

Engineering Notebook

Mechatronics Engineering 2023-2024

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SYNTAX ERROR

an indicator that you actually typed your code.

Instructions:

For each day that you enter data into your Engineering Notebook, Copy this template text and table for each project entry. The difference between a Physical Engineering Notebook and this Notebook will be that your most current entry (i.e. Your newest entry) will be at the "top" like a blog... Check [here for a Rubric](#)

Sometimes you will see a comment from your teacher. Please read, and if it's a question, answer it.

Comment or Question from Mr. Burnham:

<copy text between these lines>

<Date> <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Write a short paragraph of today's Project Goals...25 words

Planned Task List:

- List each
- Task you are trying
- To accomplish today

Useful Reference Links:

- List any links related to today's work
-

Today's Class Notes: <enter class lecture notes here>

What Did I Working On Today (Labs, Robot Club, Other Projects):

Describe the steps/challenges you are working on. Make sure you describe how you set up the experiment, how you executed it, and all the materials you needed to do it. Spend time writing your "reflections". Sometimes more important than the actual results, are your thoughts on "why" and "how". Here is where you accurately describe both the success and failures.

If you make mistakes in the data collected, document the mistake and highlight it with a comment, so you don't lose the work. Don't just delete it. Where did you get stuck? A detailed description of issues you got stuck on or did not understand.

Include pictures, Code or links to Code, and links to reference material.

What Will I Work On Next Time?

- (fill this out at the end of class/open lab activity time)
- List your next 2-5 steps or activities.
- This is key!!!
- You need to be thinking about this project as a whole, and break it down into
- small tasks you can complete in 30-60 min



<copy text between these lines>

Disclaimer

The majority of notes I take are take on an iPad

Why?

- **It helps me keep organized**
- **I can move around text**
- **I can draw diagrams**
- **Helps me remember**

I will update the Google Drive below with PDF versions of my notes.

Kevin Wong Engineering Notebook

Below are the assignments asked to be completed in my engineering notebook



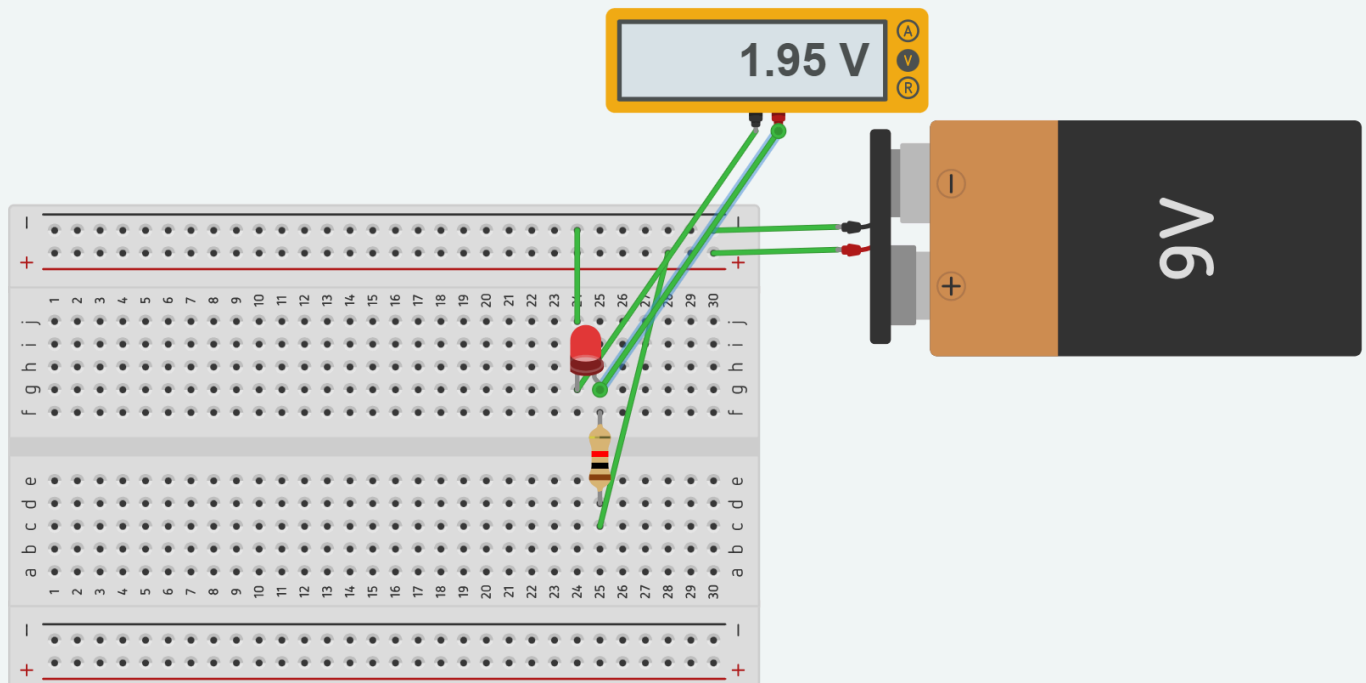
<8/16/2023> <Summary of Wednesday Reading:>

The book I read was Chapter 4 of "Shadow of the Hegemon" where Bean and Petra in the city of Istanbul find a hub of political tension after the Bugger War. The chapter explores their efforts to gather information and exert influence amidst the power struggles among nations. Quite a lofty task for a bunch of "children". Card intricately weaves together themes of manipulation, espionage, and personal conflict, highlighting the characters' roles as key players in a post-war world.



8/18/2023 Measuring Resistance:

Resistor #	Resistor Value (from color code)	Measured Ω	Measured Volts	Measured I	Calculated I
Resistor #1	330 Ω	367.4 Ω	5.15 V	15.02 mA	14.0 mA
Resistor #2	2200 Ω	2192 Ω	5.15 V	1.884 mA	1.92062043 mA
Resistor #3	240 Ω	237.8 Ω	5.15 V	21.06 mA	21.66 mA



8/18/2023 ScreenShot:

Press Windows + Shift + S together.

