Engineering Notebook

Mechatronics Engineering 2022-2023

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<LinkedIn - Optional>

<Add a Picture or Meme that represents you>

Instructions:
For each day 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

<copy text between these lines>

8/17/22 Resister Lab

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
-

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

Class Notes: <enter class lecture notes here>

What Did I Working On Today:

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.

- Resister Lab

Resistor #	Resistor Value (from color code)	Measured Ω	Measured Volts	Measured I	Calculated I
Resistor #1	10K Ω	10K Ω	5.14 V	0.51 mA	0.514mA

Resistor #2	220Ω	224.8Ω	5.03 V	22.64 mA	22.3mA
Resistor #3	220Ω	221.6Ω	5.06 V	24.44 mA	22.8mA

Date:	Signature:
Project:	Witness (optional):

<copy text between these lines>

8/17/22 Paper Airplane Launcher Project

Competing to build a launcher that can launch a paper airplane the farthest and most accurately.

Planned Task List:

- Using LEGOs and a rubber band to build the launcher
- Making a glider airplane
- Making adjustments to airplane

Useful Reference Links:

- https://www.youtube.com/embed/9Fv0-501msc?rel=0

What Will I Work On Next Time?

- **Practice throwing method**
- **Reduce the chances of the plane getting caught**

Class Notes: <enter class lecture notes here>

What Did I Working On Today:

8/17/22

- Started off with just messing around with legos, seeing what designs work. Made the first prototype 4 blocks tall, with the rubber band being in the third row. Created a sort of staircase design for aesthetics. Made the paper airplane using the world record for distance design. Paper airplane was getting caught on the launcher so we created a more minimal design. Still 4 blocks tall with two flat performs, one to improve structure, and one to go on top in order to keep the rubber band from falling out. The flat piece on the top reduces the chances of the paper airplane getting caught. Experimented with launching techniques, discovered that moving the launcher in a half circle motion while launching increases distance and reduces chance of getting caught. We later experimented with a bow made out of train tracks, and saw that it went way farther.

8/18/22

Me and my partner decided to use a way thinner plane as the glider plane originally used would catch on our launcher too often, and we were afraid that if the wings were damaged it wouldn't fly on course.We also considered the outside weather, and the gliders would be really inconsistent because of the wind blowing outside We switched to a more dart style airplane, relying on the way we throw our plane.

We managed to get 2nd place in the contest. The other group had a really similar idea to ours, with it being a crossbow and a small dart-like airplane. I think our design for the bow was a great choice, as the plane and the bow acted like an arrow.

