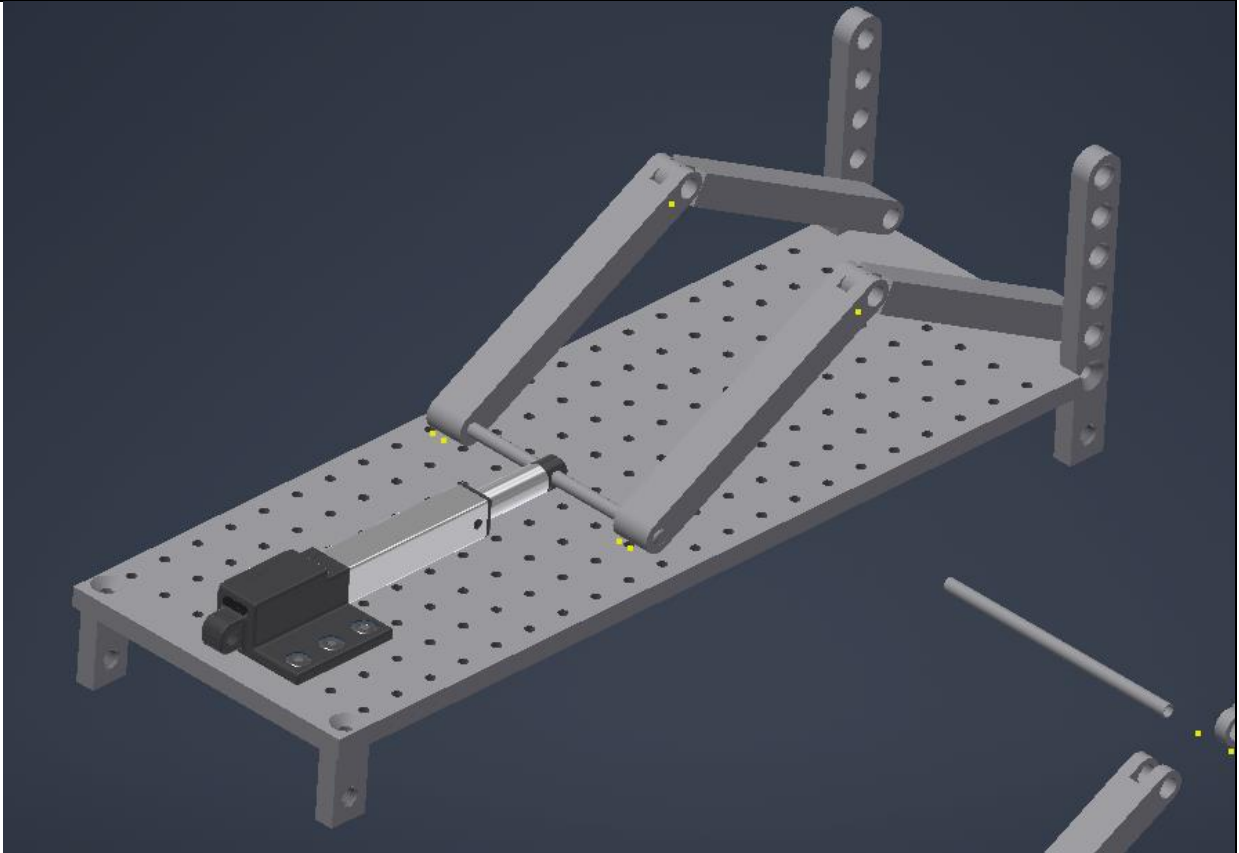
Team Number: | Fri-35

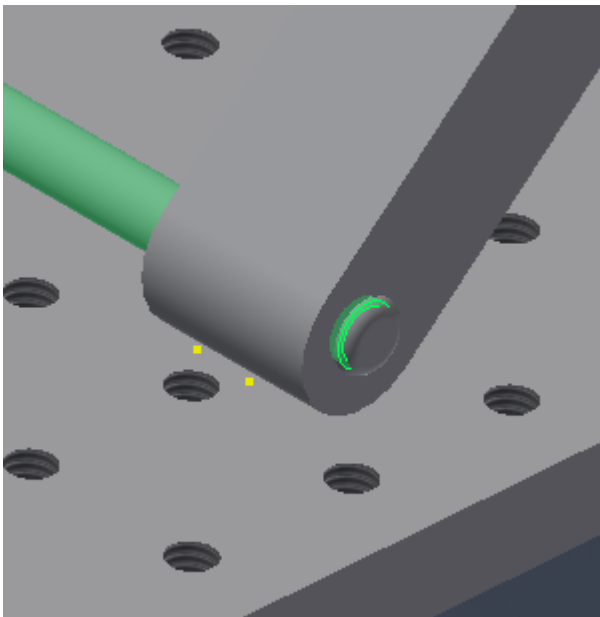