Your screen will dim and you can select an area to capture with your cursor. The snip will then be copied to your clipboard.

8/23/2023 Wednesday Reading:

In "The Polish Boy," the first story in Orson Scott Card's "First Meetings," we are introduced to John Paul, a young boy living in a future Poland under strict population control laws. This is the same John Paul from the Ender's game series. John Paul's family has more children than legally allowed, hoping to produce a highly intelligent child who can earn a ticket off Earth for the family. John Paul turns out to be exceptionally intelligent and catches the attention of the International Fleet, an organization preparing for a third invasion by the alien Formics.

8/24/2023 Free Lab:

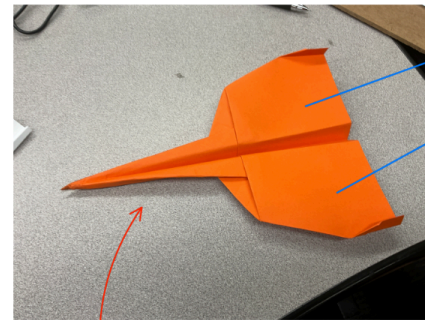
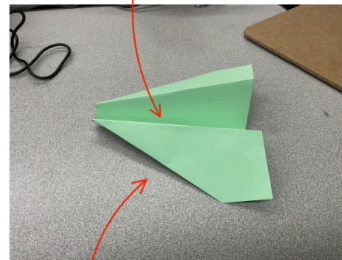
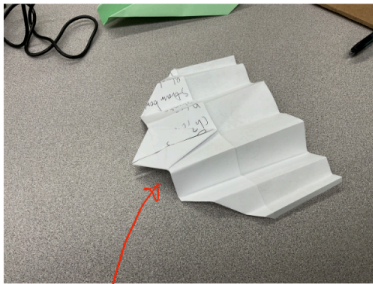
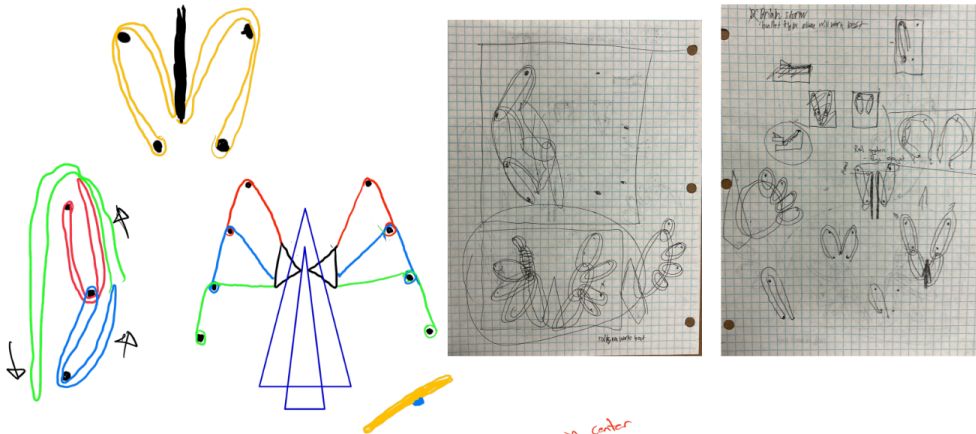
During the free lab I cleaned up some tools in the back. However some students were still soldering so some tools might have been still left behind. I also made some attempts to debug my arduino nano.

8/27/2023 Paper airplane launcher:



Wiki Boss: mechanics 709

Rubber Railgun



glider backside

8/27/2023 Paper airplane launcher:

Circuit	Measured R1	Measured R2	Measured RT	Calc R1+R2	Measured Vt	Measured V1	Measured V2	Calc Current	Measured Current
1	984Ω	1983Ω	2969 Ω	2967Ω	5.15	1.71 V	3.439 V	1.734 mA	1.7 mA
2	508Ω	1298Ω	1807Ω	1806Ω	5.08	1.432 V	3.65 V	2.813 mA	2.81 mA
3	9940Ω	1301Ω	11240Ω	11241Ω	5.08	4.5 V	0.589 V	0.452 mA	0.45 mA
4	980Ω	989Ω	1971Ω	1969Ω	5.09 V	2.527 V	2.552 V	2.582 mA	2.58 mA

8/30/2023 Love of Reading:

The book I read today discusses the art of negotiation, specifically the mind boggling benefits of a mirroring tactic. Humans respond very well to familiar situations and tend to lean away from family situations. Thus repeating what a person says in a questioning upturned voice essentially unknowingly forces them to vomit information. The mirroring tactic in negotiation can be quite effective for a variety of reasons. On a psychological level, mirroring can create a sense of rapport and understanding between two parties. By subtly repeating what the other person has said, you're showing that you're listening intently and validating their statements. This can help to create a subconscious affinity that may make the other party more likely to cooperate with you or share additional information.

