PROJECT TWO: MILESTONE 2 – COVER PAGE

Team Number: Tues-23

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

Full Name:	MacID:
Adiyan Ahmed	ahmea45
Josh Suh	suhj13
Aldraech Liac	liaca
Borna Sadeghi	sadegb1

MILESTONE 2 (STAGE 1) – REFINED CONCEPT SKETCHES (MODELLING SUB-TEAM)

Team Number: Tues-23

You should have already completed this task individually prior to Design Studio 8.

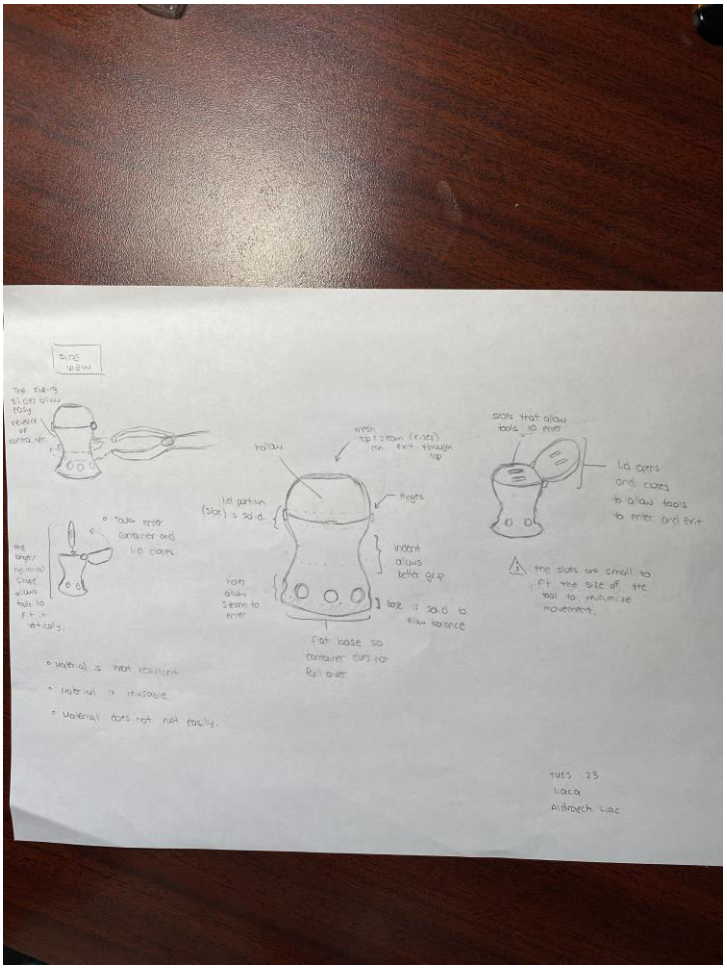
1. Copy-and-paste each sub-team member's refined sketch on the following pages (1 sketch per page)
   → Be sure to indicate each team member's Name and MacID

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 refined concept sketches with the **Milestone Two Individual Worksheets** document so that it can be ***graded***
- Compiling your individual work into this **Milestone Two 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

