PROJECT TWO: MILESTONE 1 – COVER PAGE

Team Number: Thurs-23

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

Full Name:	MacID:
Arthes Matheeswaran	matheesa
Vaisnavi Shanthamoorthy	shanthav
Emilie Alain	alaine1
Ziyang Qin	Qinz36

MILESTONE 1 (STAGE 1) – PRE-PROJECT ASSIGNMENT

Team Number: Thurs-23

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

Team Number: Thurs-23

Name: Ziyang Qin	MacID: qinz36

Objectives:

- *Lightweight*
- *Stiffness*
- *Easy to transfer*
- *Reusable*
- *High temperature resistance*

Constraints:

- *Waterproof*
- *Heat insulation*
- *Chemical inert*
- *all features must be greater than 4mm*

Functions:

- *Able to carry liquids and solids*
- *Able to maintain inside temperature*
- *Allow for lifting*
- *Allow for transport*

Team Number: Thurs-23

Name: Emilie Alain	MacID: alaine1

Objectives

- Small and portable
- Lightweight
- Function how the client wants it to

Constraints

- Accurate to certain percent
- Objects no larger than width ~80mm
- Can hold objects with width ~150mm but with less security
- Mass cannot exceed 350g
- Features must be greater than 4mm

Functions

- Pick up objects (surgical instruments)
- Rotate
- Identify the correct bin (place in correct bin)
- Open and close the gripper
- Open and close bin drawer
- Program runs based off inventory (continue program for more inventory, terminate program when there is no more inventory)

Team Number: Thurs-23

Name: Arthes Matheeswaran	MacID: matheesa

Objectives

- Identify means of picking up and transferring a container to an autoclave for sterilization
- Design the container such that it can securely hold a surgical tool in place, be picked up by a robotic arm for transfer, and facilitate sterilization
- Design a computer program for operating the robotic arm using two muscle sensor emulators
- Demonstrate that our function works

Constraints

- Base of container must fit within the desired location inside the autoclave
- Container must securely hold the surgical tool in place so that its movement is restricted during transfer
- All features be greater than 4mm in size
- Mass of design prior to scaling cannot exceed 350g

Functions

- Assigning a target location within the autoclave (in XYZ Cartesian coordinates) based on the container objects known attributes
- Controlling movement of the gripper joint in response to input data
- Controlling movement of Q-arm in response to input data

Opening the autoclave bin drawer in response to input data from one or both muscle sensor emulators

Team Number: Thurs-23

Name: Vaisnavi Shanthamoorthy	MacID: shanthav

Copy-and-paste the pre-project assignment for one team member in the space below

Objectives

- Easily accessible
- Lightweight
- Portable
- Small

Constraints

- surgical tool should be held in place in a firm manner, not moving around
- mass of container should be less than the mass of the robotic arm
- all features must be greater than 4mm
- the base of the container must fit within the desired location of the autoclave
- mass cannot exceed 350g
- objects should be no larger in width of about 80mm
- able to hold objects with width of about 150mm (less securely)

Functions

- Hold objects (surgical tools) securely in place
- Grip objects
- Release objects
- Pick up objects
- Rotate
- Move forward
- Transfer objects into container
- Identify the correct target location (correct autoclave bin)
- Code should terminate or continue based upon the number of objects (containers) successfully placed in the correct container

*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: Thurs-23

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
Small	All features must be greater than 4 mm in size	Identify correct bin to place objects
Portable	Can hold objects securely up to ~80mm	Picking the container up
Function how client wants	Mass of design cannot exceed 350g	Open and close gripper
Lightweight	Must be able to be picked up by the robot arm's end effector	Transferring the container to the specified autoclave
High temperature resistance	Accurate to a certain percent	Open and close bin drawer

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

Transferring the container to the specified target location of the autoclave

3. What are the secondary functions?

Picking the container up using the arm
Identify correct bin the place the objects
Open and close gripper
Open and close bin drawer