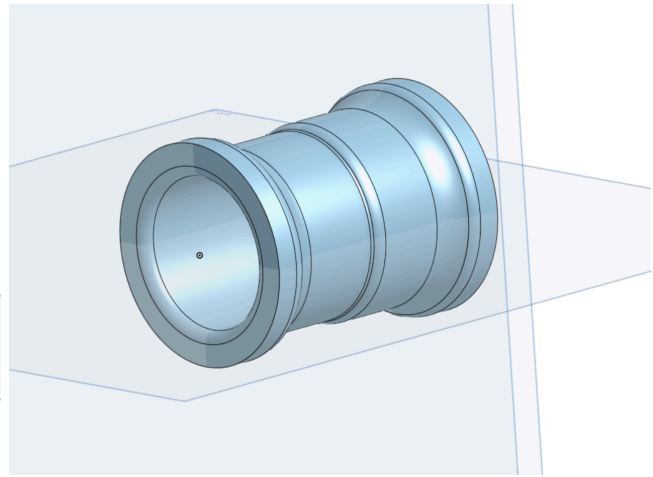
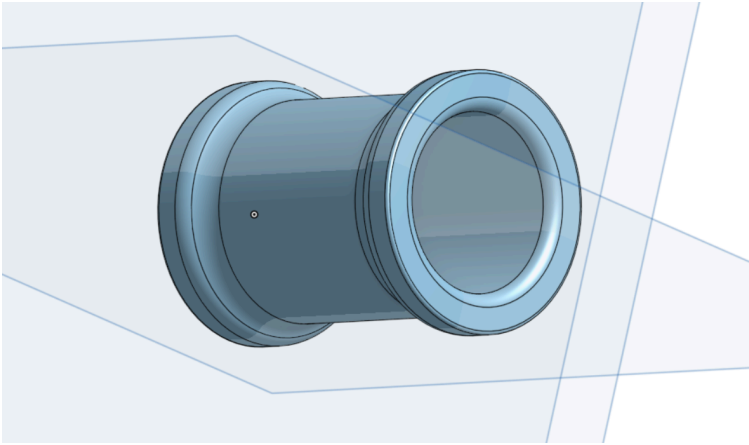
9/6/2023 Wednesday Reading:

In Chapter 3 of "Never Split The Difference" by Chris Voss, the focus is on using "tactical empathy" to understand the emotional state and perspective of the other party in a negotiation. Voss introduces the technique of "labeling," which involves verbally acknowledging the emotions of the other person. Labels usually begin with phrases like "It sounds like," or "It seems like," and are used to validate the feelings of the other party. By doing so, you build trust and prompt the other party to reveal more about their position. Tactical empathy and labeling are critical for diffusing tension and gaining valuable insights during negotiations. Voss cautions against mislabeling but also suggests that even mistakes can be useful for eliciting more information.

9/6/2023 OnShape:

<https://cad.onshape.com/documents/6d162fe5f837cae9af630b5a/w/9cf956505bd4e4841c215f8f/e/a3b028500d49df9c4fd51979>





9/6/2023 Airplanes:

After today's experiment with testing the accuracy of airplanes, here are a few things I learned. Accuracy is highly dependent on a constant machine. As long as a machine can consistently produce results it can be tuned to make the airplane fly in a certain direction.

9/8/2023 Airplanes:

Circuit	R1	R2	Calc $R_1 + R_2$	Given V_T	Calculated I_T	Calculated V_1	Calculated V_2
1	330 Ω	680 Ω	1010 Ω	5	4.95 mA	1.6335V	3.3665V
2	1000 Ω	2000 Ω	3000 Ω	5	1.67 mA	1.67V	3.33V
3	680 Ω	1000 Ω	1680 Ω	5	2.976 mA	2.023V	2.977V
4							

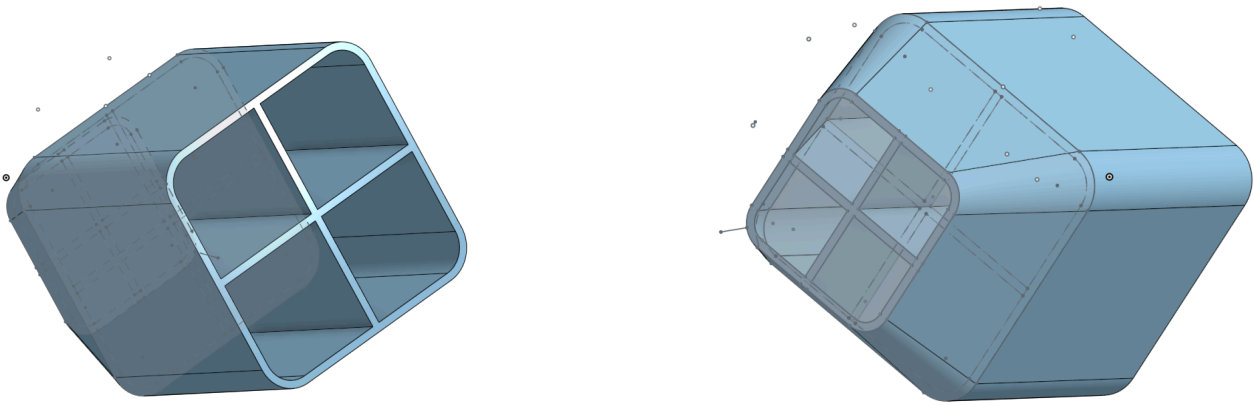
9/11/2023 Arbitrary Values:

Circuit	Measured R1	Measured R2	Calc R1+R2	Measured Vt	Measured V1	Picked V2	Measured Current
1	346.15Ω	653.84Ω	1KΩ	5.2 V	3.4 V	1.8 V	5.2 mA

9/7/2023 Robot Club: Magneto-Hydrodynamic Thruster (MHT):

V1:

<https://cad.onshape.com/documents/9450d5aa0bd675fbdd26f834/w/19dadc14ec53b84ccf7d9781/e/6557f36dc2759066a5f719b9>

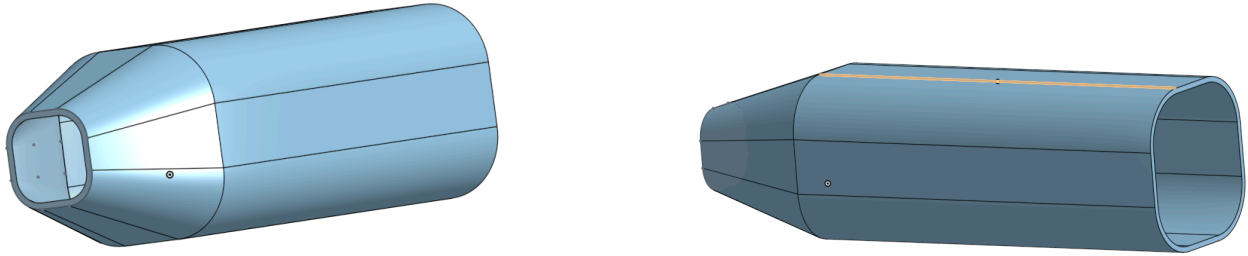


This is a revision of Joshua Ulloa's cell based design of a MHT. This design has curved edges to optimize water flow however raises some concerns when dealing with how to fit the magnetics and electronics within the walls of each cell. A future revision to an individual cell based model will make it easier to fit all the electronics around each cell.

