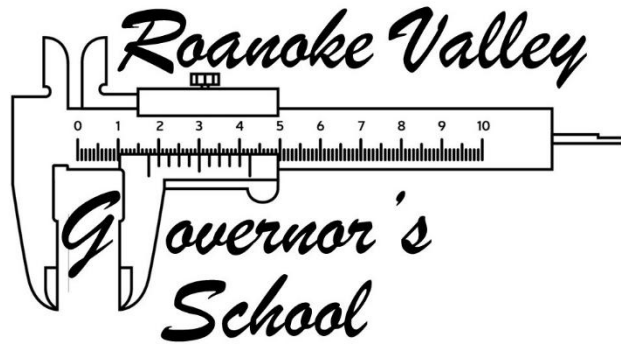


Engineering Design 2026-27 Summer Assignment



ASSIGNMENT OVERVIEW

1. Introduction
 2. On Shape Trainings
 3. On Shape Summer Portfolio
 4. Arduino Practice
 5. Project Brainstorming
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1. Introduction

Engineering design is the first-year elective for those interested in engineering. The class will focus on the engineering method, creating computer assisted diagrams (CAD, basic circuitry, and coding). Students will also find themselves soldering, fabricating with 3D printers and laser cutters, and working with standard shop tools. All the skills will be used to engineer a culminating project to be presented at project forum in 2027.

The following tasks will be turned in online no later than 8:00 Monday August 17th. The following items will need to be submitted for full credit:

- **In Class:** On Shape Trainings – Sign In and show the instructor completion status.
- **Through On Shape:** Summer portfolio shared with the instructor
- **Canvas Turn In:** Arduino Practice. Save a local **circuit file** and submit them on Canvas. The turn-in box will NOT be available until early August when next year's courses are available.

I will check my email periodically this summer. You are welcome to contact me with any questions, and I will do my best to answer them via email: mclarkston@rcps.info

Good luck, enjoy your summer, and I look forward to seeing you all again next school year.

Mr. Clarkston

2. On Shape Trainings

Log into On Shape and go to the learning center. You will need to show completion of the following two courses for credit.

- Introduction to sketching
- Introduction to part studio

While completing the trainings you should be following along in your "summer assignment" document in On Shape.

3. On Shape Portfolio

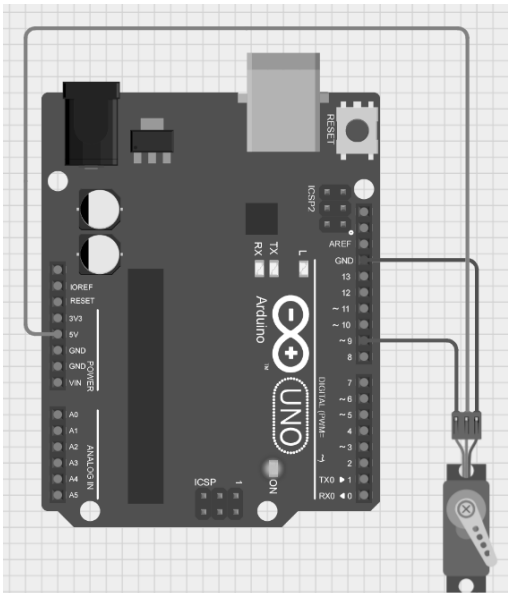
After completing the trainings, you are free to start building a portfolio. In your on shape "summer assignment" document you will need to **create 3 unique designs**. Each design needs to be contained its own part studio within the "summer assignment" document. The following skills must be demonstrated somewhere in your designs (feel free to check them off as you work):

- | | |
|---|--|
| ☐ Use sketch tools | ☐ Rib |
| ☐ Extrude | ☐ Shell or Thread |
| ☐ Revolve or Sweep | ☐ Mirror |
| ☐ Loft | ☐ Boolean |
| ☐ Fillet | |

* A portion of the portfolio grade will be determined by the complexity and originality of the designs.

4. Arduino Practice

Start by going to <https://app.circuitdesigner.com/>. Click on “start from scratch” and build the project shown below. Click on the code tab and copy the code provided below. When finished run the simulator to observe the project. Modify the project 2 times according to the instructions below. **When you complete each task, click on “file” then “save a local copy”.** This is the file you will submit for credit for each of the tasks below.

Project and Parts	Code	Set Up
Title: Single Servo - 3 Wires - 1 Servo - Arduino Uno	<pre>#include <Servo.h> Servo myservo; int pos = 0; void setup() { myservo.attach(9); } void loop() { for (pos = 0; pos <= 180; pos += 1) { myservo.write(pos); delay(15); } for (pos = 180; pos >= 0; pos -= 1) { myservo.write(pos); delay(15); } }</pre>	

Task #1: Add a button to pin 2 and modify the code so that when the button is pressed the servo moves 180 degrees. Annotate the code (remember to start with //) so that the function of each line is explained. Be sure to save a local copy to submit for credit.

Task #2: Remove the button and add a second servo that mirrors the first servo. Mirror means that they are in the same position but move in opposite directions. Annotate the code and save a local copy.

5. Project Brainstorming

NOTHING is to be turned in for this section. Fall will be busy with increasing skills in design, building, and coding along with getting a project approved and carried out through the engineering process. Spending some time thinking about your project this summer will really help you meet deadlines and produce the best project possible. When possible, think about the following topics. Jot down personal notes, ideas, etc. to remember them in the fall. I'm a big fan of making a note on my phone when an idea strikes me so that I don't forget it.

Please think about the following:

1. **Project partner** – Year one projects are normally done in pairs. FOR THE MOST PART students will work with a partner that they choose. Choosing your favorite person is tempting, but the best partners normally have the following qualities:
 - a. Ability to communicate well
 - b. Different skillsets – For example, pairs that have an excellent coder and another fabricator tend to get more done faster. Both partners should have basic competency in engineering skills to help troubleshoot problems as needed.
 - c. Ability to work for extended times. You will spend a lot of time in class working on your project and will have the opportunity to take projects home. You will want a partner that can remain focused and accomplish a lot during those classes.

Partners will NOT be selected until a few classes are completed in the fall. No decision needs to be made. Just keep in mind what you would hope to have in a partner and pay attention to your classmates.

2. **Project problem** – Try NOT to think about a solution yet. Allow the engineering process to help you in the fall. This summer try and think about:
 - a. An unmet need that a project could accomplish
 - b. A current product that meets a need but needs improvement in some area(s)

Your idea will need to have research that shows the need for the original product or improvement. Without reliable evidence project ideas will NOT be approved.