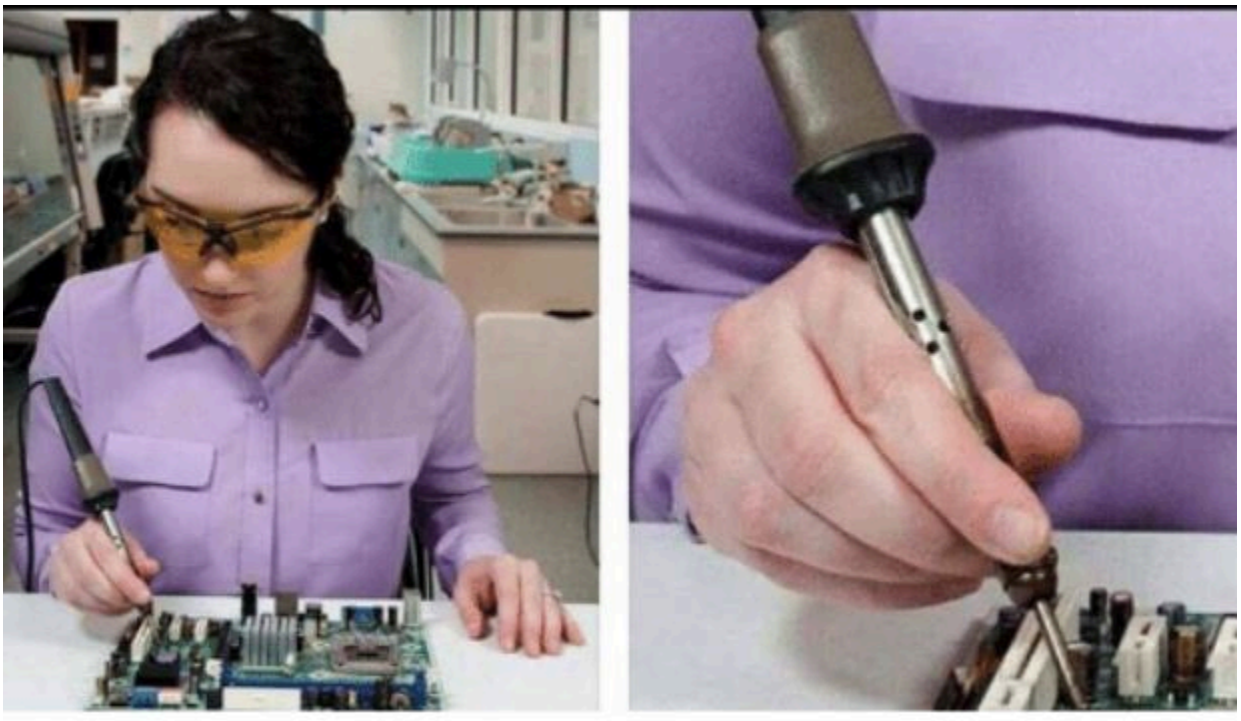
8/25/22 Soldering

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

What Did I Working On Today:

Soldering:

1) **Setup workspace**
    - **Soldering Iron**
    - **Brass Scrub/Sponge for cleaning**
    - **Solid and stranded 22AWG wire in red, black, or green**
    - **Desoldering braid**
    - **Helping stands**
    - **Proper lighting**
    - **Fan**
2) **Hold solder like a pencil**
3) **Never touch the metal part of the soldering iron,it can burn you**
4) **Never leave soldering iron out on a table, could start a fire**
5) **Do not eat while soldering, soldering is known to leak harmful chemicals(use fan to blow away fumes)**
6) **Safety glasses**
7) **Wash hands after soldering**
8) **After heating soldering iron, coat the tip with tin to make it easier to melt solder**
9) **Clean soldering iron after use**



What is wrong with this picture?

She is holding the soldering iron by the metal which could potentially burn her. She seems to be soldering the front of the board, even though it is meant to be in the back of the board.

8/24/22

Competing to build a launcher that can launch a paper airplane the farthest and most accurately.

Class Notes: <enter class lecture notes here>

What Did I Working On Today:

Circuit	Measured R1	Measured R2	Measured RT	Calc R1+R2	Measured Vt	Measured V1	Measured V2	Measured Current
1	175 ohms	176 ohms	163 ohms	351				
2	544 k ohms	534 k ohms	225 ohms	1078 k ohms				
3	.508 k ohms	.620 k ohms	244.5 k ohms	1128 k ohms				
4	**0.690 k ohms**	**.761 k ohms**	**226 ohms**	**1.451 k ohms**				

8/29/22 - Large resistors

Class Notes: <enter class lecture notes here>

What Did I Working On Today:

Circuit	Measured R1	Measured R2	Measured RT	Calc R1+R2	Measured Vt	Measured V1	Measured V2	Measured Current
1 10 k ohms								
2 10M ohms								
3								

<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:

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Useful Reference Links:

- List any links related to today's work
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What Will I Work On Next Time?

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- This is key!!!
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Class Notes: <enter class lecture notes here>

What Did I Working On Today:

Circuit	Calculated R1	Calculated R2	Calc R1+R2	Calculated Vt	Calculated V1	Calculated V2	Calculated d Current
1	330 Ω	680Ω	1010 Ω	5v	1.6v	3.3v	**4.9mA**
2							
3							
4							

$$V_x = V_t\left(\frac{R_x}{R_t}\right)$$

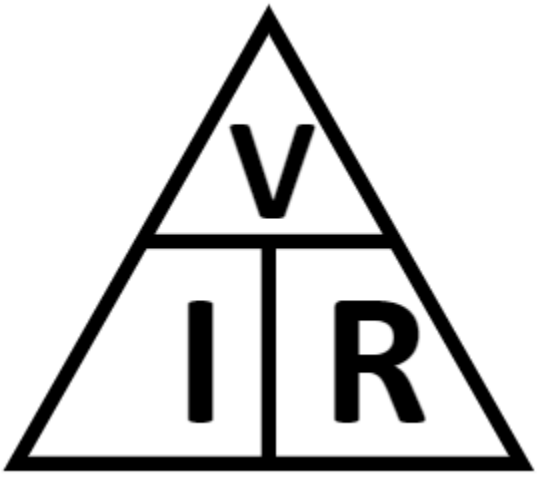
Where:

R_t = Total Resistance of series string

R_x = Resistor for which we are calculating the voltage drop

V_t = Applied voltage

V_x = Voltage drop across R_x



<- Voltage uses v unit

I=Current, it uses Ampheres (A)

Resistance uses Ohms unit

$$R_x = \frac{R_t * V_x}{V}$$

We are going to need to use this Formula to find R1 and R2

9/7-8/22 Potentiometer

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

Planned Task List:

-

Useful Reference Links:

- https://docs.google.com/presentation/d/1dH0Vi5qPafqOOR_wJ5hCJFsrPFAjLBwKvMcpbAy98l0/edit#slide=id.gea408b9846_0_129

What Will I Work On Next Time?

-

Class Notes:

A potentiometer is a 3 pinned device that acts as a resistor, which is used for measuring voltage by comparing it with known voltage. It is a cylinder with resistant material that connects the 3 pins.

What Did I Working On Today:

Circuit	Measured V1	Measured V2	Measured Vt	Measured R1	Measure R2	Calculated R1	Calculated R2
1	3.69 V	1.488 V	5.18 V	6.87k Ω	2.852 k Ω	7.124 k Ω	2.862k Ω
2	4.41 V	0.761V	5.16V	8.18kΩ	1.5k Ω	8.513 k Ω	1.469k Ω
3	3.286V	1.889	5.18V	6.12k Ω	3.565k Ω	6.344 k Ω	3.647 k Ω
4	**2.104v**	**3.069 V**	**5.18V**	**3.9k Ω**	**5.72 k Ω**	**4.062 k Ω**	**5.925 k Ω**

Date: 9/7/22	Signature:
Project:	Witness (optional):

<copy text between these lines>

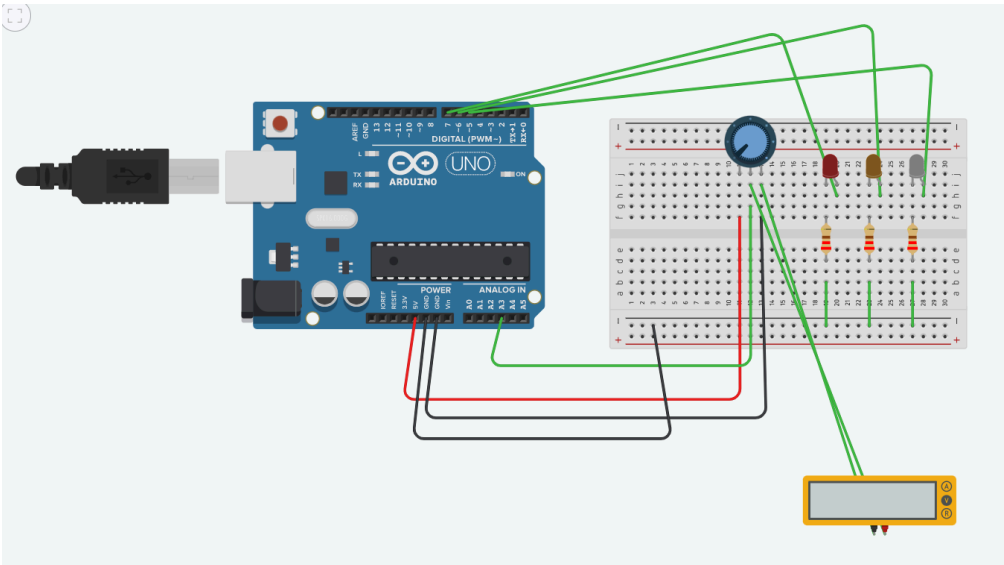
9/9/22 Arduino Analog Reading

Write a short paragraph of today's Project Goals…25 words
References
https://www.arduino.cc/reference/en/language/functions/analog-io/analogread/

Class Notes:

Quantize - approximate (a continuously varying signal) by one whose amplitude is restricted to a prescribed set of values.