9/11/2023 Robot Club: Magneto-Hydrodynamic Thruster (MHT):

V2:

<https://cad.onshape.com/documents/3189b3a4d2167a5ca4a2ae6f/w/ea2d520f3b8a4ae5a1733624/e/d88fb30eaa47bc841fc072d4>



This is the revised design of a MHT thruster that is a smaller singular cell that makes it easier to wire.

9/11/2023 Tool Safety:

Equipment and Safety Gear

Equipment Needed:

- Cut-off Saw
- Workbench or stable surface
- Material to be cut
- Measuring tape
- Chalk or marking pen

Safety Gear:

- Safety goggles
- Ear protection
- Dust mask or respirator
- Safety gloves

Steps

Stage 1: Preparing the Workspace

Step 1:

Clear your workspace of any unnecessary items or debris.

Step 2:

Place the cut-off saw on a stable, flat surface like a workbench.

Stage 2: Safety Precautions

Step 3:

Put on your safety goggles, ear protection, dust mask, gloves, and steel-toed boots.

Step 4:

Check the blade of the cut-off saw for any cracks, damages, or dullness. If you find any, replace the blade before proceeding.

Step 5:

If you haven't used this particular model of cut-off saw before, read the user manual for specific operating instructions and safety guidelines.

Stage 3: Measurement and Marking

Step 6:

Use a measuring tape to measure the exact point where you want to make your cut on the material.

Step 7:

Mark the point of the cut clearly using chalk or a marking pen.

Stage 4: Power Up and Test

Step 8:



Plug the cut-off saw into an electrical outlet.

Step 9:

Turn on the saw briefly and then turn it off to ensure it is working properly.

Stage 5: Making the Cut

Step 10:

Place the material you wish to cut against the saw's back fence, aligning the mark with the blade.

Step 11:

If your saw has a clamping mechanism, clamp the material securely in place.

Step 12:

Stand with your feet shoulder-width apart and ensure that no part of your body is in line with the blade.

Step 13:

Turn on the cut-off saw and wait for it to reach full speed.

Step 14:

Carefully lower the blade into the material, cutting along the marked line.

Step 15:

Once the cut is complete, release the saw's trigger.

Step 16:

Wait for the blade to come to a complete stop.

Stage 6: Post-Cut Actions

Step 17:

Inspect the cut to ensure it is clean and accurate.

Step 18:

Turn off the cut-off saw.

Step 19:

Unplug the cut-off saw from the electrical outlet.

Step 20:

Clean any debris or dust from the saw and the surrounding workspace.

Safety Tips

Never bypass any safety mechanisms on the saw.

Always make sure to keep your hands and other body parts away from the cutting area.

Always consult the user manual specific to your cut-off saw model for additional guidelines and safety precautions.



9/12/2023 potentiometer:

Circuit	Measured V1	Measured V2	Measured Vt	Calculated R1	Calculated R2
1	1.931 V	3.218 V	5.149 V	3123.345 Ω	5205.037 Ω

Circuit	Derived V1	Pick V2	Measured Vt	Calculated R2	Measured R2
1	3.14 V	2 V	5.14	5420	3452.229
2	3.404	1.736 V	5.14		3.062
3					
4					

9/12/2023 variable speed reversible drill:

- Which component is responsible for the variable speed feature in the drill?
 - A) Chuck
 - B) Motor
 - C) Trigger**
 - D) Gearbox
- Which type of bit is commonly used for drilling into concrete?
 - A) Spade bit
 - B) Forstner bit
 - C) Masonry bit**
 - D) Brad point bit
- What should you do before changing the drill bit?
 - A) Increase the speed to maximum
 - B) Unplug the drill or remove the battery**
 - C) Apply oil to the bit
 - D) Tighten the chuck
- In what unit is the speed of a drill commonly measured?
 - A) Miles per hour



- **B) Revolutions per minute (RPM)**
 - C) Feet per second
 - D) Meters per second
5. What is the typical material of a drill bit used for woodwork?
- **A) High-speed steel**
 - B) Carbide
 - C) Cobalt
 - D) Diamond
6. What is the best way to ensure that your drill bit is centered?
- A) Eyeballing it
 - B) Using a ruler
 - **C) Using a center punch**
 - D) Asking a friend for a second opinion
7. Which of the following is a safety feature commonly found in modern drills?
- **A) Automatic shutdown when overheated**
 - B) Voice-activated control
 - C) Internet connectivity for remote operation
 - D) Built-in radio for entertainment
8. Which of the following materials requires a specialized drill bit for drilling?
- A) Wood
 - B) Plastic
 - **C) Glass**
 - D) Soft metal
9. What is the advantage of a keyless chuck over a keyed chuck?
- A) It can hold larger bits
 - B) It requires a key to operate
 - **C) It allows for quicker bit changes**
 - D) It is more durable
10. What does the torque setting control?
- A) The drill's speed
 - B) The drill's weight
 - **C) The rotational force**
 - D) The drill's battery life
11. Which type of battery is most commonly used in cordless drills?
- A) Nickel-Cadmium (NiCd)
 - **B) Lithium-Ion (Li-ion)**
 - C) Alkaline
 - D) Lead-Acid
12. What should you do if the drill bit gets stuck in the material?
- A) Pull the drill away forcefully
 - **B) Reverse the direction and gently pull out**
 - C) Increase the speed to maximum



