

Engineering Notebook

Mechatronics Engineering 2024-2025

Viktor Collins

V.Collins1@my.metroed.net

<LinkedIn - Optional>



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: Check out the [New Blog Template Here](#)
Also, please have the newest Blog Entry here at the top... and turn all your text black from the **red**

Get the template from here [New Blog Template Here](#)

8/13/2025 <Title - Daily/Weekly “Blog” Project Title - compelling, descriptive title>

Today is our first “Love of Reading” day, we begin Wednesdays with 20 minutes of reading. Today we’re reviewing what we learned about breadboards and series circuits with 2 quizzes.

Entry Ticket:

- Our entry ticket today was to read a book from the shelf for 20 minutes
- I read “A Clockwork Universe” a book about the scientific revolution and how the world was remarkably unhygienic and superstitious before scientists like Isaac Newton revolutionized how we view the world
 - The first few pages talk about how even during Newton’s time people viewed the universe through an unstructured mystical lens and how people’s views began to change when the influx of sciences caused people to see the world with constant mathematical principals

What Did I Do Today:

- After reading we did two quick tests about breadboards covering what was considered a functioning circuit and what wasn’t
- Once we had finished that me and Vedant began dismantling our Canon printer and receipt printer for parts
 - Vedant unscrewed the motherboard screen and two motors (we likely won’t use the motherboard)
 - I fully disassembled the receipt printer and cut off the number display for possible later use
- We scavenged
 - Several motors
 - An 8 bit number display
 - An lcd screen
 - Many springs
- After scavenging the printers we cleaned up the scraps and organized them into respective recycling bins
- At the end of the day we learned about how class jobs are gonna work



8/20/2025 <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Today is another love of reading day, after the entry ticket we will go to the auditorium where we are introduced to SVCTE and available resources

Entry Ticket:

- Today's entry ticket was 20 minutes of reading
- I read the book "A Clockwork Universe" chapters 3-6 covered the rapture and how people in the 1660's even scientists planned or calculated for the rapture with the black plague, comets, and other strange events culminated in hysteria leading to the year 1666 which at the time was thought to be the end of the world

Today's Class Notes:

< Enter any class lecture notes here. You can include screenshots, images and diagrams. If you drew any notes, you can take a picture and post it here. >

I read the article "What the heck is a time crystal, and why are physicists obsessed with them?" I was intrigued by the sci-fi premise and wanted to learn what they were calling "a time crystal". In short; a time crystal is a crystal whose pattern not only repeats itself in space, but time as well. Scientists used a tuned laser to force crystals to flip between states in a repeating pattern. "Time Crystals" could be used to store data in quantum computers similar to silicon underpins in traditional computers.

8/27/2025 <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Today is another love of reading day, after the entry ticket we will be continuing work from yesterday, such as arduino soldering and

Entry Ticket:

- Today's entry ticket was 20 minutes of reading
- I read the book "A Clockwork Universe" chapters 7-8 Covered how religion was so comically entwined with sciences, almost everyone was christian and god was believed to be a mathematician in nature

Today's Class Notes:

< Enter any class lecture notes here. You can include screenshots, images and diagrams. If you drew any notes, you can take a picture and post it here. >



I read the article "Destroy the Target, Not Everything Else: Beam Management in High-Power Directed Energy Laser Projects"

The military is looking to use lasers in weaponry for soldiers and sailors. Lasers are ideal since they don't use ammunition, have long range, can control lethality, and are silent. Due to the danger of these lasers a new system was developed to absorb output during testing which consists of water cooled channels that control the dangerous output.

<9/2/25> <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Today our entry ticket was to read an article from "AI Magazine"

Entry Ticket:

- I read "Behind the Rise of AI Agents Replacing Human Recruiters"

This article went over the results of a recruitment test, comparing Ai recruiters to human ones. They would give interviewees either a human recruiter, an ai recruiter, or a choice between them. The results of this test showed that Ai recruiters were better at staying to the point but left worse impressions, while the humans made more connections but were less efficient.

Today's Class Notes:

< Enter any class lecture notes here. You can include screenshots, images and diagrams. If you drew any notes, you can take a picture and post it here. >

<9/3/25> <Title - Daily/Weekly "Blog" Project Title - compelling, descriptive title>

Today was a love of reading day

Entry Ticket:

- Today I continued "The Clockwork Universe" This segment was about moving from trigonometry to calculus and physics. They talked about the greeks knowledge of trigonometry and how Newton and Leibniz compared to each other
- I enjoy this book because it reveals the truth behind these famous scientists, what they were like and how mystical they can really be, it's rather surreal.