What Did I Working On Today: Wrote a code with potentiometer.



```
// C++ code
//
int analog_pin = A3;
int analog_pin_value = 0;
int LED_red = 7;
int LED_orange = 6;
int LED_white = 5;

void setup()
{
  pinMode(LED_red, OUTPUT);
  pinMode(LED_orange, OUTPUT);
  pinMode(LED_white, OUTPUT);
  pinMode(analog_pin, INPUT);
  Serial.begin(9600);

}
void loop() {
  analog_pin_value = analogRead(analog_pin); //read the input pin
  Serial.println(analog_pin_value);
  delay(100); //Wait for 100 millisecond(s


  if (analog_pin_value > 1000 ){
     digitalWrite(LED_red, HIGH);
    digitalWrite(LED_orange, 0);
```

```
    digitalWrite(LED_white, 0);
}

  else if (analog_pin_value < 200) {
  digitalWrite(LED_orange, 1);
  digitalWrite(LED_red, 0);
    digitalWrite(LED_white, 0);
}

  else {
  digitalWrite(LED_white, HIGH);
  digitalWrite(LED_orange, 0);
    digitalWrite(LED_red, 0);
}

}
```

9/7-8/22 Photoresistor

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

Planned Task List:

-

Useful Reference Links:

-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

Circuit	Brightness	Measured V2	Measured Vt	Derived VP	Calculated I	Calculated RP
1	**Covered**	0.17V	4.98V	4.81 V	5 mA	962 ohms
2	**Some Light**	0.19 V	4.95 V	4.76 V	5 mA	952 ohms
3	**Room**	0.98 V	5.01 V	4.03 V	5 mA	806 ohms
4	**Brighter**	**1.298 V**	**4.859 V**	**3.561 V**	**4.9 mA**	**726 ohms**
5	**Full Bright**	**3.031 V**	**5.187 V**	**2.156 V**	**5.1 mA**	**422 ohms**

9/7-8/22 Revolution Robot Do-Not-Fall-Off Project

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

Planned Task List:

-

Useful Reference Links:

-

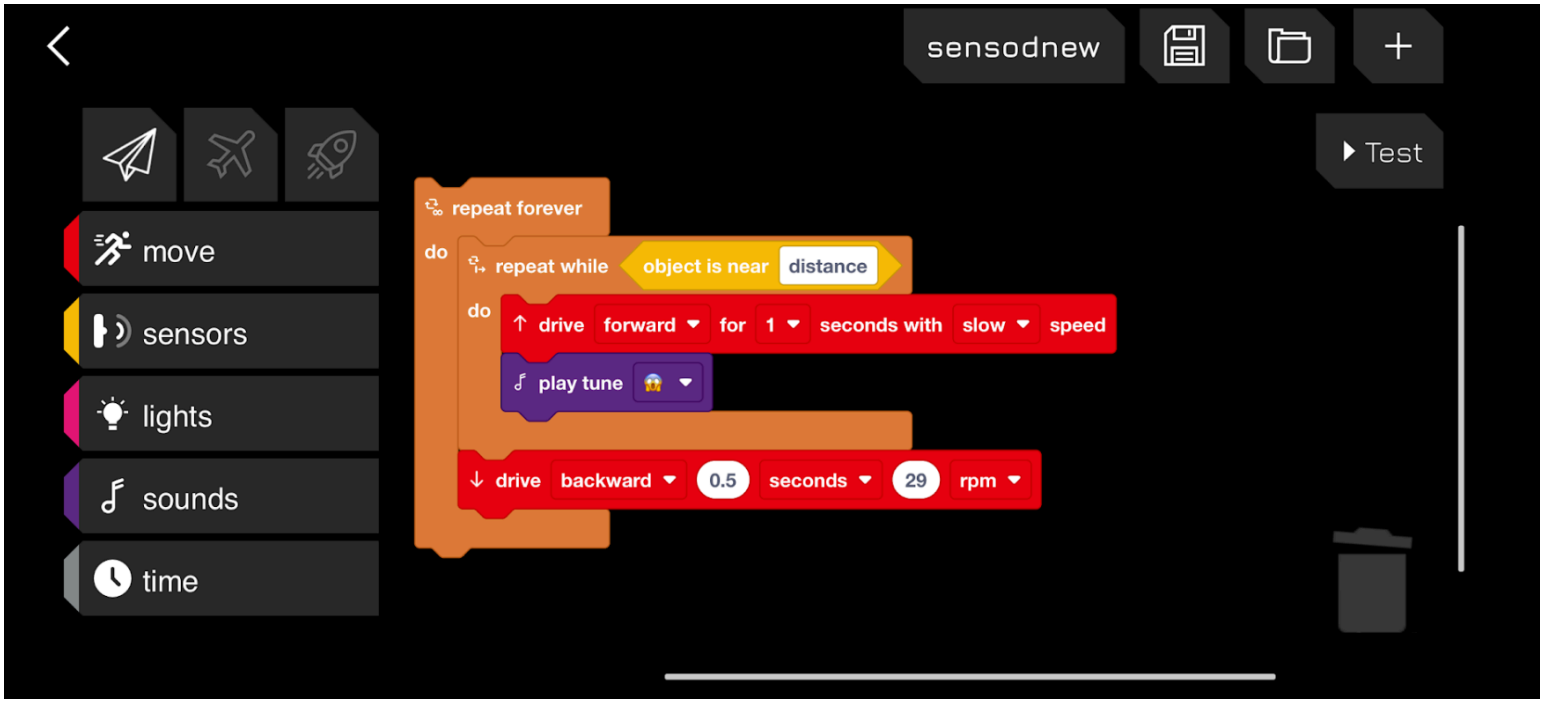
What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