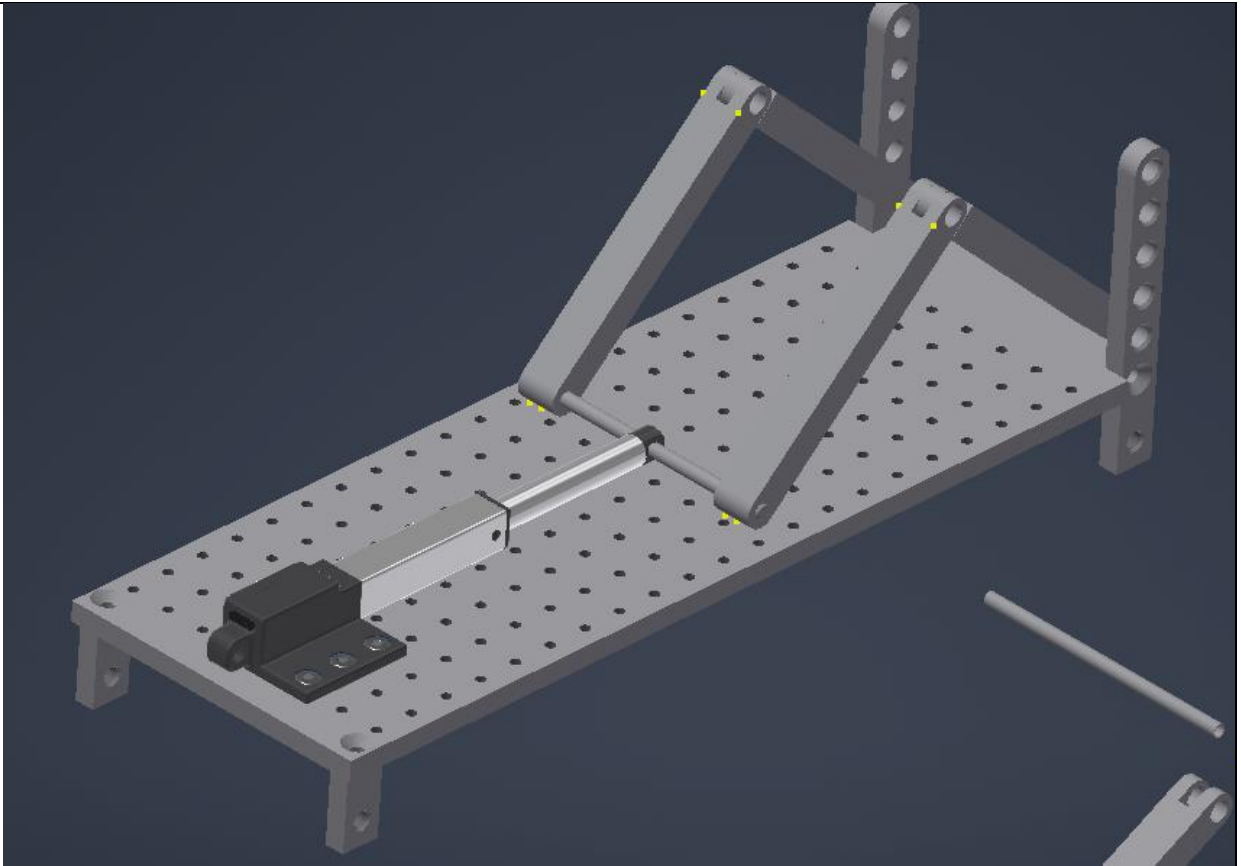| Name: Buu Ha | MacID hab8 |
