Medication Dispenser & Reminder System

Team Z10: Aldrin Tankeu, Moyin Wright, Jennifer Trac, Yufei Zhao, Neeraj Divakarla, Yalin Tuo

Agenda

- Problem Statement
- Customer needs
- Benchmarking
- Target specifications
- Conceptualization
- Decision matrix
- Prototype and Final Design
- Testing
- Business model
- Economics
- Problems faced and Future work
- Conclusion

Problem Statement

The client has trouble remembering to take her prescriptions or keeping track of said prescriptions, as such, she requires a novel item to aid in the tracking and dispensing of her prescriptions.

Customer Needs

The customer needs were ranked on a scale of 1-5 to assess the importance of those criteria in the final product.

#	Customer Need Statement	Rank
1	The product will remind the user to take her medication.	5
2	The product will remind the user if she has already taken her medication.	5
3	The product will be simple to use and require low user effort.	4
4	The product will automatically dispense medication.	4
5	The product will use LED lights to visually indicate reminders.	3
6	The product will integrate standard pill bottles.	3
7	The product will indicate when medication is running low and when the user should pick up more medication.	3
8	The product will be travel-sized and compact.	2
9	The product will incorporate recycled materials.	3
10	The product will integrate reminders to buy other medications.	3
11	The product will use loud auditory alarms.	1
12	The product will send reminders to the user's phone.	1
13	The product will resemble a weekly pill organizer.	1

Benchmarking

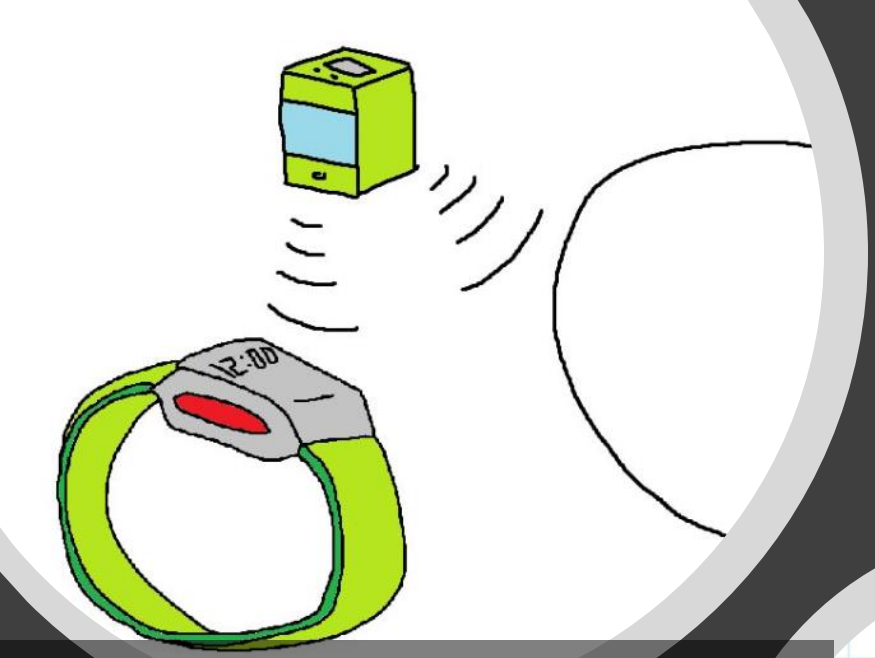
- Research was done for existing products on the market
- Most of these products used timers and compartments for each day of the month to track prescription dosage
- The client does not like this method of medication dispensing as it requires more effort at the beginning of each month to prepare