I wrote a code for the Ravvy Robot to drive to the edge of tables, and not call off the edge and instead back up.



9/19 Distance Time Speed Formula

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

Planned Task List:

-

Useful Reference Links:

-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

Distance = Speed x Time

9/22/2022 Presentation tips

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

Planned Task List:

-

Useful Reference Links:

-

What Will I Work On Next Time?

-

Class Notes:

- Words are too small, making it hard to read
- Too much information on one slide, makes it hard to process
- No imagery
- Blank bullet points
- Stopped to check phone in the middle of the presentation
- Constant stuttering
- Wasn't prepared in the beginning
- Not familiar with the topic
- Doesn't elaborate on points
- Read off the slides

Good Notes:

- Eliminate distractions
- Check out the venue early on
- Nail the first two minutes of your presentation and the last two minutes
- Introduce yourself, establish why you are there
- Break the Ice by making a related joke that won't fall flat
- Let the audience know how you're accepting questions
- Moving hands around to much can be distracting, let them hang at your side and be natural
- Look around the room and hold eye contact with people for a few seconds

What Did I Working On Today:

9/23/2022 Micro Servo Coding

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

Planned Task List:

-

Useful Reference Links:

-

What Will I Work On Next Time?

-

Class Notes:
What Did I Working On Today:

```
//*
 // C++ code
//
#include <Servo.h> // Import Servo Library
// create servo object to control a servo
// my_servo can be any name.
// Twelve servo objects can be on most Arduino boards
Servo my_servo;
int pos = 0; // variable to store the servo position

void setup()
{
```

```
  pinMode(LED_BUILTIN, OUTPUT);
  my_servo.attach(9);
  pos = 45;
  my_servo.write(pos);
}

void loop()
{
  pos = 0;
  my_servo.write(0);
  digitalWrite(LED_BUILTIN, HIGH);
  delay(500); // Wait for 1000 millisecond(s)
  my_servo.write(360);
  digitalWrite(LED_BUILTIN, LOW);
  delay(500); // Wait for 1000 millisecond(s)
}
```

10/11/2022 Ace Lovelace

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

-

Class Notes:

- Lovelace was a mathematician and a writer, commonly known as the first computer programmer.
- She coded the first code for the proposed general-purpose computer by Charles Babbage.

10/26/2022 Love for reading

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

Planned Task List:

-

Useful Reference Links:

-

What Will I Work On Next Time?

-

Class Notes:

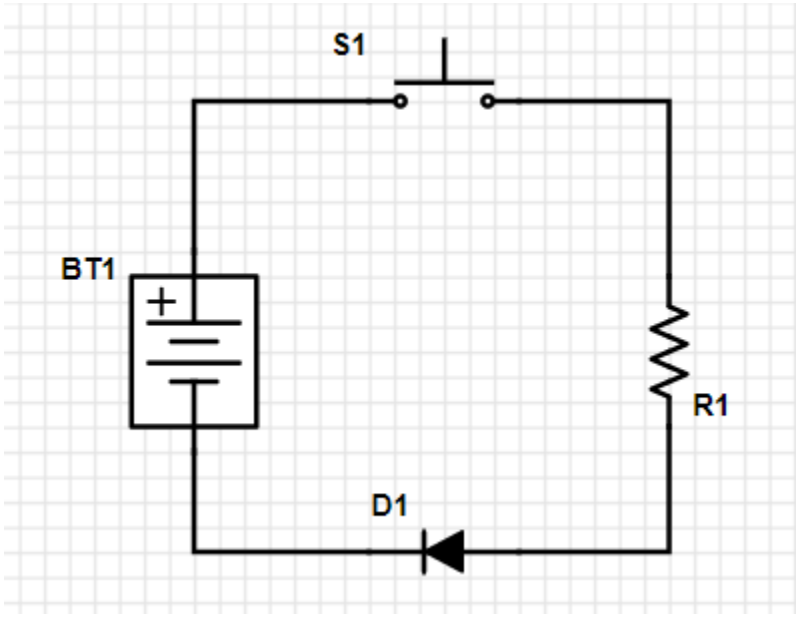
What Did I Working On Today:

I read about a NASA funded space launch from SpaceX that explored one of Jupiter's Moons Europa. It talked about how past astronomers observed there was ice and water on the surface, which was confirmed after the launch, which could signal life on Europa. The goal of the spacecraft is to confirm if it is a habitable moon.

11/15/2022- Toshiba / NAST ExploraVision

What Did I Working On Today:
Me and Quincy are preparing for the Toshiba / NAST ExploraVision, narrowing our list of possible problems down.
1) Energy
2) Cancer
3) Prosthetics

People In our group :
Brian
Quincy
Josue
Jessica



11/16/2022 ***Read For the Love of Reading***

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
-

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

Class Notes: <enter class lecture notes here>

What Did I Working On Today:

I read an article in the STEM magazine about awards given out by Novim AJN for the COVID 19 pandemic contributions. Various people awarded have made major contributions, like inventing ventilators that could be used for 2 or more people, research towards the widespread use of the vaccines, and letting the public know the latest news on COVID 19.

12/2/2022 Reading and Series Resistor Circuit Work

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

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

https://www.space.com/second-nearest-supermassive-black-hole-hunt?utm_term=9625BAA3-2CEA-4AD9-93C9-9B6407C5150D&utm_campaign=58E4DE65-C57F-4CD3-9A5A-609994E2C5A9&utm_medium=email&utm_content=69B76D9B-BD95-4B5F-8577-7885D9583075&utm_source=SmartBrief

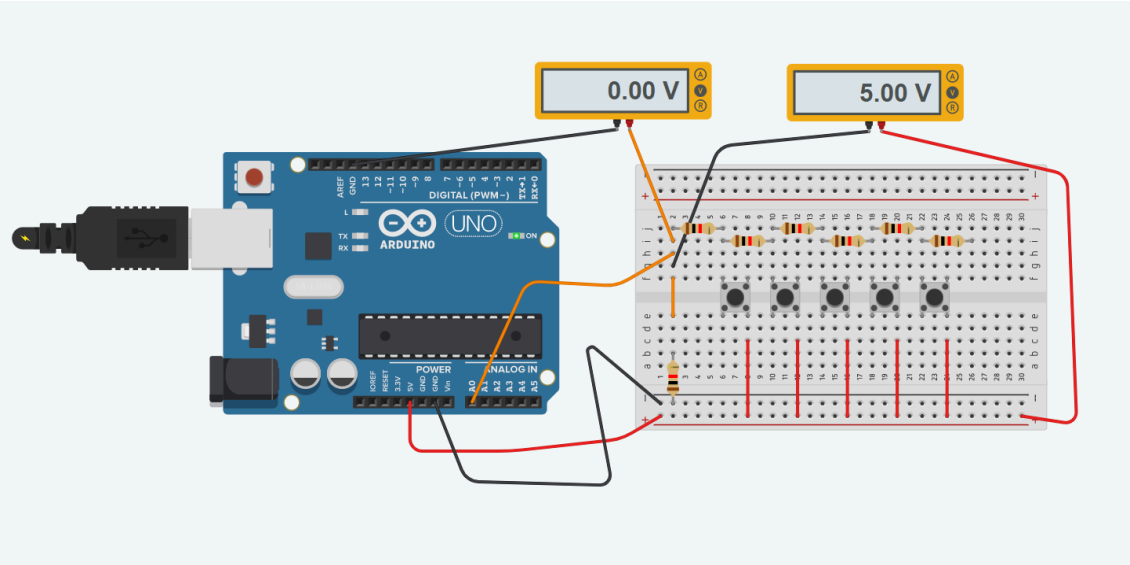
1) **What did Fabio Pacucci mean when they said, "Black holes are very elusive objects, and sometimes they enjoy playing hide-and-seek with us,"**

   What Pacucci meant was that because black holes don't emit light, it's hard to detect them with telescopes. Instead, they are relying on seeing stars getting pulled into one at a high speed.