Team Number: Tues-23

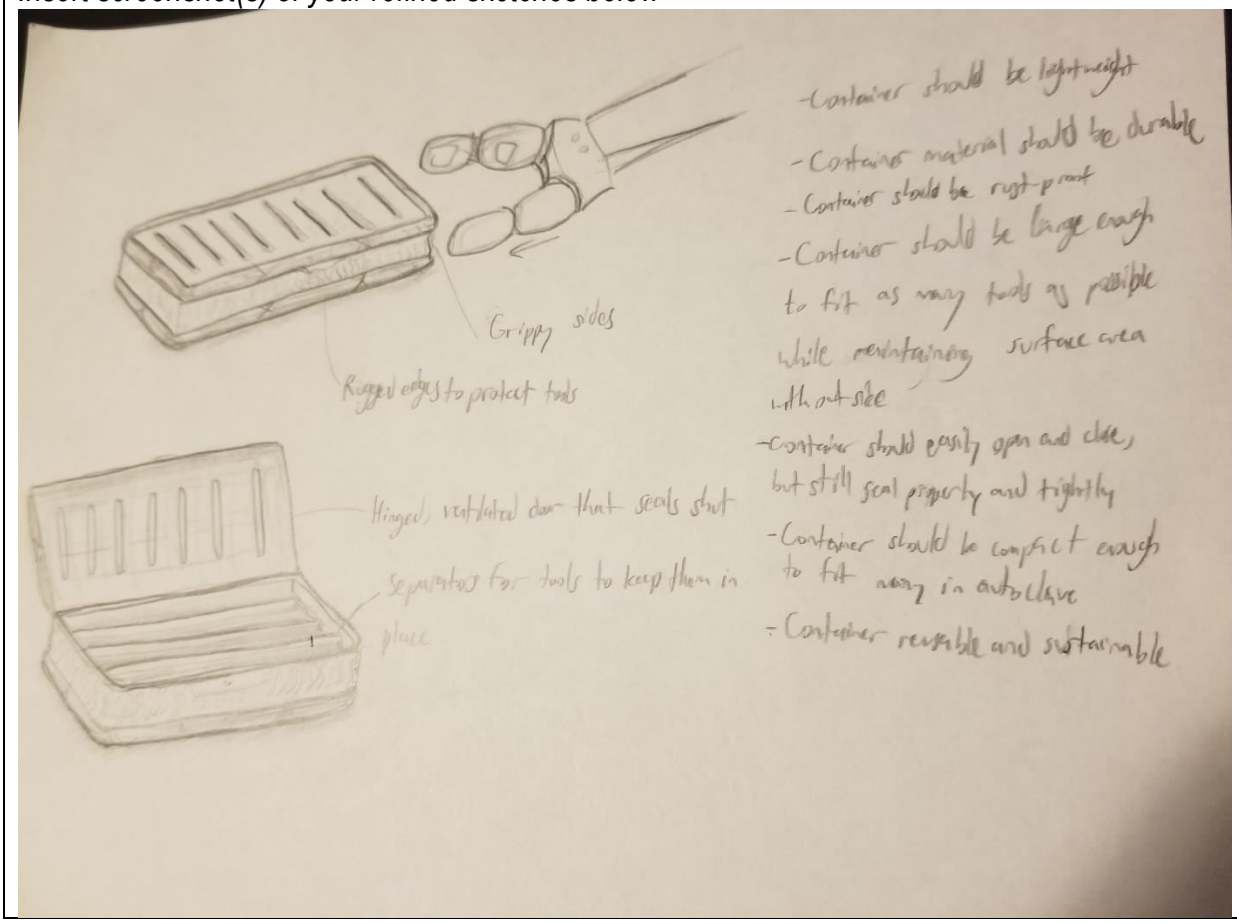
Name: Aldraech Liac	MacID: liaca



Team Number: Tues-23

Name: Borna Sadeghi	MacID: sadegb1

Insert screenshot(s) of your refined sketches below



*If you are in a sub-team of 3, please copy and paste the above on a new page

MILESTONE 2 (STAGE 2) – COMPUTER PROGRAM WORKFLOW (COMPUTATION SUB-TEAM)

Team Number: Tues-23

You should have already completed this task individually prior to Design Studio 8.

1. Copy-and-paste each team member's storyboard or flowchart sketches on the following pages (1 team member per page)
   → Be sure to indicate each team member's Name and MacID