| Name: Muhammad Danyal Afzal | MacID: afzalm7 |
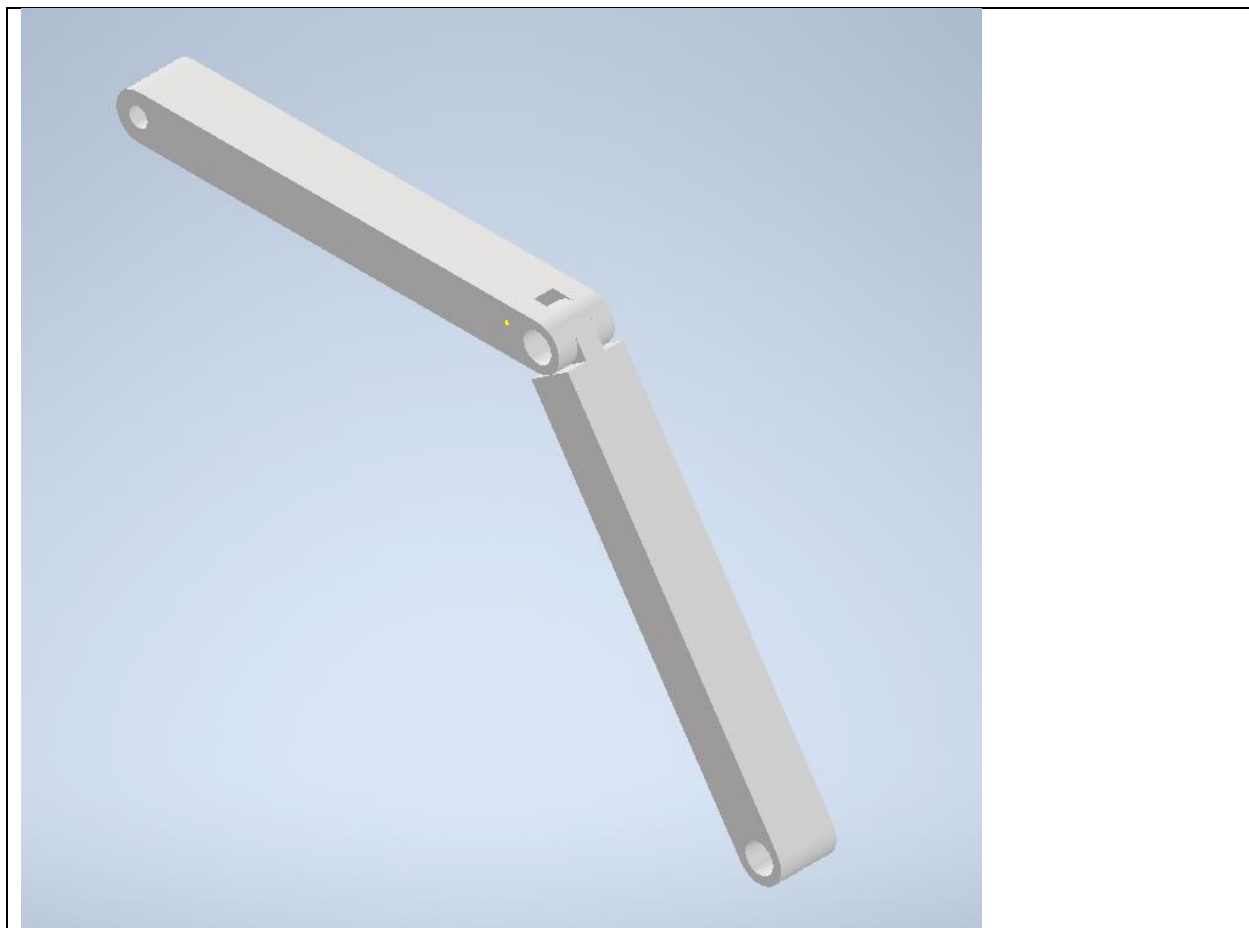