2) **In your own words, how are astronomers planning to detect the super massive black hole called Leo?**

   They are relying on detecting the radiation around Leo, with the hopes of seeing the light around the black hole. If they do manage to be able to detect radiation it could be a sign that around the black hole is emitting light.

   Quantum Mechanics: science dealing with the behavior of matter and light on the atomic and subatomic scale



This breadboard layout works by layering resistors the further you press buttons down the line. Pressing buttons further on the right will compound more resistors, making the electrical signals go through more resistors. Pressing buttons more towards the left side will layer less resistors, making electrical signals easier to go through.

12/5/2022 Rube Goldberg

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Class Notes: Rube Goldberg (1883-1970) was a cartoonist and an inventor. He went to UC Berkeley for this Engineering degree, but had decided to switch careers as a cartoonist. Of the nearly 50,000 cartoons he drew in his lifetime, Rube is best known for his cartoons about Professor Butts. It was in these cartoons that he would invent the Rube Goldberg Machines, which was able to solve tasks in the most hilarious way possible.

What Did I Working On Today:

Me and Quincy are using a servo motor to make a catapult-type structure. Golf-ball, Ping-pong ball, marbles, etc. We wanted to be able to transport different types of objects to other boards to be able to interact with other people's projects easier. Had also set up train tracks.

12/5/2022 Rube Goldberg Project

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

The servo motor ran completely autonomously, and we couldn't control when to trigger it to be able to sync it with other people's boards. Quincy decided on an ultrasonic sensor, which is able to sense objects in-front of it. This was perfect as we could use our previous model of the train tracks to activate it, or maybe use the other teams' contraptions as the trigger. It was a versatile solution, so Quincy coded the distance code into it to work. It's now able to detect someone's hand, or a toy train running by.

12/6-16/2022 Rube Goldberg Project

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Wrapped up Rube Goldberg project with hot gluing ultrasound sensor. We're going to be hot gluing down the ramp where the marbles are going to roll down because we aren't too sure how this would interact with other boards. Another group was popping balloons, maybe position the ramp below the balloon and ask them to put a marble in the balloon? Another group was going to a basketball hoop, maybe have the ball that goes through the hoop go into the ramp?

1/11/2023 Reading/Projects

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Reading:

Learned what CPI (Consumer Produce Index) means and how to calculate it. CPI is used to track changes in inflation in durations of time, like years or months. Measure of change in price of goods.

1/18/2023 Love for Reading

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Reading:

https://www.sciencedaily.com/releases/2023/01/230113112804.htm

I read about how Scientists are researching the components of what happens when chocolate turns to an emulsion during human consumption. Fats on the outside of the chocolate are found to react first, turning into liquid with the high heat, also a big factor in consistency and taste of chocolate. With this knowledge the University of Leed hopes to create healthier chocolate by creating a fat lining that causes the same reaction, with less fats towards the core. Low fat option that does not sacrifice taste.

2/7/2023 What to do for Robot Club

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

We had just finished up our SkillsUSA competition, and now I have to decide what robot club project I have to do. I'm not sure yet, but I'm hoping to continue the LED music equalizer with my partner that we didn't get the chance to do at the beginning of the year because of Skills. If not, I'll find another project to work on in Instructables.

2/7/2023 Love for reading

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

I read the 2nd chapter of Bless me Ultima, which was about a boy who is stuck in a feud between an army of men and a disabled person, Lupito. Lupito accidently shot one of the men, which happens to be the brothers of another one of the men and now the other brother is rallying an army against him. The boy, Antonio, watches from afar as the chase happens.

2/14/2023 Tesla Presentation

Planned Task List:

-

Useful Reference Links:

-
-

What Will I Work On Next Time?