- D) Continue drilling in the same direction

6. **What is the typical material of a drill bit used for woodwork?**

- A) High-speed steel
- B) Carbide
- C) Cobalt
- D) Diamond

7. **What is the function of the clutch in a variable speed reversible drill?**

- A) To control speed
- B) To control direction
- C) To prevent over-tightening
- D) To improve grip

8. **What is the best way to ensure that your drill bit is centered?**

- A) Eyeballing it
- B) Using a ruler
- C) Using a center punch
- D) Asking a friend for a second opinion

9. **Which of the following is a safety feature commonly found in modern drills?**

- A) Automatic shutdown when overheated
- B) Voice-activated control
- C) Internet connectivity for remote operation
- D) Built-in radio for entertainment

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- D) Soft metal

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- B) It requires a key to operate
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- D) It is more durable

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- A) The drill's speed
- B) The drill's weight



- C) The rotational force
 - D) The drill's battery life
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- A) Nickel-Cadmium (NiCd)
 - B) Lithium-Ion (Li-ion)
 - C) Alkaline
 - D) Lead-Acid
14. What should you do if the drill bit gets stuck in the material?
- A) Pull the drill away forcefully
 - B) Reverse the direction and gently pull out
 - C) Increase the speed to maximum
 - D) Continue drilling in the same direction
15. Which of the following is NOT a recommended safety measure when using a variable speed reversible drill?
- A) Wearing safety goggles
 - B) Using gloves with rubber grips
 - C) Holding the drill with wet hands
 - D) Keeping the work area clean and uncluttered

9/15/2023 Photoresistor:

Test	Brightness	Selected R_2	Measured V_2	Measured V_T	Derived V_p	Calculated I	Calculated R_p
1	Covered	2200 Ω	1.2V	5.95V	4.75V	0.545mA	558.82 Ω
2	Some Light	2200 Ω	3.4V	5.95V	2.55V	2.704 mA	1663.87 Ω
3	Room	2200 Ω	4V	5.95V	1.95V	1.818 mA	1037.6 Ω
4	Brighter	2200 Ω	4.9V	5.95V	1.05V	2.23mA	469.41 Ω
5	Full Bright	2200 Ω	5.4V	5.95V	0.55V	2.45mA	225.63 Ω

9/18/2023 DC Motor:

A DC motor spins clockwise when one side is connected to ground and another is connected to ground, To reverse the direction of the motor you only have to switch the grounds nd power wires and the motor will spin counter clockwise



9/18/2023 While Loops Labs:

Lab 1:

```
Serial.begin(9600);  
int var = 0;  
while(var < 200){  
  Serial.println("hello world");  
  var++;  
  
}
```

Lab 2:

```
Serial.begin(9600);  
int myCount = 5;  
while(myCount > 0){  
  Serial.println("Blastoff");  
  Serial.println("myCount");  
  myCount--;  
}
```

Lab 3:

```
pinVal = 7;  
void setup() {  
  Serial.begin(9600);  
  pinMode(7,  
INPUT);  
}  
  
void loop() {  
  while(digitalRead(pinVal) == 0){  
    Serial.println(digitalRead(pinVal));  
  }  
}
```



9/19/2023 Servo Labs:

Lab1:

```
#include <Servo.h>
```

```
Servo servo1;
```

```
int pos = 0;
```

```
void setup() {
```

```
    // put your setup code here, to run once:
```

```
    servo1.attach(9);
```

```
    servo1.write(pos);
```

```
}
```

```
void moveMid(){
```

```
    servo1.write(90);
```

```
}
```

```
void moveLeft(){
```

```
    servo1.write(0);
```

```
}
```

```
void moveRight(){
```

```
    servo1.write(180);
```

```
}
```

```
int pastTime = millis();
```

```
int fsm = 0;
```

```
void loop() {
```

```
    // put your main code here, to run repeatedly:
```

```
    if (fsm == 0){
```

```
        if (millis() - pastTime < 1000){
```

```
            moveLeft();
```

```
        } else {
```



```
fsm = 1;
pastTime = millis();
}

}

if (fsm == 1){
  if (millis() - pastTime < 1000){
    moveMid();

  } else {
    fsm = 2;
    pastTime = millis();
  }
}

if (fsm == 2){
  if (millis() - pastTime < 1000){
    moveRight();

  } else {
    fsm = 3;
    pastTime = millis();
  }
}

if (fsm == 3){
  for(int i = 180; i > 0; i--){

    servo1.write(i);
    delay(20);

  }
  fsm = 0;
}
```



```
}
```

Lab 2:

```
#include <Servo.h>
```

```
int upperLimit = 2;  
int lowerLimit = 179;  
Servo servo1;  
int pos = 0;
```

```
void setup() {  
  // put your setup code here, to run once:  
  servo1.attach(9);  
  servo1.write(pos);  
}
```

```
void moveMid(){  
  servo1.write(89);  
}
```

```
void moveLeft(){  
  servo1.write(lowerLimit);  
}
```

```
void moveRight(){  
  servo1.write(upperLimit);  
}
```

```
void loop() {  
  // put your main code here, to run repeatedly:  
  moveLeft();  
  delay(500);  
  moveMid();  
  delay(500);  
}
```



```
moveRight();  
delay(500);  
moveMid();  
delay(500);  
}
```

