

## PROJECT TWO: MILESTONE 1 – COVER PAGE

Team Number: 

Mon-30
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Please list full names and MacID's of all *present* Team Members

Full Name:	MacID:
Charlotte Casey	caseyc6
Qisheng Thomas Wang	wangq157
Gurleen Dhillon	dhillg25
Martin Ivanov	ivanom4

## MILESTONE 1 (STAGE 1) – PRE-PROJECT ASSIGNMENT

Team Number: 

Mon-30
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You should have already completed this task individually prior to Design Studio 7.

1. Copy-and-paste each team member's list of objectives, constraints and functions on the following pages (1 team member per page)
  - a. 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 list of objectives, constraints and functions with the **Milestone One Individual Worksheets** document so that it can be **graded**
- Compiling your individual work into this **Milestone One Team Worksheets** document allows you to readily access your team member's work
  - This will be especially helpful when completing **Stage 2** of the milestone

Name: Charlotte Casey	MacID: caseyc6
<p><i>Objectives</i></p> <ul style="list-style-type: none"> <li>• Should be intuitive to use</li> <li>• Should be easy to set up</li> <li>• Should require minimal maintenance</li> <li>• Should be cost effective</li> </ul> <p><i>Constraints</i></p> <ul style="list-style-type: none"> <li>• Must sanitize tools</li> <li>• Must pick up and put down tools</li> <li>• Must deposit tools into autoclave</li> <li>• Container must be lightweight enough for the arm to pick it up (mass &lt; 350 g)</li> <li>• Container must be small enough to be manipulated by the robotic arm (width &lt; 80 mm)</li> </ul> <p><i>Functions</i></p> <ul style="list-style-type: none"> <li>• Able to effectively apply sterilizing agent</li> <li>• Able to securely hold instrument within the container</li> <li>• Able to move equipment in a controlled manner</li> <li>• Able to sort containers based on different attributes</li> </ul>	

Team Number: MON-30

Name: Thomas Wang	MacID: wangq157
<p><i>Objectives</i></p> <ul style="list-style-type: none"><li>• Should be easy for robot arm to pick up (grippy sides/handles)</li><li>• Should have maximized internal storage</li><li>• Should be easily sterilizable (no hard-to-reach crevasses where it may be hard to clean)</li><li>• Should be able to resist external changes in heat (thermal insulator)</li><li>• Should be able to withstand high pressures</li><li>• Should be able to identify the difference between different containers</li></ul> <p><i>Constraints</i></p> <ul style="list-style-type: none"><li>• Must have dimensions less than size of autoclave holder (max width of 80mm)</li><li>• Must be light weight enough to be picked up by the robot arm (max mass of 350 grams)</li><li>• Must have storage for tools</li></ul> <p><i>Functions</i></p> <ul style="list-style-type: none"><li>• Store contents</li><li>• Transportable container</li><li>• Place container in autoclave bin</li><li>• Hold tool securely</li><li>• Move equipment in an efficient manner that isn't error prone</li><li>• Sort objects based on colour scheme</li><li>• Prepare instruments for sterilization</li></ul>	

Name: Gurleen Dhillon	MacID: dhillg25
<p><i>Objectives (attributes/behaviour design should have)</i></p> <ul style="list-style-type: none"> <li>• Should be easy for arm to pick up container and place in autoclave</li> <li>• Should be connected to muscle sensor</li> <li>• Should work efficiently</li> <li>• Should not break easily</li> </ul> <p><i>Constraints (constraints)</i></p> <ul style="list-style-type: none"> <li>• Size of container should be small enough for arm to pick up (max width is about 80 mm)</li> <li>• Each tool/bin should be placed according to colour</li> <li>• Code must be in python</li> <li>• Mass must be less than 350 grams</li> </ul> <p><i>Functions (functionality of design)</i></p> <ul style="list-style-type: none"> <li>• Arm should be able to pick up tool</li> <li>• Arm should securely hold surgical tool in place</li> <li>• Arm should be able to move container to location</li> <li>• Arm should be able to place container in the correct spot/autoclave bin (on top for small tools, and inside for big tools)</li> <li>• Should be able to open and close autoclave bin</li> <li>• Should be able to identify correct bin based on colour and size</li> <li>• Program should end when all items in place</li> </ul>	