9/5/25

In the article "No Your Phone Isn't Listening Here's What's Really Happening" they cover how websites use your information for targeted advertisement which is intended to be less annoying, most often websites like Meta will only use data from their apps or recently visited websites however some websites use more information that isn't relevant and sell it to data brokers.

9/10/25

Today was our love of reading day. I continued to read "A Clockwork Universe" and this past few chapters it covered Francis Bacon as well as the dangerous and misunderstood world of early scientific experimentation. One notable experiment saw a civilian getting a blood transfusion from a goat with dozens of people watching.

9/15/25

In the article "Cultivating Knowledge: The Benefits of Hydroponics in K-12 STEM Education" from this issue of Stem Magazine, hydroponics provides hands-on learning opportunities in children which helps to build problem solving, critical thinking, and fine motor skills. Hydroponics can also help students learn broader agricultural skills which can help with future jobs and food security. Community involvement can be a big part of hydroponics, helping students develop social and communication skills as well as harboring good emotional development. I think schools should start providing agriculture and hydroponics classes early on as they teach important life skills and hydroponics is very rewarding to young students.

9/16/25

Today i worked on the CNC machine, by connecting wires and testing the new stepper motors, i also did work practicing "while loops" in arduino

9/17/25

Love of reading, This chapter of "The Clockwork Universe" covered early medical sciences especially related to animal testing. One segment went into detail on what scientists tried to learn by transfusing blood between dogs like how might an aggressive dog act with a transfusion from a tame dog, or more sensibly, does venom spread through the body? And if so how does poison act when injected?

9/19/25

The article "One Operator, Multiple Drones: Is This a Game Changer for Public Safety?" goes into how new drones can help with indoor and outdoor urban policework allowing one operator to control a whole ecosystem. My



major issue with this article is that they don't explain how the drone ecosystem works, they talk about previous models that used AI but all they say about new models is that they're controlled by an ecosystem. I think that drone ecosystems are a good idea for police work however they are only practical in some situations, i think in most cases it would have a lower success rate in negotiations or similar issues.

9/22/15

Bio-microelectronics (BioMEMS)

The combination of of biology microelectronics and microsystems which is designed to interact with biological entities on a microscopic level

This article mostly serves to make readers aware of the technology of BioMEMS rather than to explain how it works or is used. BioMEMS are used for things like gene editing, identifying cancer cells, and moderating/altering bodily functions. BioMEMS are helpful to society as they typically can prevent or moderate potential biological issues though there is debate on whether gene editing is lawful.

9/24/25

In the latest chapter of "A Clockwork Universe" I read about how the discovery of earths orbiting the sun by Galileo and Copernicus changed the view of humanity and cemented Copernicus as one of the 3 scientists who dealt enormous blows to mankind's self-esteem by changing their view of the universe.

9/30/25

AI in companies tends to fail because companies force it into their pre-existing work functions instead of changing how they operate to accommodate the AI better. Another reason AI tends to fail in companies is because they use open source LLMs which are much more buggy and likely to experience hallucinations, this small increase in buggy behaviour over private models is a big factor in the struggle companies might face with integrating AI.

10/1/25

This chapter of "The Clockwork Universe" covered Leeuwenhoek's perfection of the microscope. He was always putting new things under it; moss, bugs, printed marks, needles, he had a fascination with finding the intricacies and imperfections of the miniature world. Earlier in the book they called God a mathematician because everything in the world follows basic mathematical laws, this next chapter covers how German philosopher Leibniz reasoned that god would create a world governed by math in such an expansive universe. Leibniz's main reasoning explained how variety is needed to create the wisdom which God has, God created numerous worlds and earth is just one which holds life which is governed by such natural laws.



10/2/25

Helix, a humanoid robot from Figure recently developed the ability to fold towels, it uses a vision language model to constantly adjust to the towels position and fold it before placing it in a basket. This advancement in humanoid robotics is interesting to me because; it can move with humanoid motor function consistently and it can accomplish the task without major errors. Despite how interesting the robot is, I don't see this function helping majorly in society, it often missed the towels a couple times when trying to grab them due to poor depth perception and the task could easily be accomplished much faster and cleaner by a human or dedicated robot.

10/13/25

This article talked about "Lovable Cloud" an app development AI that takes care of not only coding, but also shipping the app. Lovable can be used to create apps in minutes which can get ideas across and add pretty complex functions which would usually take a human hours if not days. Lovable can be great for indie app development or simply pitching your idea. I don't think that Lovable is something I would use to create an app since I generally prefer doing it myself, however it's a genuinely applicable tool.