MILESTONE 1 (STAGE 3) – MORPHOLOGICAL ANALYSIS

Team Number: Thurs-23

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	Handle	Magnet	Sensors	Trigger	Velcro (on both instrument and gripper)	Double sided tape
Open drawer	Gripper	Pulley System	Trigger	Magnet	By hand	String
Identifying Correct Bin	Shape	By colour	Location	Sensors	Size	Mass

MILESTONE 1 (STAGE 4) – CONCEPT SKETCHES

Team Number: Thurs-23

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 your 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

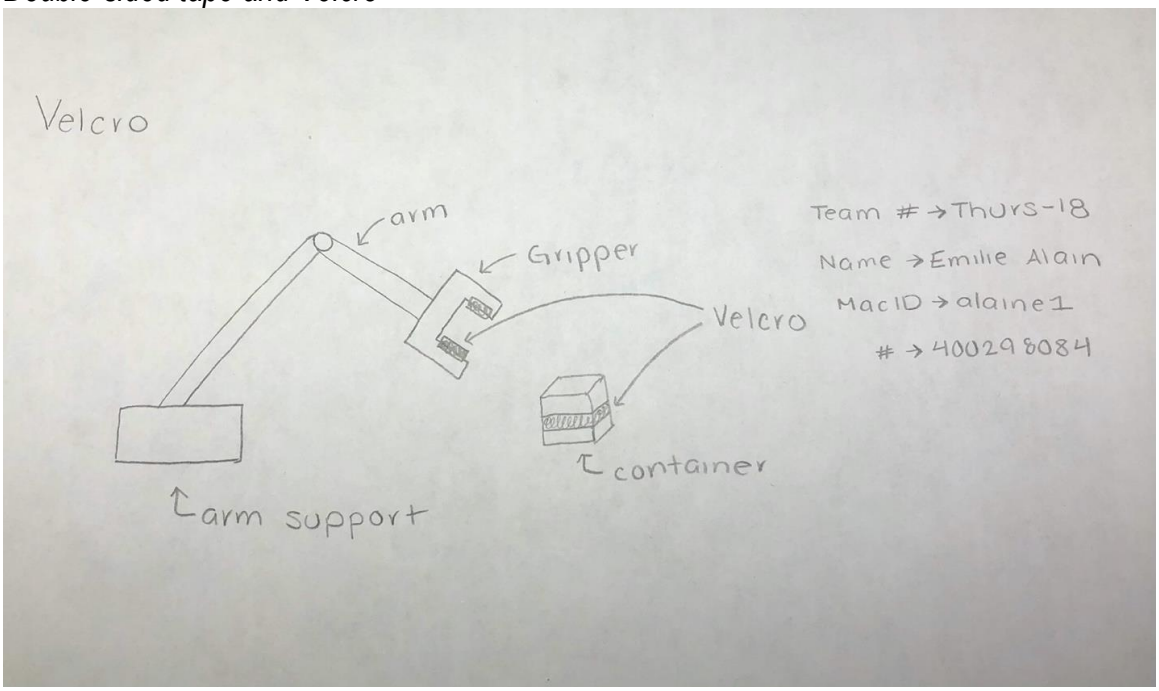
We are asking that you submit your work on both worksheets. It does seem redundant, but there are valid reasons for this:

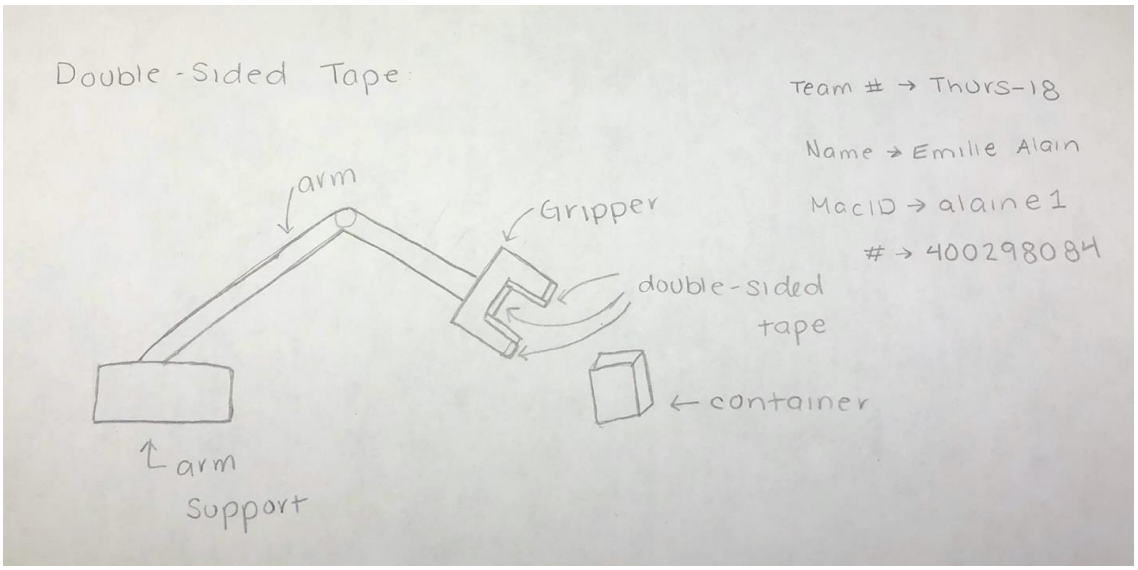
- Each team member needs to submit their sketch with the **Milestone One Individual Worksheets** document so that it can be ***graded***
- Compiling your individual work into this **Milestone One Team Worksheets** document allows you to readily access your team member's work