Team Number: MON-30

Name: Martin Ivanov	MacID: ivanom4
<i>Objectives</i> <ul style="list-style-type: none"><li>• Durable and long lasting</li><li>• Cost effective</li><li>• Size efficient</li><li>• Easy to use</li></ul> <i>Constraints</i> <ul style="list-style-type: none"><li>• Able to be picked up and manipulated by robot (mass &lt; 350 grams), (width &lt; 80mm)</li><li>• Able to fit in autoclave</li><li>• Able to have the instrument fit inside of the container</li><li>• Able to facilitate sterilization</li></ul> <i>Functions</i> <ul style="list-style-type: none"><li>• Easily pick up instrument</li><li>• Securely hold instrument in place during transfer</li><li>• Accurately place instrument into autoclave</li><li>• Complete the entire task in a time effective manner</li><li>• Prepare instrument for sterilization</li></ul>	

\*If you are in a team of 5, please copy and paste the above on a new page

## MILESTONE 1 (STAGE 2) – LIST OF OBJECTIVES, CONSTRAINTS, AND FUNCTIONS

Team Number: MON-30

1. As a team, create a final a list of objectives, constraints, and functions in the table below.

- Use your individual *Pre-Project Assignment* to build your team's final list
- The exact number you should have depends on what information you have gathered from the Project Pack.

Objectives	Constraints	Functions
Simple overall design/Easy to set up	Small size of container	Easy to pick up instrument
Minimize amount of unused space within the container	Light weight of container	Securely hold instrument within the container
Require minimal maintenance	Shape of container fits in autoclave	Accurately sort objects based different attributes
Cost effective	Able to facilitate sterilization	Complete task in efficient and timely manner
		Prepare instrument for sterilization

2. What is the primary function of the entire system?

Securely picking up and placing the container

3. What are the secondary functions?

Sorting different objects based on different attributes
Arm moves the container in a secure and efficient trajectory to the autoclave
Instrument is securely placed within the container
Open the bigger autoclave bin storage section

## MILESTONE 1 (STAGE 3) – MORPHOLOGICAL ANALYSIS

Team Number: **MON-30**

1. Identify multiple means to perform the secondary functions that your team came up with during Stage 1 of this milestone. One sub-function (pick up) is already listed for you. The other two sub-functions are for your team to choose.

→ Make sure that every mean for the “pick up” sub-function assumes that the end effector of the robot arm is a gripper. The means for your other sub-functions do not need to follow this assumption.

Function	Means				
Pick up	Pick up container around its exterior	Handle to hold	Picking up container by the rim	Forklift (container placed on different platform)	Hook
Transfer tools	Conveyer belt	Pulley	Catapult	Chute/ rail system	Slide
Automatically Opening Storage System	Handle	Motion sensor	Tripwire	Pull string	Lever/ button

Legend: Thomas, Charlotte, Gurleen, Martin

(Handle: Interior handle vs Exterior handle)

(Pick up around exterior: textured surface vs shape with respect to the arm)

(Pick up by rim: as it sounds)

(Forklift: container slides onto platform which is picked up by the claw)

(Hook: into a hole in the container vs. A lid with a part that can get hooked)



## MILESTONE 1 (STAGE 4) – CONCEPT SKETCHES

Team Number: MON-30

Complete this worksheet *after* having completed stage 3 as a team **and** after having **individually** created your concept sketches.

1. Each team member should copy-and-paste the photo of their individual concept sketches in the space indicated on the following pages
  - The photo's should be the same one you included in the **Milestone One Individual Worksheets** document
  - Be sure to include your **Team Number** on each page
  - Be sure each team member's **Name** and **MacID** are included with each sketch