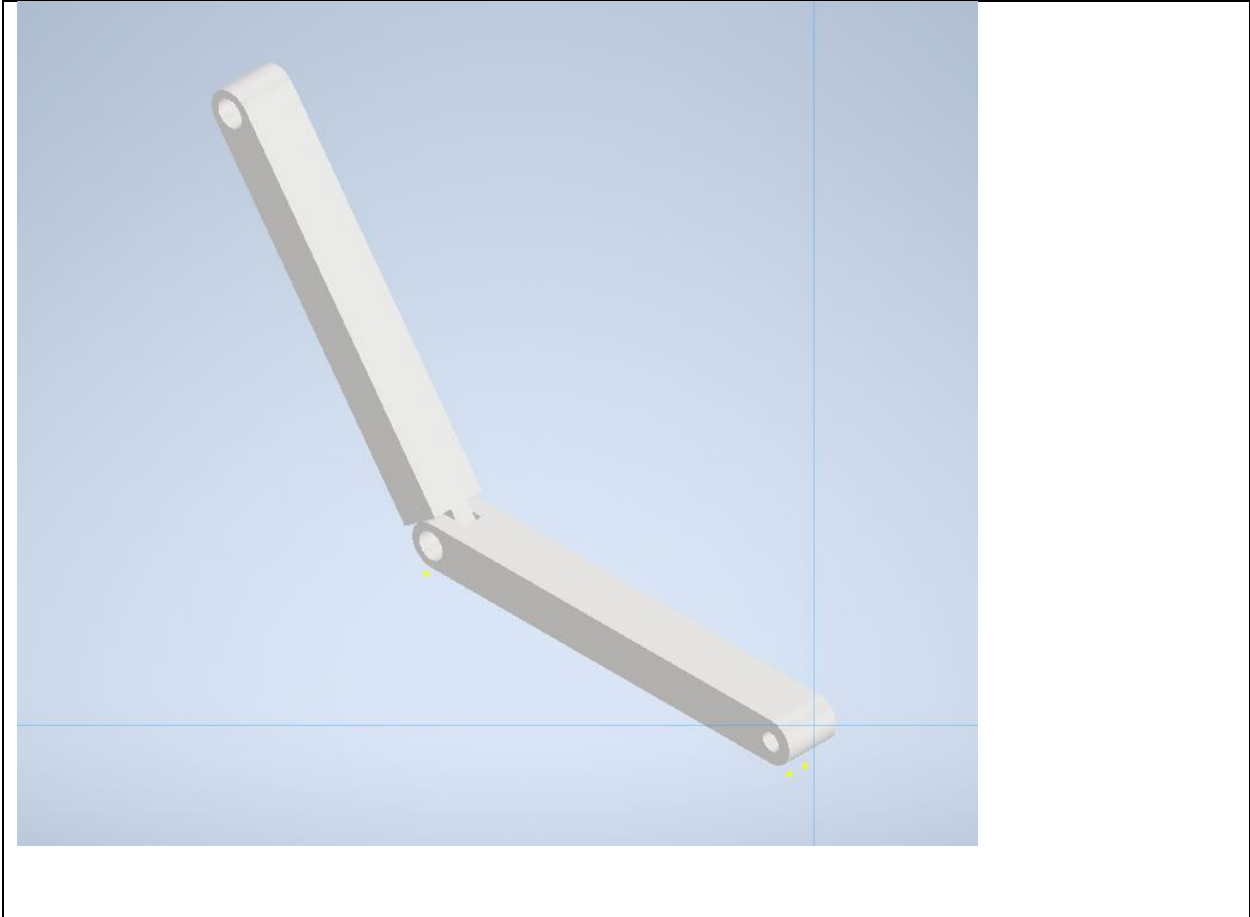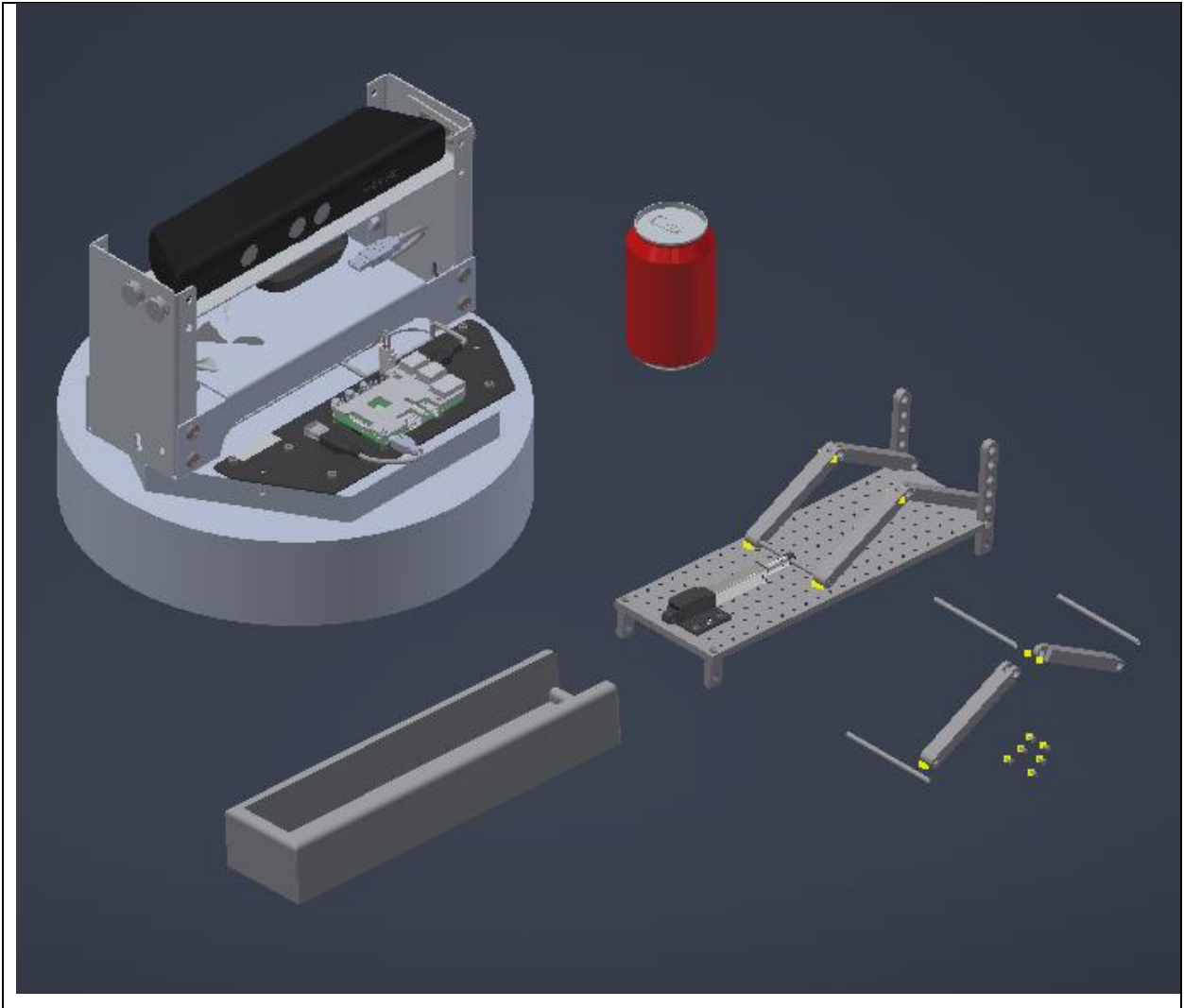
*Limit screenshots to no more than 2 per page. For additional screenshots, please copy and paste the above on a new page