10/15/25

Today is love of reading. I read "The Clockwork Universe" . They again talked about early physicists' relationship with God. The common belief of the time was that everything was where it was because it was made by god for man, not because of evolution. And because things as integral to human development as trees and metals existed they had to be by design, and where there's design there's a designer.



Tab 2

R #	Resistor Number Value (from Colors)	Measured Ω	Ω Error In Spec?
#0	Red, Red, Brown, Gold = 220Ω 5%	217Ω	3Ω
#1	Orange, orange, brown, gold = 330Ω 5%	325.5Ω	4.5Ω
#2	Yellow, purple, yellow, gold = $470k\Omega$ 5%	$461k\Omega$	$9k\Omega$
#3	Green, blue, brown, gold = 560Ω 5%	556Ω	4Ω
#4	Orange, white, green, gold, = $3.9M\Omega$ 5%	$3.95M$	$.05M\Omega$
#5	Brown, black, blue, gold = $10m\Omega$ 5%	$9.65m\Omega$	$.35m\Omega$

Resistor #	Resistor Value (from color code)	Measured Ω	Measured Volts	Measured I	Calculated I
Resistor #1	$15k\Omega$ 5%	$14.91k\Omega$	4.19V	0.28mA	0.28mA
Resistor #2	220Ω 5%	217Ω	4.92V	20.02mA	22.67mA
Resistor #3	$1k\Omega$ 5%	984Ω	4.11V	4.49mA	4.18mA

R #	Measured Rt	Measured R1	Measured R2	Calc R1 +R2	Measured Vt	Measured V1	Measured V2	Calculated I	Measured I
#0	659 Ω	330 Ω	327 Ω	657 Ω	5.16 V	2.58 V	2.56 V	7.83 mA	7.79 mA
#1	10.22 KΩ	510 Ω	511 Ω	10.21 KΩ	9.18 V	9.18 V	9.18 V	55.56 mA	
#2	15.26 KΩ	329.8 Ω	14.93 KΩ	15.2598 kΩ					
#3	9.6 MΩ	327.3 Ω	9.59 MΩ	9.5903 MΩ					
#4	2.993 KΩ	326.3 Ω	2.667 KΩ	2.993.3 KΩ					
#5	3.971 MΩ	558 Ω	3.971 MΩ	3.971558 MΩ					

Circuit	Measured R1	Measured R2	Measured Rt
1	89.2 KΩ	39 KΩ	90 KΩ
2	44 KΩ	47.9 KΩ	90 KΩ
3	72.8 KΩ	19.22 KΩ	90 KΩ
4	58.8 KΩ	33.04 KΩ	90 KΩ

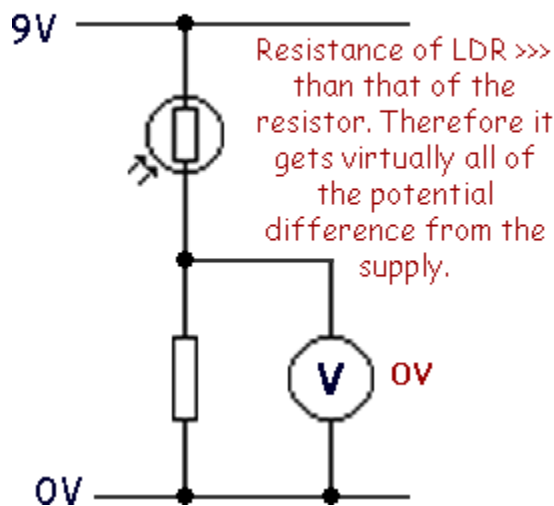
Circuit	Measured V1	Measured V2	Measured Vt	Measured R2	Calculated R2
1	3.367 V	1.792 V	5.16 V	32.62 KΩ	31.255 KΩ
2	1.312 V	3.84 V	5.16 V	68 KΩ	66.976 KΩ
3	2.964 V	2.187 V	5.16 V	39.19 KΩ	38.145 KΩ
4	3.96 V	1.193 V	5.16 V	22.12 KΩ	20.808 KΩ