Team Number: Thurs-23

Name: Emilie Alain	MacID: alaine1

Double-sided tape and Velcro

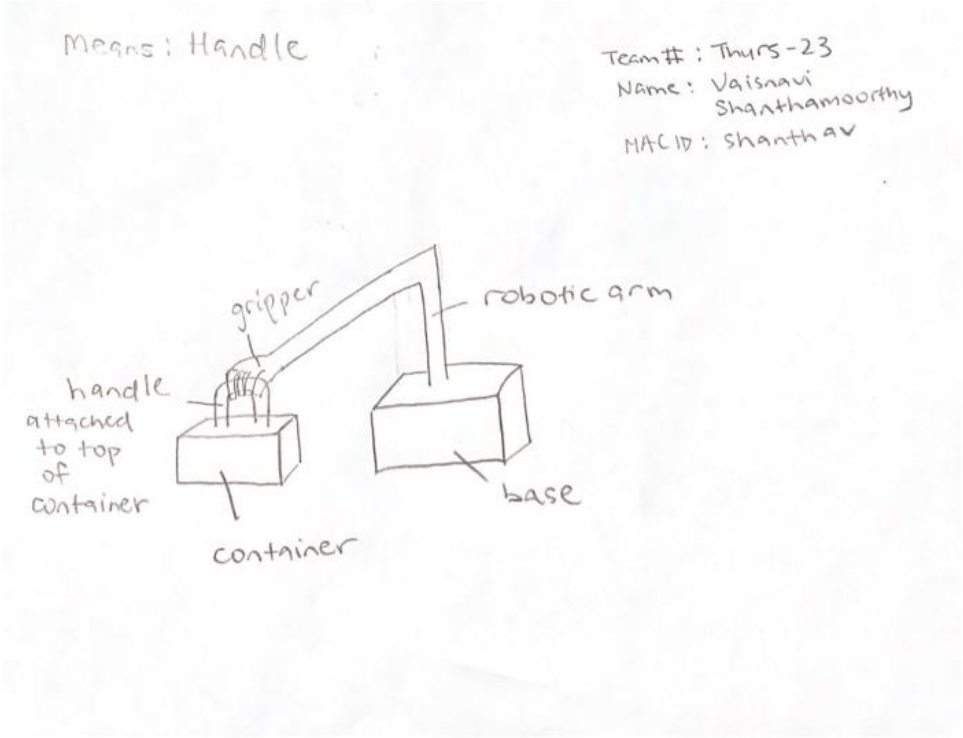




Team Number: Thurs-23

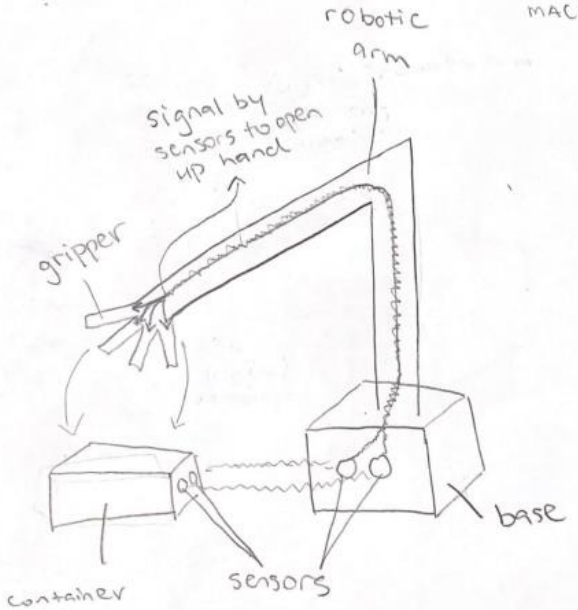
Name: Vaisnavi Shanthamoorthy	MacID: shanthav