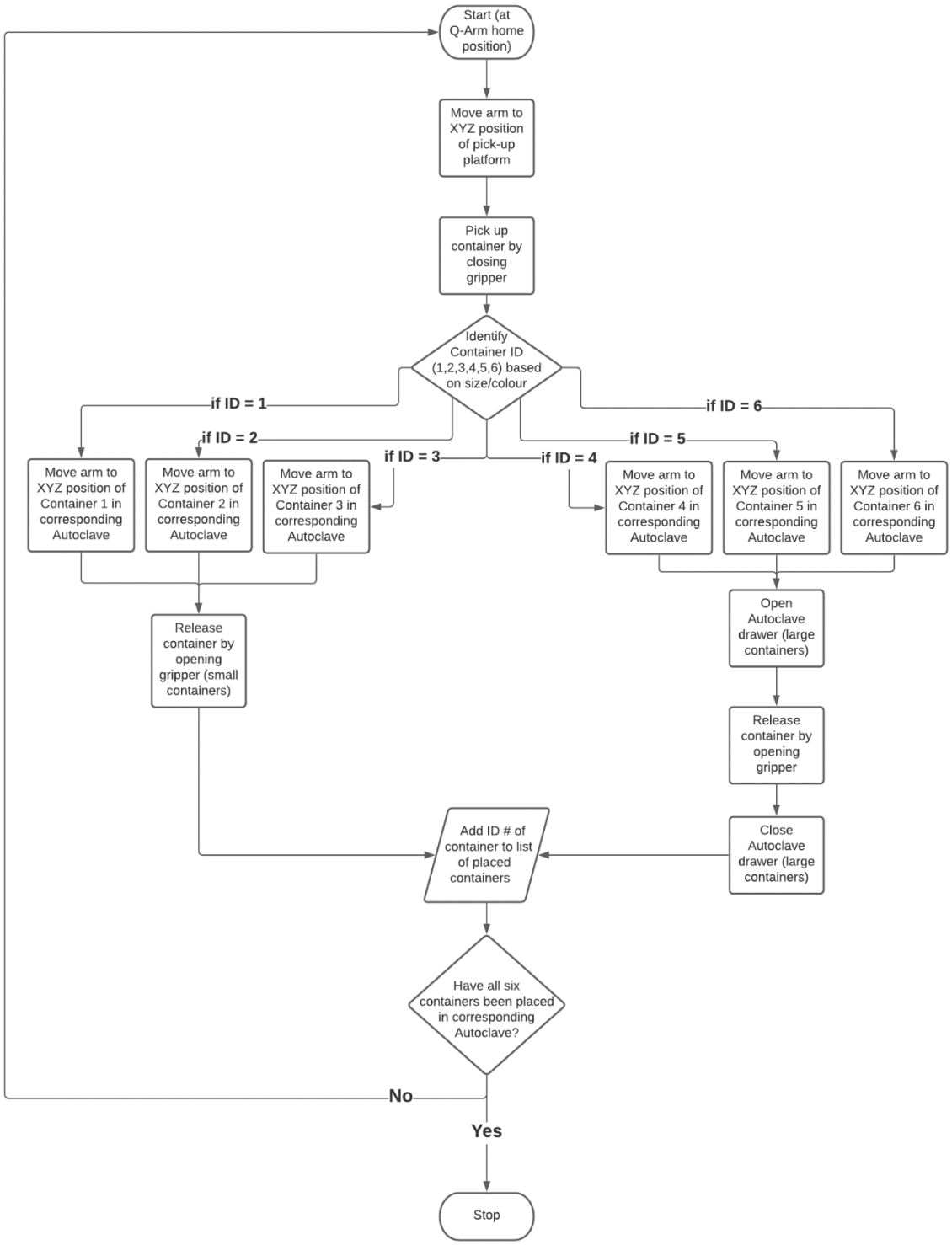
We are asking that you submit your work on both worksheets. It does seem redundant, but there are valid reasons for this:

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

Team Number: Tues-23

Name: Adiyan Ahmed	MacID: ahmea45

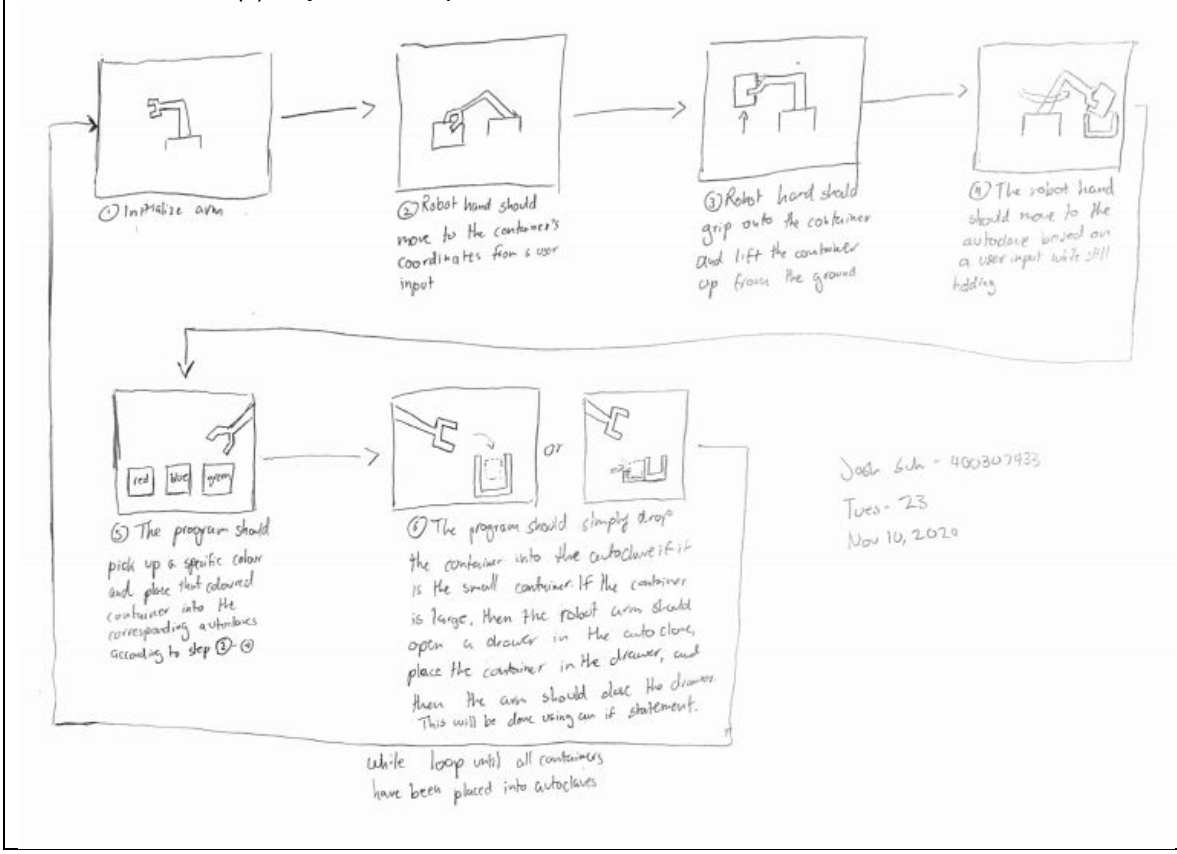
Insert screenshot(s) of your workflow below



Team Number: Tues-23

Name: Josh Suh	MacID: suhj13

Insert screenshot(s) of your concept workflow below



*If you are in a sub-team of 3, please copy and paste the above on a new page

MILESTONE 2 (STAGE 3A) – LOW-FIDELITY PROTOTYPE (MODELLING SUB-TEAM)

Team Number: Tues 23

Complete this worksheet during design studio 8 after creating the low-fidelity prototypes.

1. Take multiple photos of your low-fidelity prototypes
   → Include an index card (or similar) next to the prototype, clearly indicating your Team Number, Name and MacID on *each* sketch
2. Insert your photo(s) as a Picture (Insert > Picture > This Device)
3. **Do not include more than *two* prototype photo's per page**

Make sure to include photos of each team member's prototype

Team Number: Tues 23

Name: Aldraech Liac	MacID: liaca

Team Number: Tues-23

Name:	MacID:

Insert screenshot(s) of your low-fidelity prototype below

*If you are in a sub-team of 3, please copy and paste the above on a new page

MILESTONE 2 (STAGE 3B) – LOW-FIDELITY PROTOTYPE OBSERVATIONS (MODELLING SUB-TEAM)

Team Number: Tues-23

As a team, document your observations for each low-fidelity prototype. Make sure to label your observations to indicate which prototype it belongs to. As a starting, consider the following: (note, this does not fully encompass all discussion points)

→ Advantages and disadvantages of each prototype
→ Extent to which each concept aligns (or does not align) with the List of Objectives, Constraints, and Functions you came up with for Milestone 1
→ Reliability of the design in picking up the surgical tool
→ Reliability of the design in securing the surgical tool
→ Extent to which it allows for tool sterilization

*Document your observations for each prototype in the space below. It is recommended you document observations in a **table** or in bullet form (it should be clear which prototype you are referring to for each observation.*

Aldraech's design:

Constraints:

- The container varies in size, depending on the size of the tool. Regarding large tools, this may not actually fit within the autoclave due to the container's large vertical component (as it holds the tools vertically to secure them). This is a large issue that must be addressed.
- To ensure a tight grip, the width of the container must not exceed 80mm which is possible for the design of the container. Furthermore, the design allows for a tighter hold due to the indent and sloping sides.
- The holes at the bottom and mesh top allow for steam to enter, rise, and exit. It allows for efficient sterilization.
- The container does allow for easy tool access (enter and exit)
- Every feature is larger than 4mm.