Lab 3:

```
#include <Servo.h>
```

```
int upperLimit = 0;  
int lowerLimit = 180;  
Servo servo1;  
int pos = 0;
```

```
void setup() {  
  // put your setup code here, to run once:  
  servo1.attach(9);  
  servo1.write(pos);  
  pinMode(8, INPUT);  
}
```

```
void moveMid(){  
  servo1.write(90);  
}
```

```
void moveLeft(){  
  servo1.write(lowerLimit);  
}
```

```
void moveRight(){  
  servo1.write(upperLimit);  
}
```

```
void loop() {  
  // put your main code here, to run repeatedly:  
  if (digitalRead(8) == HIGH){
```



```
    moveRight();  
  } else{  
    moveLeft();  
  }  
  delay(500);  
}
```

9/21/2023 Love of Reading #6:

e

In the fifth chapter of "Never Split the Difference" by Chris Voss, the concept of the "Accusation Audit" is introduced, which is a technique used to alleviate tensions and neutralize negative emotions during negotiations. This method requires a negotiator to address the other party's fears and concerns upfront. By doing so, it helps in creating a collaborative atmosphere and paves the way for more constructive conversation. Voss emphasizes the importance of "labeling," which involves verbalizing and validating the counterpart's perceived emotions, to build rapport and understanding.

He also advises listing and addressing all potential negatives and accusations openly, rather than denying them, to avoid confrontation and maintain smooth negotiations. Strategic use of silence after labeling or performing an accusation audit is stressed, allowing the counterpart to respond and provide valuable insights. Achieving a "That's right" from the counterpart is crucial as it reflects agreement and understanding, leading to negotiation breakthroughs. Overall, the chapter provides strategies to navigate emotional undercurrents effectively, fostering mutual respect and understanding.



9/22/2023 Variable Speed Reversible Drill Lab:

Objectives:

Investigate the power consumption of the drill at various speeds.

Observe the differences in power consumption between forward and reverse drilling.

Study the effect of different materials on power consumption.

Required Materials:

Variable speed reversible drill

Multimeter

Variety of materials to drill into (wood, metal, plastic)

Drill bits suitable for each material

Clamp to secure the materials

Safety gear (gloves, goggles)

Tachometer to measure the speed of the drill

Stopwatch

Scales to measure the force applied while drilling

Procedure:

1. Set up the Experiment:

Secure the material to be drilled using a clamp to avoid any movement during the drilling process.

Connect the drill to a power meter to measure its power consumption.

Wear the appropriate safety gear (gloves and goggles).

2. Measure the Power Consumption:

Set the drill to a low speed and begin drilling in the forward direction.

Use the tachometer to measure the actual speed of the drill.

Record the power consumption from the power meter.

Gradually increase the speed of the drill and repeat the process, recording the power consumption and speed at each setting.

Once the forward drilling is complete, repeat the process in reverse.

3. Change Materials:

Repeat the above steps for each material, recording the power consumption and speed for both forward and reverse drilling.

Ensure that a suitable drill bit is used for each material.

4. Apply Force:



Measure the force applied while drilling using scales and observe how it affects the power consumption.

Record the force applied and power consumption at each speed setting, in both forward and reverse directions.

Data Analysis:

Plot graphs of power consumption against drill speed for each material in both forward and reverse directions.

Analyze the effect of the applied force on power consumption.

Compare the power consumption between different materials and drill directions.

Safety Precautions:

Always wear safety gear to protect against flying debris and other hazards.

Ensure that the materials are securely clamped to prevent movement during drilling.

Avoid touching the drill bit immediately after drilling as it may be hot.

Keep hands and clothing away from the moving parts of the drill.

9/21/2023 For loops Labs:

Lab 1:

```
const int arduinoBoardLED = 13; // LED on pin 13
```

```
void setup() {  
  // put your setup code here, to run once:  
  Serial.begin(9600);           // Use Serial Monitor to debug  
  pinMode(arduinoBoardLED, OUTPUT); // initialize the digital pin as an output.  
  Serial.println("Running The Seup Function");  
}
```

```
void loop() {  
  // put your main code here, to run repeatedly  
  delay(1000); // just a small delay to slow the main loop down  
  Serial.println("Starting Main Loop Code");  
  // put your code between here  
  for (int i = 0; i < 20; i++){
```



```
Serial.println(i);  
}
```

```
// and here  
Serial.println("Ending Main Loop Code");  
}
```

Lab 2:

```
const int arduinoBoardLED = 13; // LED on pin 13
```

```
void setup() {  
  // put your setup code here, to run once:  
  Serial.begin(9600);           // Use Serial Monitor to debug  
  pinMode(arduinoBoardLED, OUTPUT); // initialize the digital pin as an output.  
  Serial.println("Running The Seup Function");  
}
```

```
void loop() {  
  // put your main code here, to run repeatedly  
  delay(1000); // just a small delay to slow the main loop down  
  Serial.println("Starting Main Loop Code");  
  // put your code between here  
  for (int i = 0; i < 20; i++){  
    Serial.println(i);  
    If (i == 10){  
      Serial.println("the loop is equal to 10");  
    } else if (i < 10){  
      Serial.println("the loop is less than 10");  
    } else {  
      Serial.println("the loop is greater than 10");  
    }  
  }  
}
```



```
// and here
Serial.println("Ending Main Loop Code");
}
```

Lab 3:

```
const int arduinoBoardLED = 12; // LED on pin 13
```

```
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);          // Use Serial Monitor to debug
  pinMode(arduinoBoardLED, OUTPUT); // initialize the digital pin as an output.
  Serial.println("Running The Setup Function");
}
```

```
void loop() {
  // put your main code here, to run repeatedly
  delay(1000); // just a small delay to slow the main loop down
  Serial.println("Starting Main Loop Code");
  // put your code between here
  for (int i = 13; i < 100; i+=3){
    if (i % 2 == 0){
      Serial.println("the loop counter" + (String)(i) + "is EVEN");
    } else {
      Serial.println("the loop counter" + (String)(i) + "is ODD");
    }
  }
}
```

```
// and here
Serial.println("Ending Main Loop Code");
}
```