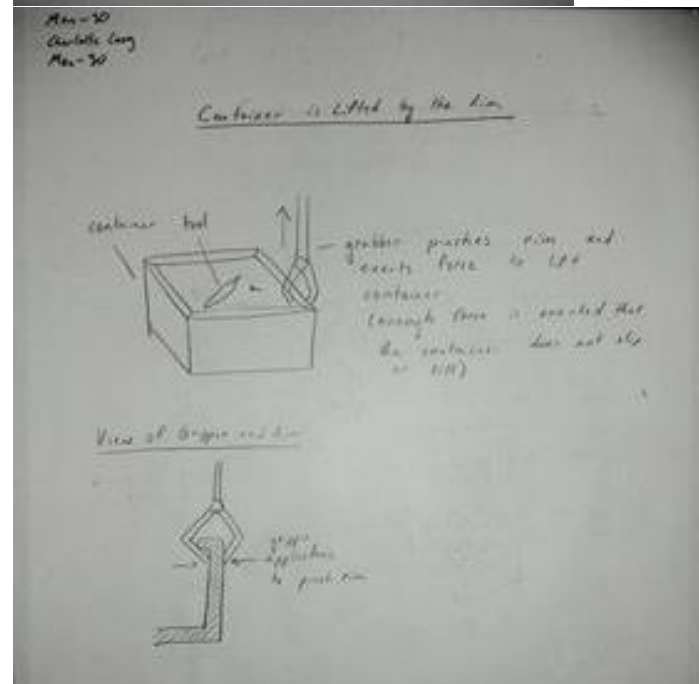
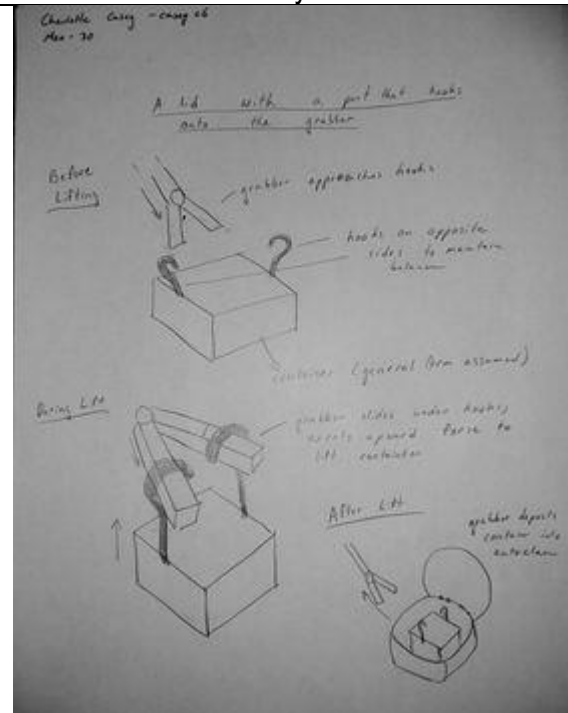
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Team Number: **MON-30**