-

Class Notes:

What Did I Working On Today:

Tesla Presentation:

- **Tesla is the biggest electric car company**
- **Many jobs, with many qualities of a job that you would want, hardworking employees**
- **Pathway—> trainee -> hard work -> work gets noticed -> promoted**

3/15/2023 Next Flex Presentation

What Did I Working On Today:

Next Flex Presentation:

- **Setup Pictures within the slides to match the topic discusses**
- **Put down information regarding our product**
- **“3 hundred thousand cases of cardiac arrest, product being introduced is better than other products because of constant charging, costs 1500 which is the same as competitors”**
- **Business model, promotion, costs and utilities, advertising**

3/22/2023 Open Lab

Projects/Assignments:

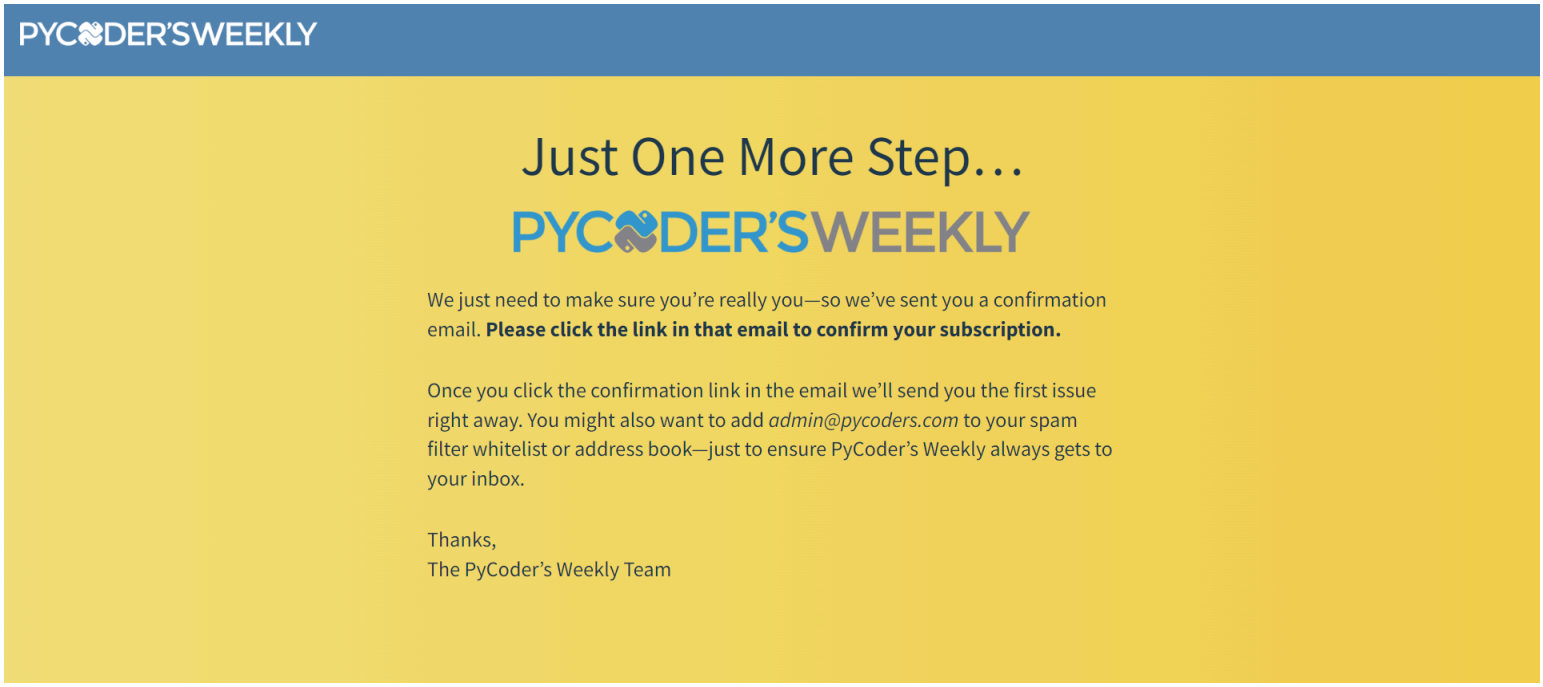
- Canva assignments in-class
- SkillsUSA Urban Search and Rescue
- Raspberry Pi

Completed:

- Attached 2 extra motors to our robot

- Attached a new claw

3/22/2023 Python Weekly Newspaper



PYCODER'SWEEKLY

Just One More Step…

PYCODER'SWEEKLY

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