Target specifications

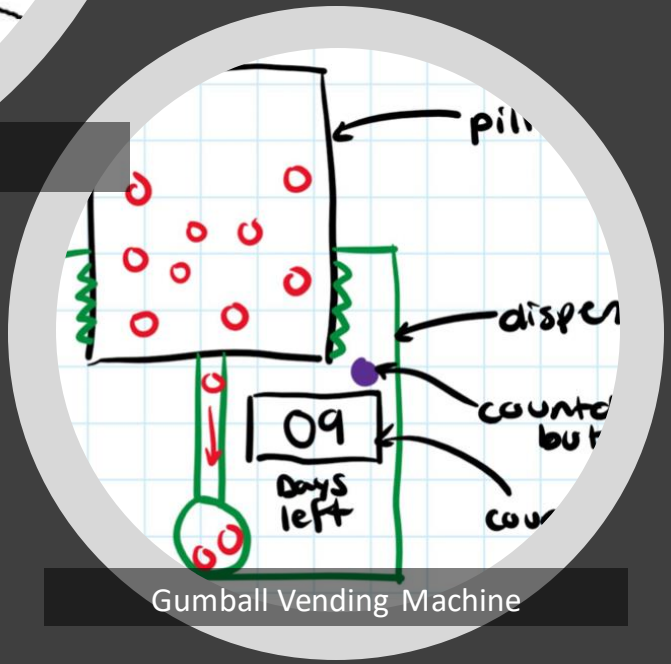
- Manufacturing cost: <$50
- Medicine net weight: <150g
- Container diameter: <5cm
- Container height: <10cm
- Dosage length: 30 days
- Pills per day: 2
- Sound emission: <40dB
- LED Brightness: <30 Lumens
- Power consumption: <5W
- Operation time: 365 days/year

Conceptualization

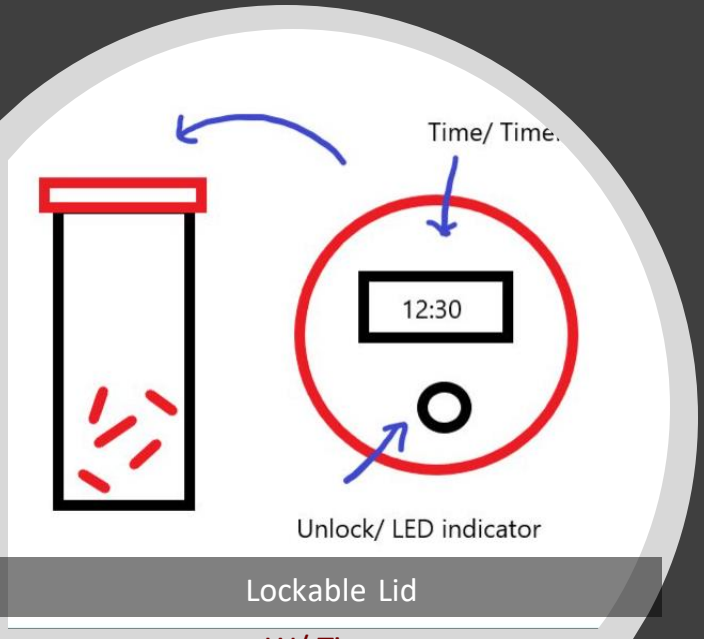
- After the problem refinement stage of the Iterative Engineering Design Process (IEDP), we began to ideate and generate solutions.
- Each team member generated three different conceptual ideas. Afterwards, the team used a decision matrix to select the most feasible design out of the top three solutions shown on the slide.