Name: Charlotte Casey

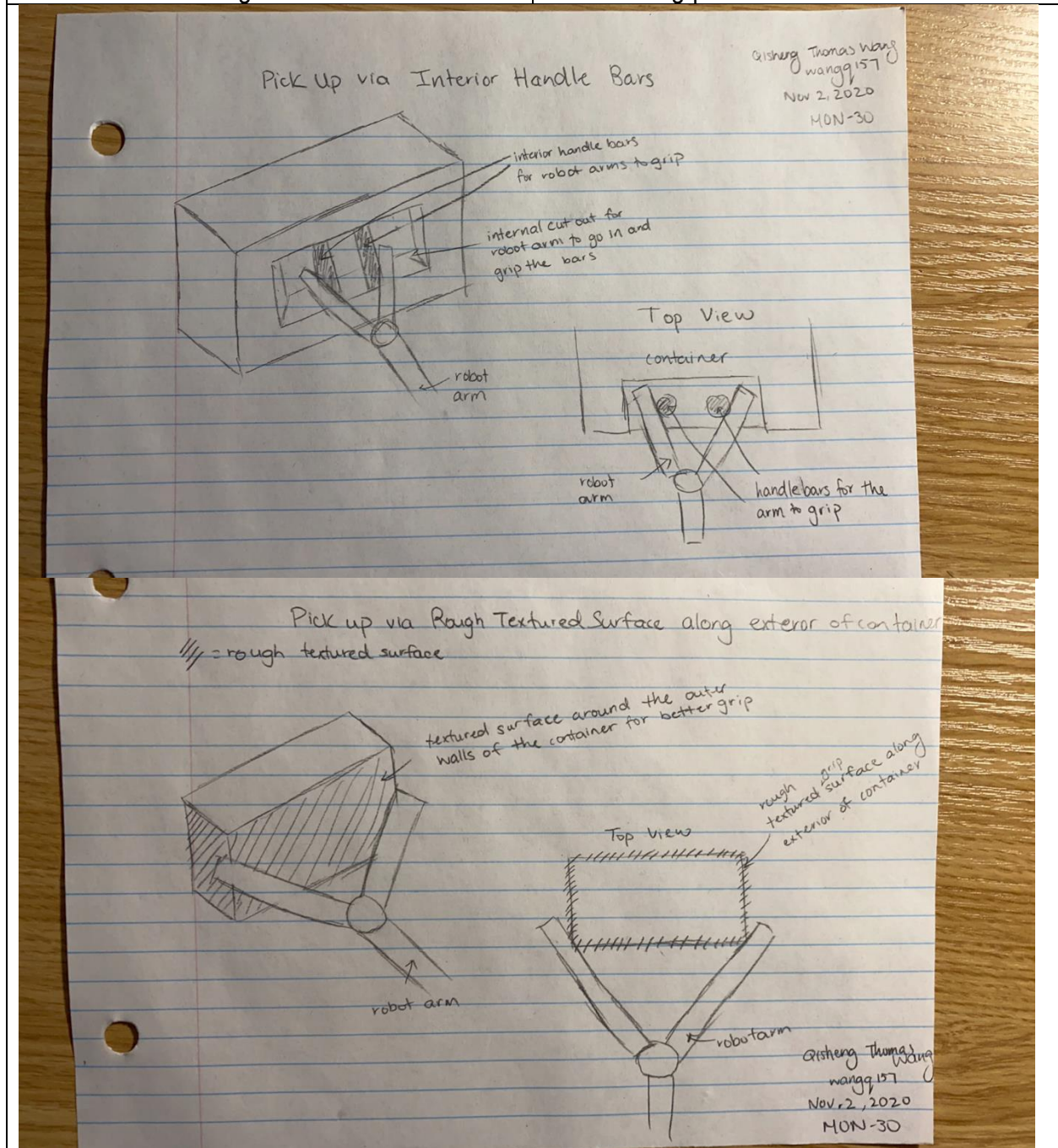
MacID: caseyc6



Team Number: MON-30

Name: Thomas Wang

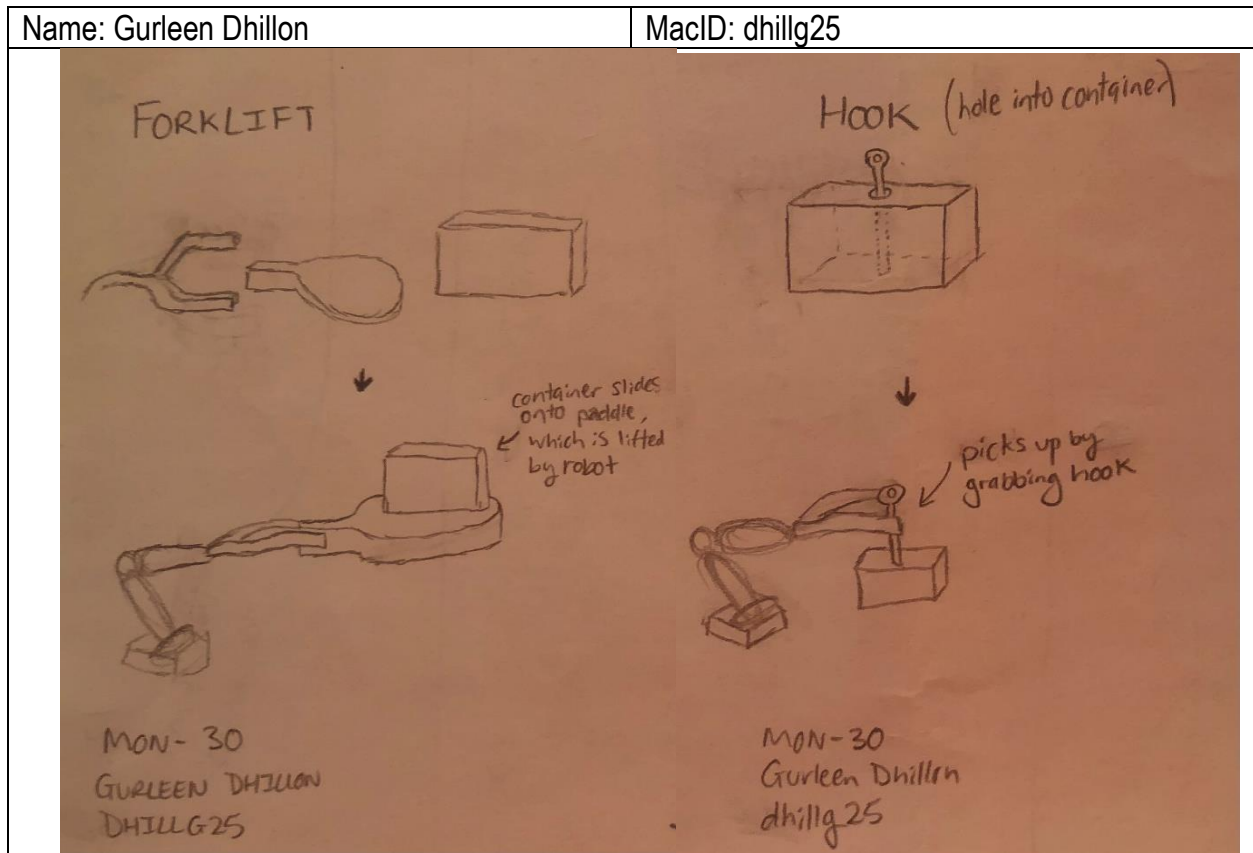
MacID: wangq157



Team Number: MON-30

Name: Gurleen Dhillon