Insert screenshot(s) of your concept sketches below
Means: Handle & Sensors



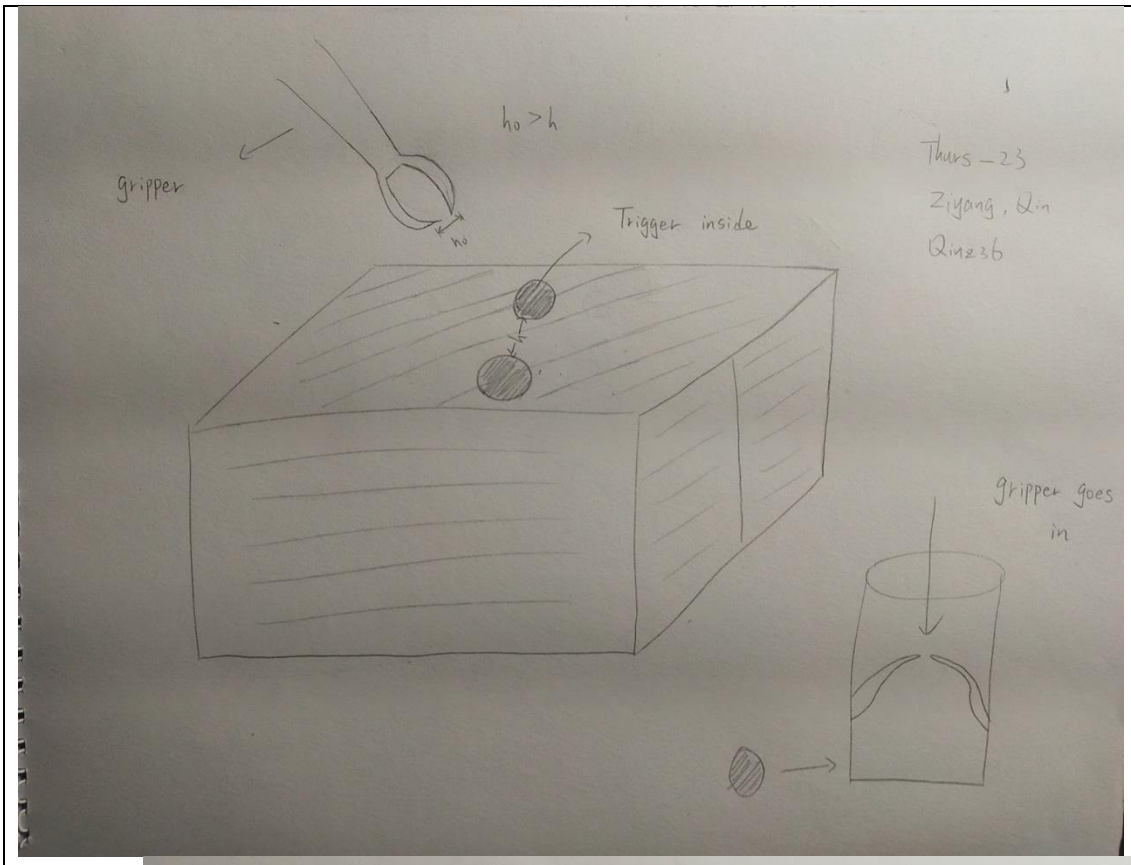
Means: Sensors

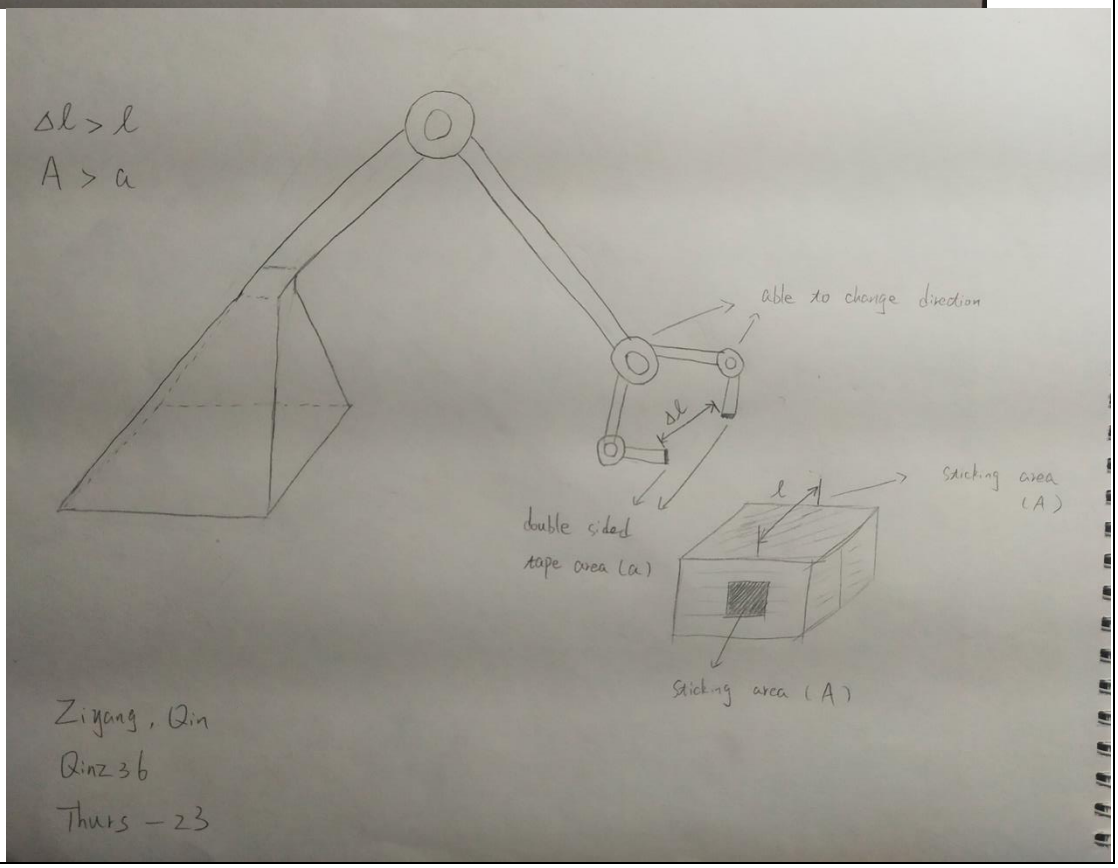
Team #: Thurs-23
Name: VAISNAVI SHANTHAMOORTHY
MACID: shanthav



Team Number: Thurs-23

Name: Ziyang Qin	MacID: Qinz36
Insert screenshot(s) of your concept sketches below *Trigger& Double-sided tape*	


gripper
$h_0 > h$
h_0
Trigger inside
Thurs – 23
Ziyang, Qin
Qinz36
gripper goes in


$\Delta l > l$
$A > a$
able to change direction
Δl
l
Sticking area (A)
double sided tape area (a)
Sticking area (A)
Ziyang, Qin
Qinz36
Thurs – 23

Team Number: Thurs-23

Name: Arthes Matheeswaran	MacID: matheesa

Insert screenshot(s) of your concept sketches below
Handlle and Magnet