Bracelet Reminder



Gumball Vending Machine



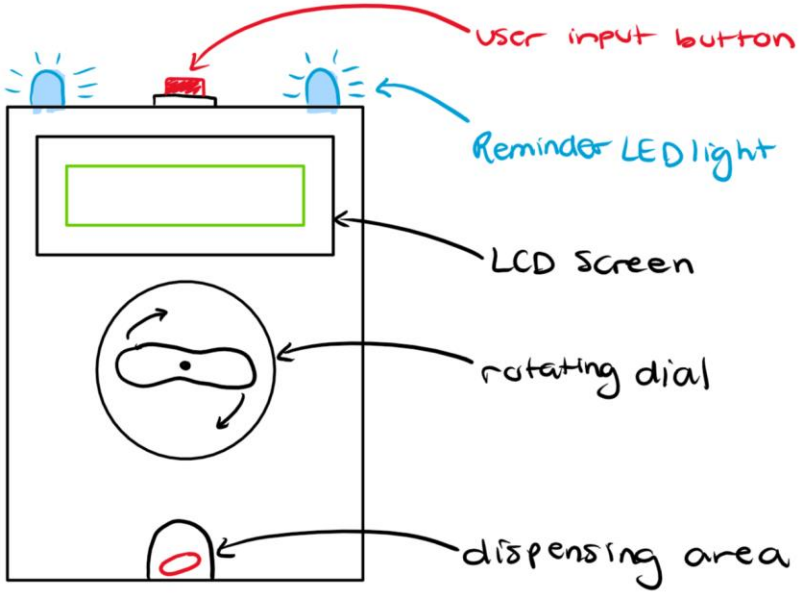
Lockable Lid

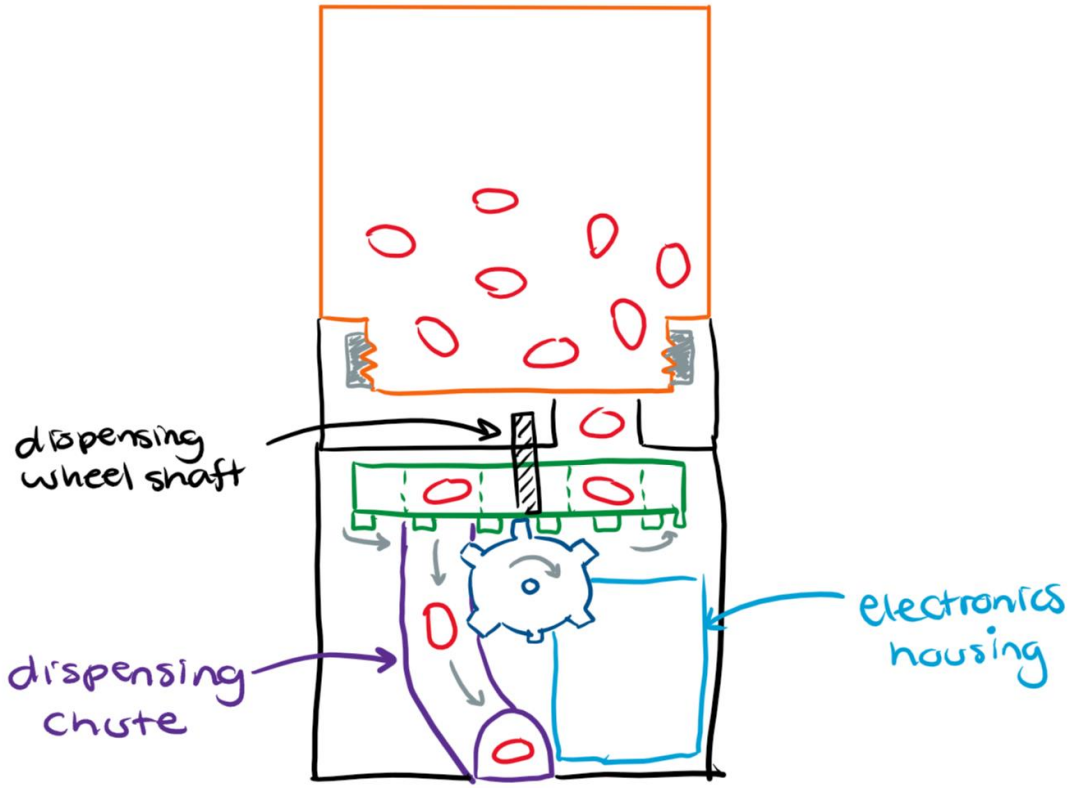
Decision Matrix

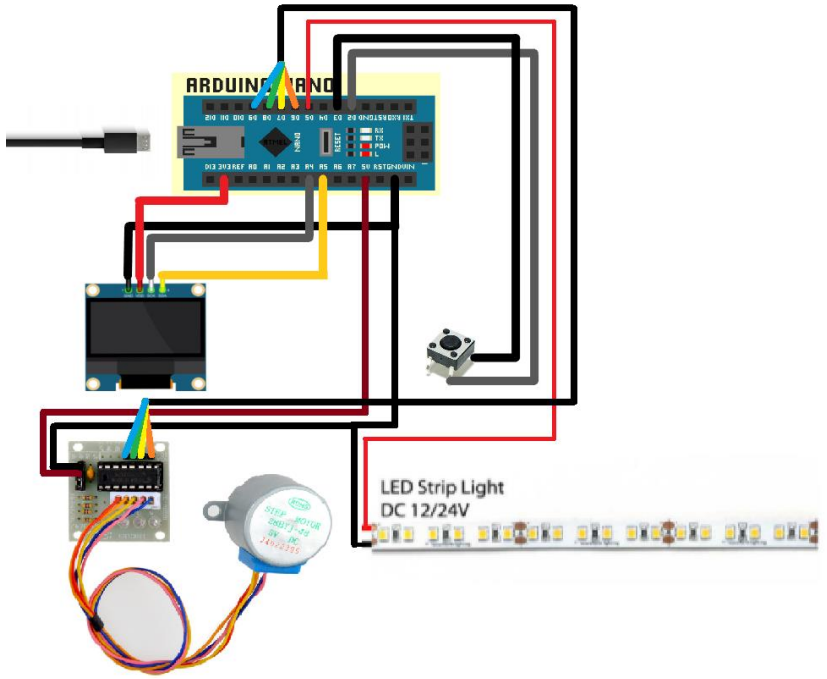
Table 6: Decision matrix of three group concepts