Functions:

- The container allows for easy sterilization via the holes at the bottom and the mesh top; by the end of the process the tool will be sterilized.
- The ideal design allows for a secure hold of the Q arm throughout transport

- The design also allows the Q-arm to grab it from any angle

Objectives:

- The small slots allow for a secure hold on the tool by minimizing movement (of the tool)
- The design is mostly hollow, except for a slightly thicker base, however due to the mostly hollow design the container is relative lightweight
- Due to the many holes at the bottom of the design and its hollow interior, its long-term structural integrity may waver
- The design is reusable.
- The design should be heavier at the bottom in order to lower its center of mass and prevent it from falling over

Borna's design:

Constraints:

- *The container allows for a tool to be placed within, also despite the size of the tool, because it is laying down on its back it should be able to fit within the autoclaves with relative ease.*
- *The container may vary in size depending on the tool within, but for the most part the container can have a default width of less than 80mm. However, its lack of features to aid the arm in grabbing it may be an issue. Albeit, in the project 2 Quanser lab activity, it is seen that the arm can grab a cubic shape with ease and transport it securely.*
- *The slits at the top allows for steam entry and exit, therefore allowing the tool inside to be sterilized.*
- *The lid allows for a tool to be taken out and put back in with fair ease.*
- *The features on the container conform to the 4mm standards as there are no small feature on the design.*

Functions:

- *The container design allows for steam entry and exit via the holes, thus promoting sterilization. By the end of the process tools should be sterilized.*
- *Design properties such as the width can be made a default size to ensure a secure grip on the container. The system according to Quanser, should be able to transport the container to its respective autoclave without an issue.*
- *Can only be grabbed width wise (not length as that would violate the 80mm rule)*

Objectives:

- *The interior of the container has a soft material that prevents any damage to the tools, additionally, the container has seats for individual tools. Although during the event of a drop, the tools may bounce around but the soft interior allows for minimal damage*
- *The mostly hollow design means a lightweight container for transport*
- *The container is both durable and reusable. The container's design is rigid and distributes weight evenly.*

MILESTONE 2 (STAGE 4A) – WORKFLOW PEER-REVIEW (COMPUTATION SUB-TEAM)

Team Number: Tues-23

As a team, document your observations, specifically any similarities and differences between each team member's visual storyboard or flowchart in the table below.

Document your observations for each visual storyboard / flowchart in the space below.

Similarities

- *There's a split at the end for the function that will distinguish how the container will enter the autoclave*
- *While loop at the end to keep the program going*
- *Generally, both workflows have similar order of operations*

Differences

- *Different formats*
- *The flowchart identifies the small and large containers while picking it up while the storyboard defines a code that distinguishes the sizes almost at the end of the program with an if statement. The storyboard distinguishes the containers more efficiently in terms of the amount of code since there would only be two if statements instead of the 6 if statements in the flowchart.*
- *At the end of the flowchart, the ID# of the placed containers is added to a list. This approach was better because it would allow the program to keep track of how many containers have been placed and end the program accordingly.*
- *The flowchart opens all the autoclave drawers at the start and closes them as each large container is placed. This is considered a better approach because it makes the arm not have the put the container down and pick it back up again while opening the autoclave drawer.*

MILESTONE 2 (STAGE 4B) – PROGRAM PSEUDOCODE (COMPUTATION SUB-TEAM)

Team Number: Tues-23

As a team, write out a pseudocode outlining the high-level workflow of your computer program in the space below.

Run the following code if all 6 containers haven't been placed

Start the arm at home position

Take input from muscle sensor emulator

Open all drawers of the three autoclaves

Move arm to the x,y,z coordinates for the pickup position

Pick up the container by closing the gripper

Identify the container size

If the container is small

Identify the container color

If the container is red

The container ID is 01

Move arm to xyz position where container 01 should be placed in Autoclave

If the container is green

The container ID is 02

Move arm to xyz position where container 02 should be placed in Autoclave

If the container is blue

The container ID is 03

Move arm to xyz position where container 03 should be placed in Autoclave

Release the container by opening the gripper

Add the container ID last placed to a list

If the container is large

Identify the container color

If the container is red

The container ID is 04

Move arm to xyz position where container 04 should be placed in Autoclave

If the container is green

The container ID is 05

Move arm to xyz position where container 05 should be placed in Autoclave

If the container is blue

The container ID is 06

Move arm to xyz position where container 06 should be placed in Autoclave

Release the container by opening the gripper

Close the Autoclave drawer

Add the container ID last placed to a list