10/7/2023 ultrasonic lab 1:

```
const int triggerPin = 9;
const int echoPin = 10;
const int ledPin = 13;
const float distanceThreshold = 10.0;

void setup() {
  pinMode(triggerPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(ledPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  float distance = measureDistance();
  Serial.print("Distance to hand: ");
  Serial.print(distance);
  Serial.println(" cm");

  if (distance <= distanceThreshold) {
    digitalWrite(ledPin, HIGH);
  } else {
    digitalWrite(ledPin, LOW);
  }

  delay(100);
}

float measureDistance() {
  digitalWrite(triggerPin, LOW);
  delayMicroseconds(2);
  digitalWrite(triggerPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(triggerPin, LOW);

  long duration = pulseIn(echoPin, HIGH);

  float distance = (duration / 2.0) * 0.0343;

  return distance;
}
```

10/7/2023 ultrasonic lab 2:

```
const int trigPin = 9;
const int echoPin = 10;
const float thresholdDistance = 20.0;

void setup() {
  Serial.begin(9600);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
}

void loop() {
```



```
long duration;
float distance;
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = duration * 0.0343 / 2;
Serial.print("Distance: ");
Serial.print(distance);
Serial.println(" cm");
if (distance < thresholdDistance) {
  Serial.println("STOP!");
}
delay(1000);
}
```

10/7/2023 ultrasonic lab 3:

```
const int irSensorPin = 2;
int objectCount = 0;
bool objectDetected = false;
bool objectLeft = true;

void setup() {
  Serial.begin(9600);
  pinMode(irSensorPin, INPUT);
}

void loop() {
  int irSensorState = digitalRead(irSensorPin);

  if (irSensorState == LOW && !objectDetected) {
    objectDetected = true;
    objectLeft = false;
    objectCount++;
    Serial.print("Object Count: ");
    Serial.println(objectCount);
  }

  if (irSensorState == HIGH && !objectLeft) {
    objectLeft = true;
    objectDetected = false;
  }
}
```

10/11/2023 Love of Reading #6:

"Earth Unaware" opens with a focus on the mining ship El Cavador and its close-knit, multi-generational crew of free miners, working in deep space to extract valuable resources



from asteroids. Victor Delgado, a young and resourceful mechanic aboard El Cavador, is highlighted for his mechanical ingenuity and problem-solving skills. The hard-working and cooperative family live a perilous life, managing the complexities and dangers inherent in their deep-space mining operations. Their relatively stable existence, however, is soon to be disrupted by unforeseen challenges and threats from the stars. This first chapter sets the stage by introducing readers to the crew, their operations, and providing an initial glimpse into their tight-knit community and day-to-day struggles.

10/16/2023 GitHub AI:

GitHub's Copilot AI is revolutionizing the developer landscape by suggesting code snippets and writing documentation, leading to a 55% increase in coding speed. While educators initially expressed concerns about potential cheating with such tools, they have come to appreciate AI's role as a supplementary tutor for students. As AI reshapes the coding domain, the emphasis is shifting from mastering languages to focusing on holistic project-based learning and understanding how different components integrate. This evolution in technology is not just reshaping the coding process but also the requisite skills, with a heightened focus on understanding the broader problem scope. To ensure these tools are efficiently integrated, GitHub is actively collaborating with academic professionals. Beyond the AI realm, GitHub is pioneering ways to financially sustain open-source developers, considering sponsorships and venture capital partnerships. Yet, the open-source community faces challenges, chiefly around funding, but there's hope in bridging the gap by pairing eager newcomers with seasoned mentors.

10/11/2023 Love of Reading #7: io

The novel "Earth Unaware" opens in the vastness of deep space aboard the El Cavador, a free-mining ship busy extracting precious metals from an asteroid. One of the crew members, Victor Delgado, is engrossed in refining an apparatus designed to detect metal-rich asteroids. As the narrative unfolds, readers are introduced to the tight-knit community aboard the El Cavador, painting a vivid picture of their familial bonds and the inherent challenges of life in space. During their routine operations, the crew spots a fast-moving object. Initially, they assume it might be another mining vessel. However, its extraordinary speed soon dispels that notion, leading to speculation that it isn't of human



origin. The object's trajectory, ominously pointing towards Earth, sets the stage for the larger narrative, foreshadowing the arrival of the Formics, a previously unknown alien species.

10/23/2023 Piezo Eletric:

Piezoelectric devices are materials that produce electricity when a pressure is being applied to them. They could also be used in reverse as is the case for speakers to produce sound. If an audio signal is pumped into a piezoelectric device it causes it to rapidly fluctuate a diaphragm producing sound.

11/3/2023 Entry Ticket:

Recent developments in artificial intelligence have shown that there is a significant risk in the replacement of jobs and the overall security of nations. Thus, governments have banded together and agreed to share research and information with each other.

11/6/2023 Entry Ticket:

Grok, a text based gpt chatbot trained specifically on twitter tweets could pose significant risk in source credibility. While there are a lot of experts on twitter that are providing accurate scientific information there are also a lot of individuals that are "just yappin". This could lead to a significant amount of inaccuracy in the information it provides.

11/6/2023 Love of Reading #8:

11/13/2023 Entry Ticket:

SAG-AFTRA has successfully concluded a nearly four-month-long strike by securing a tentative agreement with Hollywood studios, providing actors with wage increases and a \$40 million streaming bonus fund over three years, alongside new AI-related protections, such as consent and compensation for digital replicas. The agreement also addresses discriminatory practices in hair and makeup for actors of color and includes the use of intimacy coordinators. In entertainment news, Netflix has released the first trailer for its live-action remake



of "Avatar: The Last Airbender," set to debut on February 22, 2024, sparking curiosity about its faithfulness to the original series. Meanwhile, the Game Awards 2023 nominations are led by "Baldur's Gate 3" and "Alan Wake 2," with winners to be determined by a combination of jury and fan votes, and the ceremony planned for December 7. In a concerning development, the AI platform Civitai introduced a "bounties" feature that promotes the creation of deepfakes of real people, leading to ethical and legal debates, especially regarding nonconsensual sexual images and the use of images of private individuals.