$$V_x = (R_t * V_2) / 5.16$$

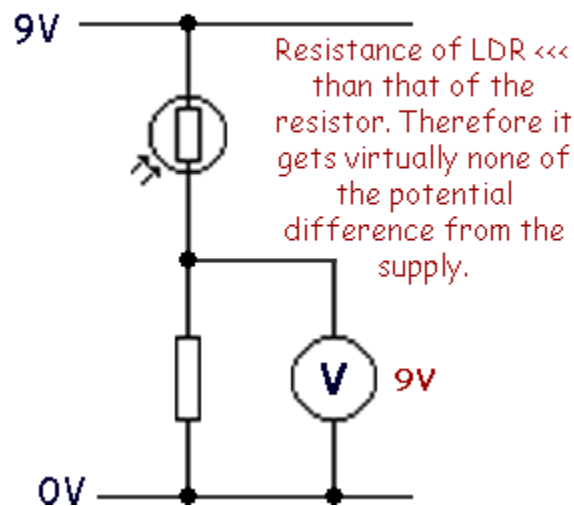
WORKING OF LDR

- A LDR works on the principle of photoconductivity.
 - Photo conductivity is an optical phenomenon in which the materials conductivity reduces when light is absorbed by the material.
 - When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band.
 - These photons in the incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band.
- ...contd.

In the Dark



Under a bright Light



CNC-Robot Club-Notebook

9/10/25

-Introduction-

CNC Machine repair Day 1

Preperations

- In order to get the machine working, we need "Stepper Motors" to allow the dremel to move across the X and Z axes
 - We have access to stepper motors from the class however the motors were 5-pin and our controller is 4-pin
 - To fix this, Vedant remapped the wires from the motors to only connect at required points changing the 5-pin into a 4-pin
 - Now we have 2 stepper motors which can rotate using inputs from the CNC controller
-

Components

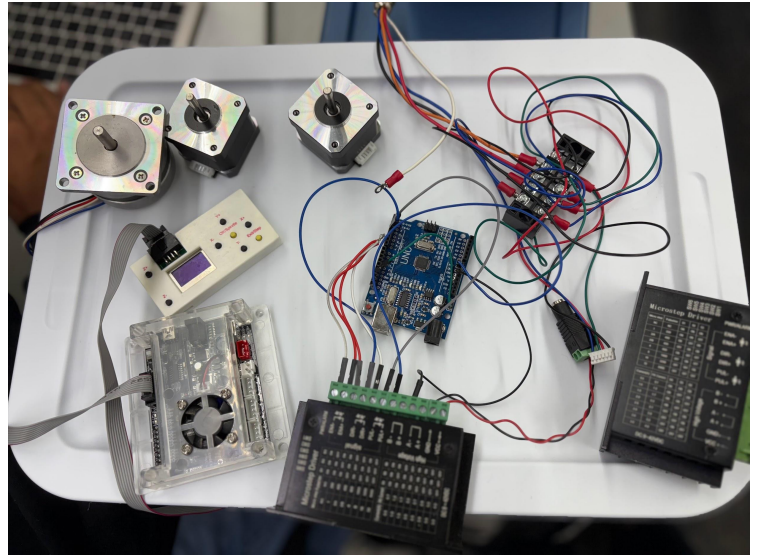
Vocabulary

- Stepper Motor
 - A motor that moves in steps rather than constant smooth movement
-

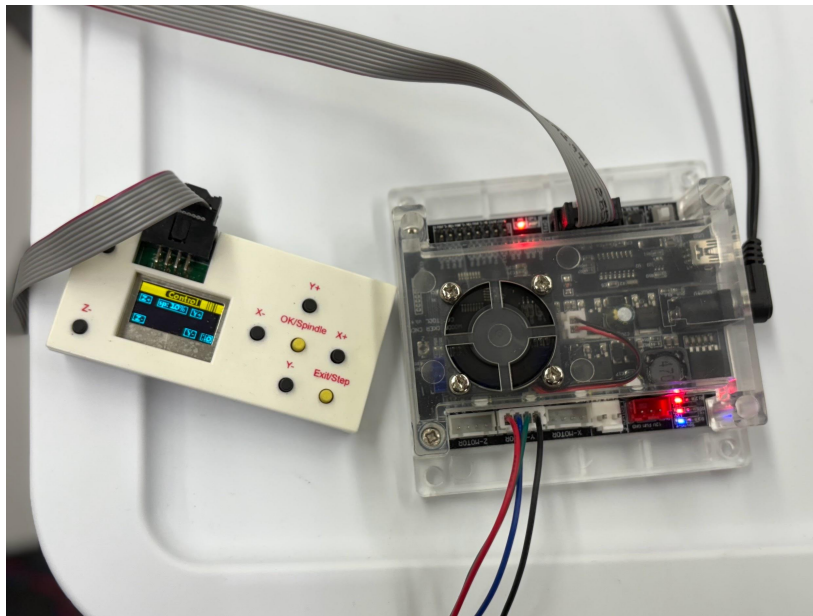
Day 1 Images



Starting Machine



Pre-existing Components



CNC Controller (Provided by Vedant)