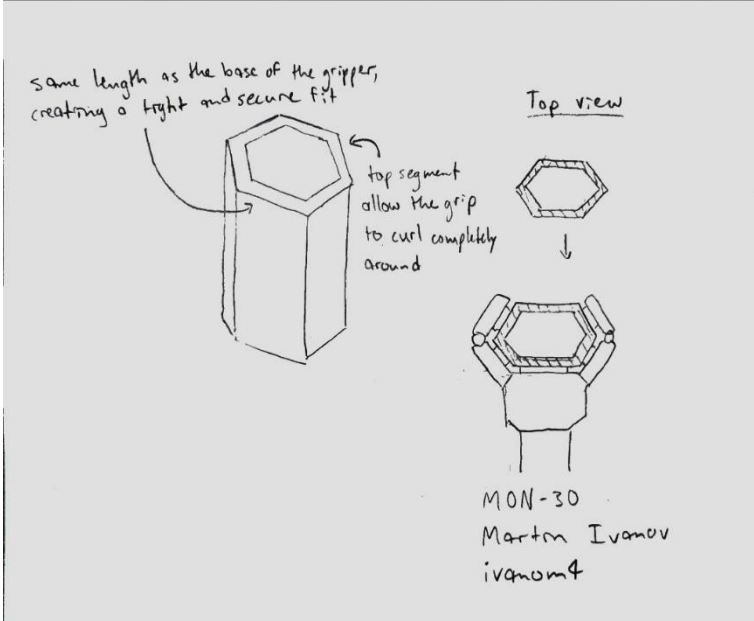
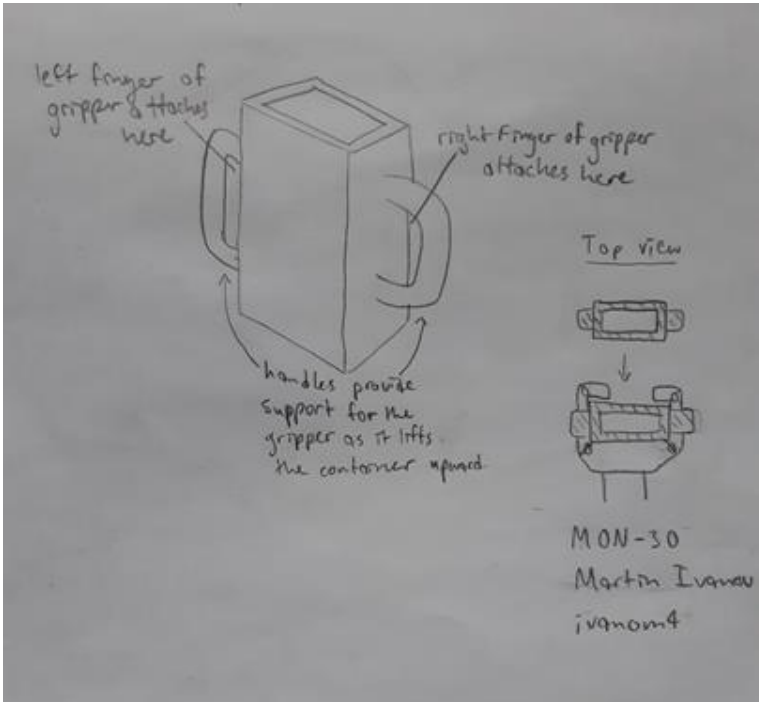
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Team Number: **MON-30**

Name: Martin Ivanov

MacID: ivanom4



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