11/14/2023 Rube Goldberg:
Magnetic

11/27/2023 Entry Ticket

In recent events at OpenAI, a conflict emerged between its business-oriented leaders and the safety-focused board, leading to the firing and then reinstatement of CEO Sam Altman. This rift highlighted tensions over the future direction of AI development, particularly around issues of public safety and ethical regulation. A key aspect of the dispute involved the handling of a project named Q*, rumored to be a breakthrough in artificial general intelligence (AGI), raising concerns about its potential impact on humanity. The situation exposed the challenges in balancing commercial success with ethical and safety considerations in the rapidly advancing field of AI. The resolution saw major changes in OpenAI's board and leadership, reflecting the ongoing debate over the responsible development of AI technologies.

12/4/2023 Entry Ticket

The article from Engineer's Codex examines Google's code review tool, Critique, which boasts a 97% satisfaction rate among Google engineers. Critique enhances the code review process with AI-powered improvements, efficient guidelines, and integration with other Google tools. Key features include machine learning suggestions, static analysis, and a



focus on the latest code changes. While unique to Google, the insights and practices from Critique offer valuable lessons for broader software engineering practices.

12/11/2023 Entry Ticket

Researchers from ETH Zurich, in collaboration with US-based startup Inkbit, have successfully 3D-printed a robotic hand comprising bones, ligaments, and tendons using various polymers. This innovation was made possible by employing thiolene polymers, known for their elasticity, as opposed to the traditionally used fast-curing polyacrylates. The team developed a novel 3D printing process incorporating a laser scanner and a feedback mechanism, allowing for the simultaneous use of soft and rigid materials. This technological leap, led by ETH Zurich's Professor Robert Katzschmann and doctoral student Thomas Buchner, enhances the safety and efficiency of robots in human environments and opens up new avenues for complex, multi-material robotic designs. Inkbit plans to commercialize this technology for broader applications in 3D printing services and equipment sales.

X-ray pulsar-based navigation (XNAV) is an innovative space navigation method that uses X-ray signals from pulsars to determine a spacecraft's location. This technique compares received signals with a known database of pulsar frequencies and locations, allowing precise positioning. It has been the focus of various studies and experiments, including the European Space Agency's feasibility study in 2003, China's XPNAV 1 satellite launch in 2016 for pulsar characterization, and NASA's SEXTANT project in 2017 testing XNAV on the International Space Station. The method offers advantages over traditional navigation systems, such as smaller and lighter equipment, and has potential applications in spacecraft and aircraft navigation.

1/11/2024 Stuck valve may have doomed private Peregrine moon lander mission

Astrobotic figured out why their moon lander Peregrine moon lander was having problems. The source of the issues has been narrowed down to a sticky valve that sits between the hydrogen tank and oxygen tank. This leads to a considerable spike in hydrogen and an eventual leak.



1/23/2024 Researchers approach industry for air-superiority munitions technologies like artificial intelligence (AI)

This article discusses a market survey conducted by the U.S. Air Force Research Laboratory's Munitions Directorate at Eglin Air Force Base in Florida. The survey aims to identify potential sources capable of developing advanced solutions in 13 air munitions-related research areas. These areas include:

Modeling, simulation, and analysis.

Aircraft integration technologies.

Find, fix, target track, and datalink technologies.

Engagement management system technologies.

The article highlights the need for innovation in AI for swarming unmanned aircraft and various missile technologies. Companies interested in participating are invited to submit white papers describing their capabilities and experience to the Air Force's Misti DeShields by February 2, 2024.

2/13/2024 Entry Ticket

Roblox, a leading video game developer, announced significant growth in its fourth-quarter and full-year 2023 financial results, highlighting its first-ever quarter with over \$1 billion in bookings, a 25% increase year over year. The company attributes this growth to its strong network effects in content, social connection, and investments in immersive experiences, advertising, and AI, aiming for over 1 billion daily active users. Roblox's engagement on new AR/VR/MR devices is expected to increase as it becomes available on Meta Quest VR and Sony Playstation, and explores opportunities with the Apple Vision Pro MR headset. AI plays a crucial role in Roblox's strategy, powering real-time chat translation and enhancing safety through moderation. The platform seeks to expand its audience beyond the under-13 demographic, leveraging its developer community to attract an older user base and improve monetization.



<copy text between these lines>

<Date> <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Write a short paragraph of today's Project Goals...25 words

Planned Task List:

- List each
- Task you are trying
- To accomplish today

Useful Reference Links:

- List any links related to today's work
-

Today's Class Notes: <enter class lecture notes here>

What Did I Working On Today (Labs, Robot Club, Other Projects):

Describe the steps/challenges you are working on. Make sure you describe how you set up the experiment, how you executed it, and all the materials you needed to do it. Spend time writing your "reflections". Sometimes more important than the actual results, are your thoughts on "why" and "how". Here is where you accurately describe both the success and failures.

If you make mistakes in the data collected, document the mistake and highlight it with a comment, so you don't lose the work. Don't just delete it. Where did you get stuck? A detailed description of issues you got stuck on or did not understand.

Include pictures, Code or links to Code, and links to reference material.

What Will I Work On Next Time?

- (fill this out at the end of class/open lab activity time)
- List your next 2-5 steps or activities.
- This is key!!!
- You need to be thinking about this project as a whole, and break it down into
- small tasks you can complete in 30-60 min

<copy text between these lines>