Concept Options		1		2		3	
Selection Criteria	Weight	Score	Weighted score	Score	Weighted score	Score	Weighted score
Effectiveness of Reminder	5	8	40	10	50	9	45
Cost of unit	5	10	50	7	35	7	35
Power consumption	4	9	36	8	32	9	36
Sustainable materials	4	2	8	9	36	3	12
Ease of use	5	9	45	9	45	7	35
Effectiveness of dispensing	3	1	3	8	24	1	3
Sound emission	3	8	24	7	21	8	24
Light emission	3	8	24	7	21	8	24
Compact size	2	10	20	7	14	10	20
Aesthetics	1	2	2	9	9	5	5
Total score							
			252		287		239

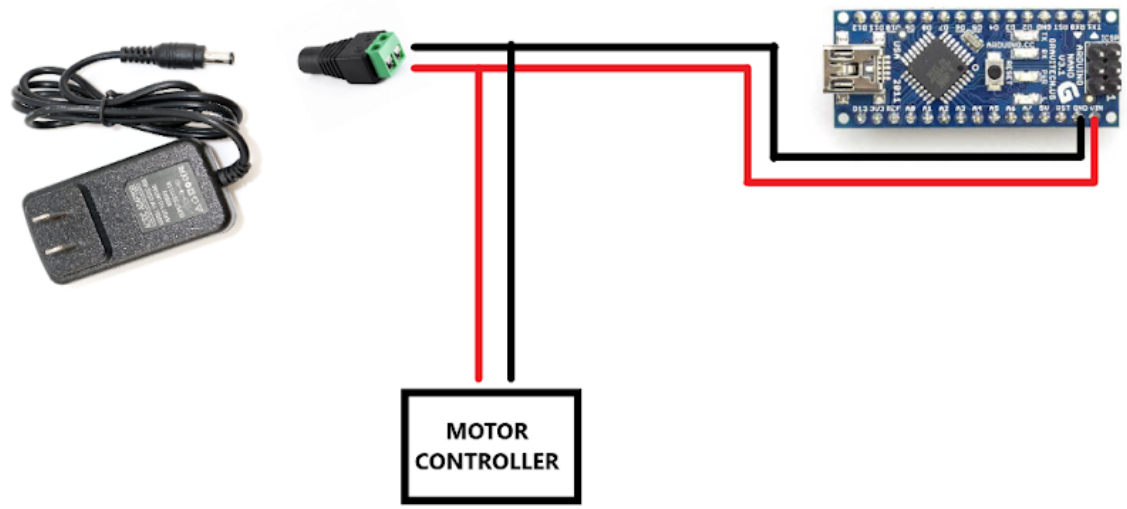
Prototype 1

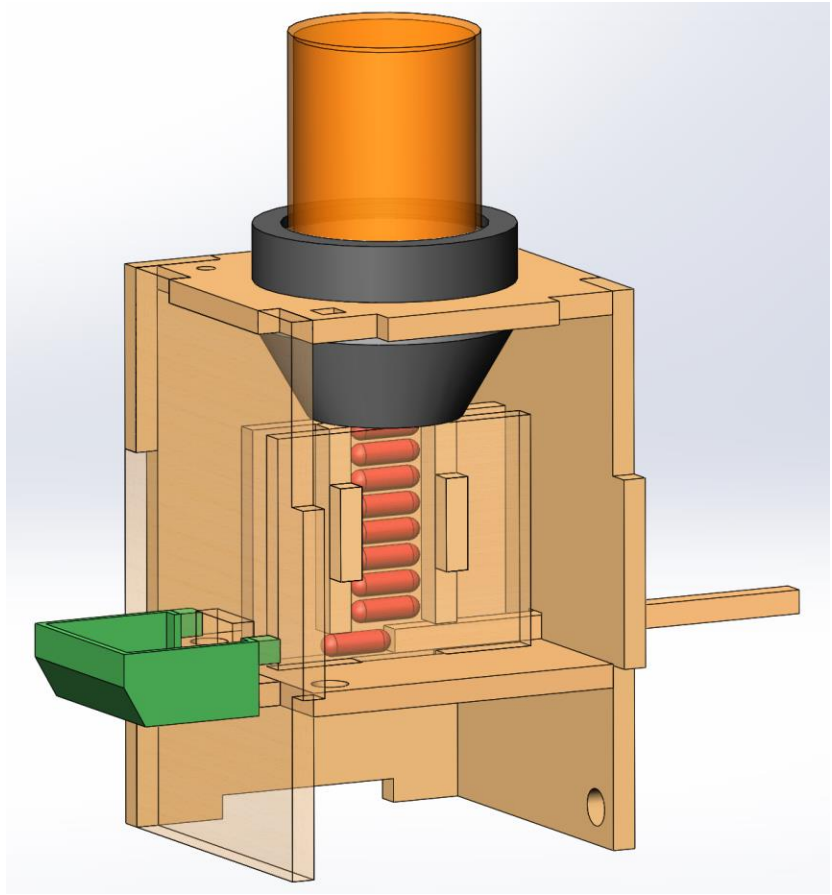

user input button
Reminder LED light
LCD screen
rotating dial
dispensing area


dispensing wheel shaft
dispensing chute
electronics housing


LED Strip Light
DC 12/24V

Prototype 2





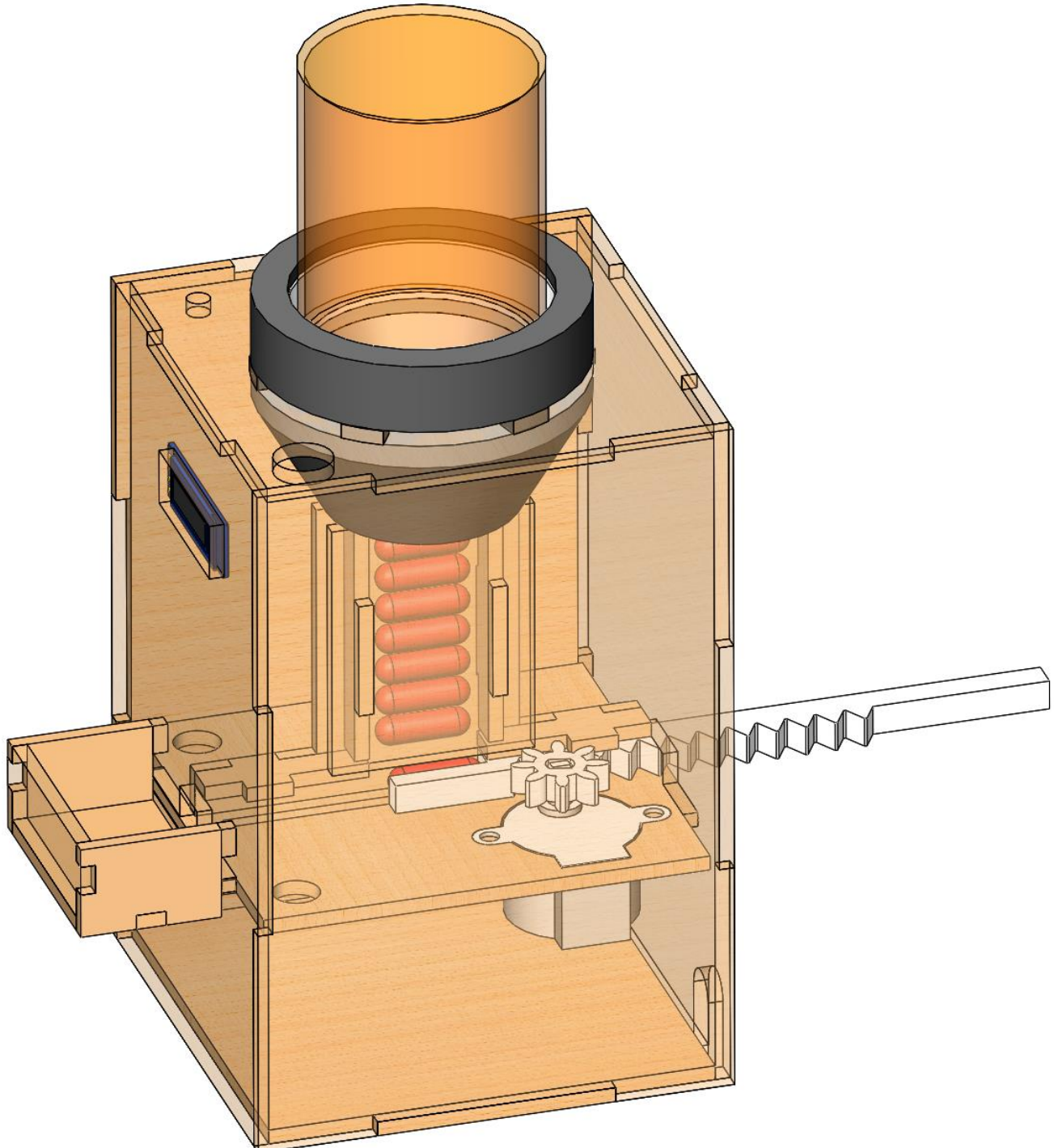
Changes made for Prototype 2:

- Electronics are now powered by an external 12V power supply
- Dispensing mechanism now uses a dropping and pushing method

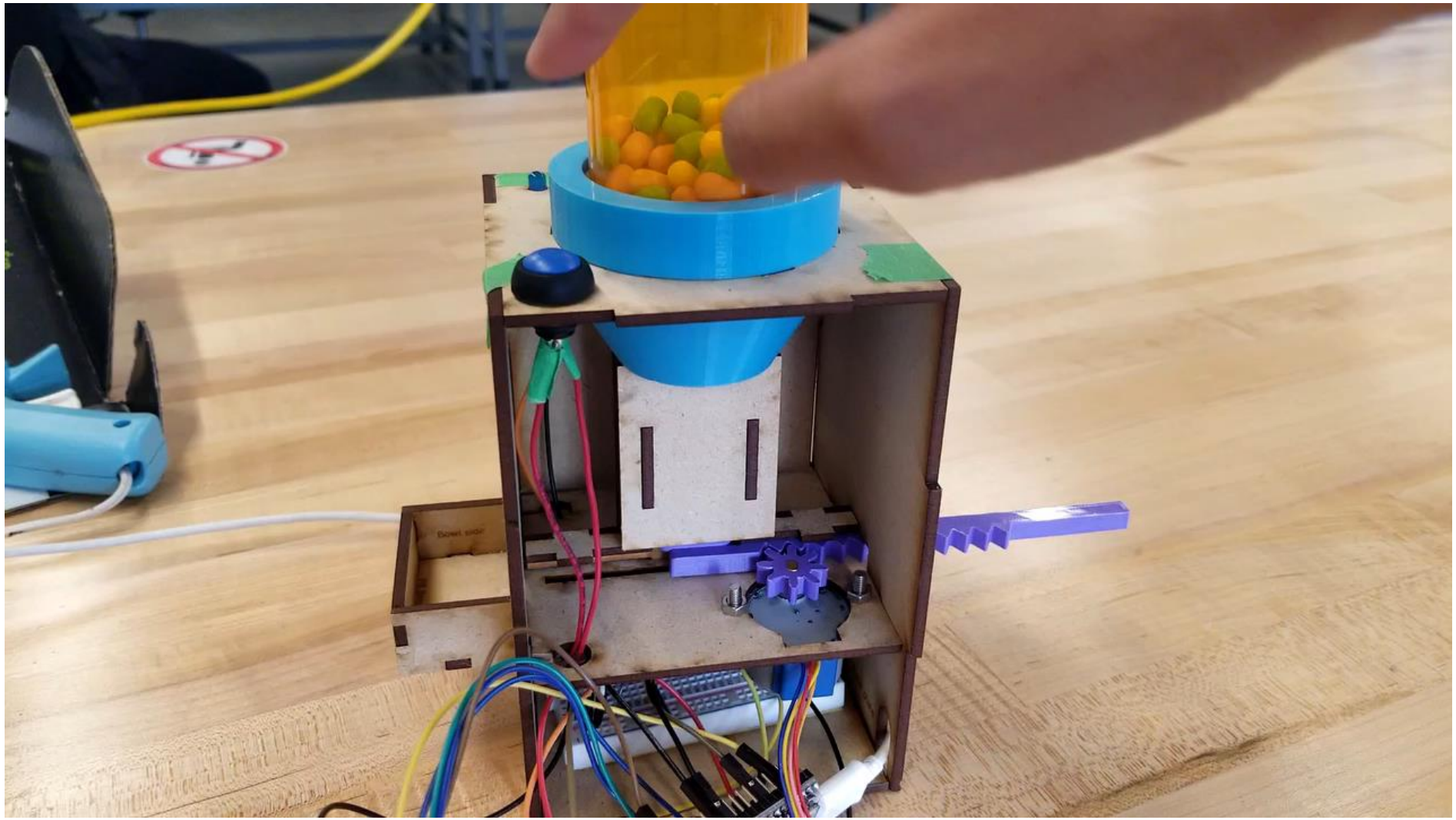
Final Prototype Design

Changes made for Final Prototype:

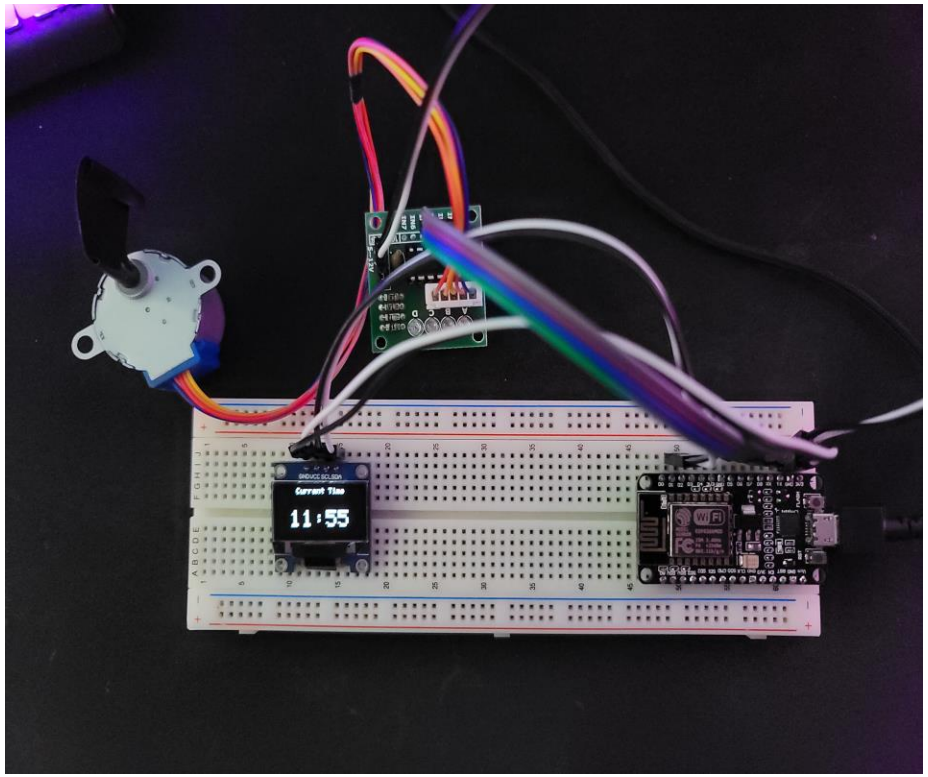
- Automatic dispensing mechanism is powered by a stepper motor and a rack and pinion
- Outer shell has been reduced to 1/8" thickness and component location and types have been finalized

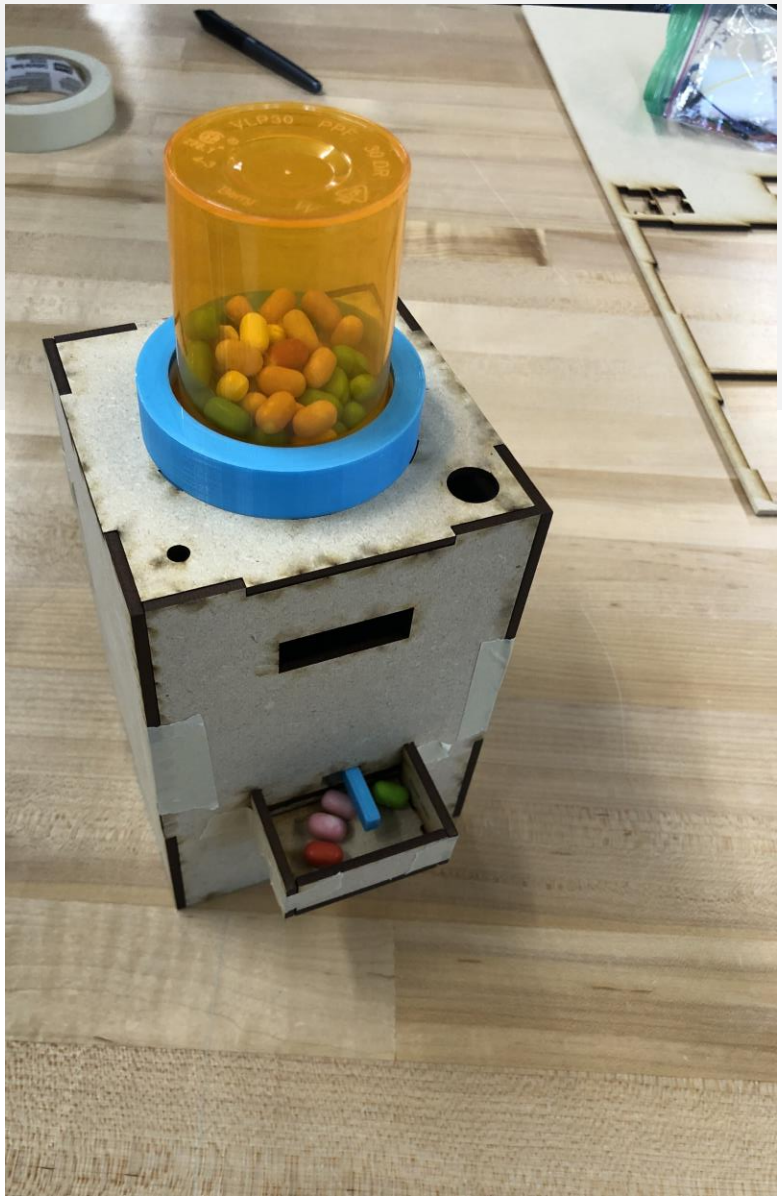


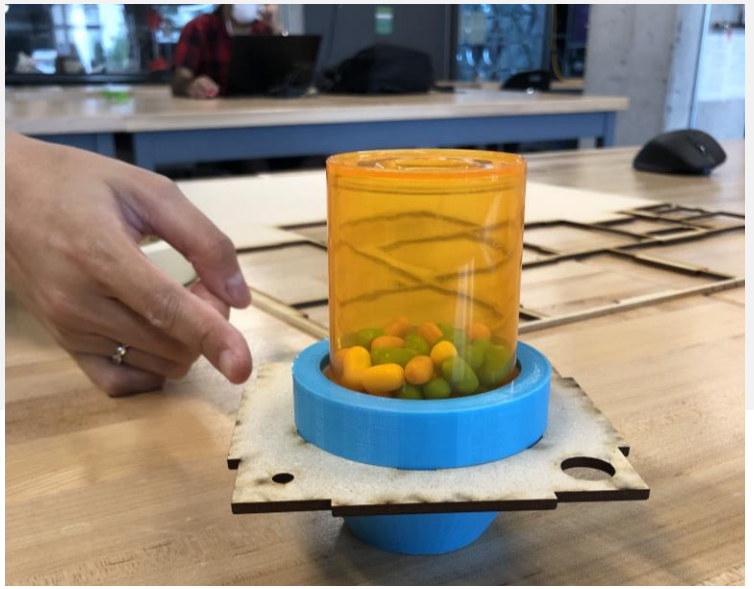
Completed Final Prototype

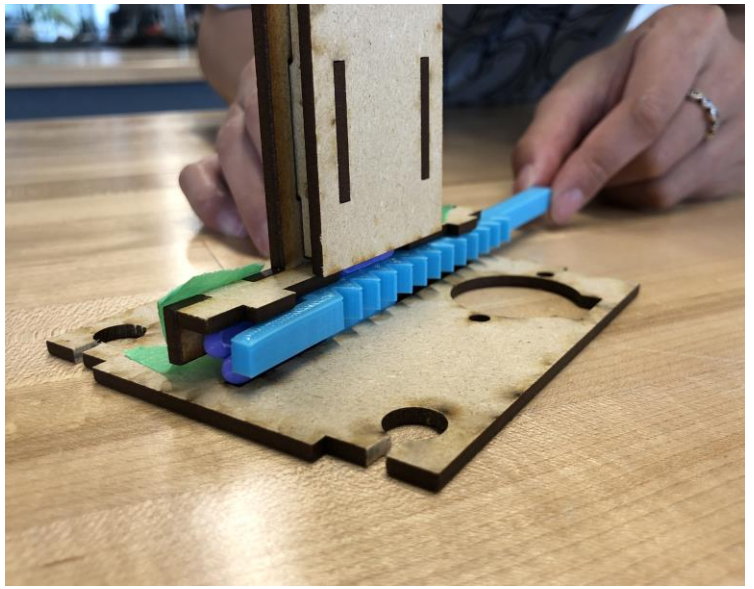


TESTING

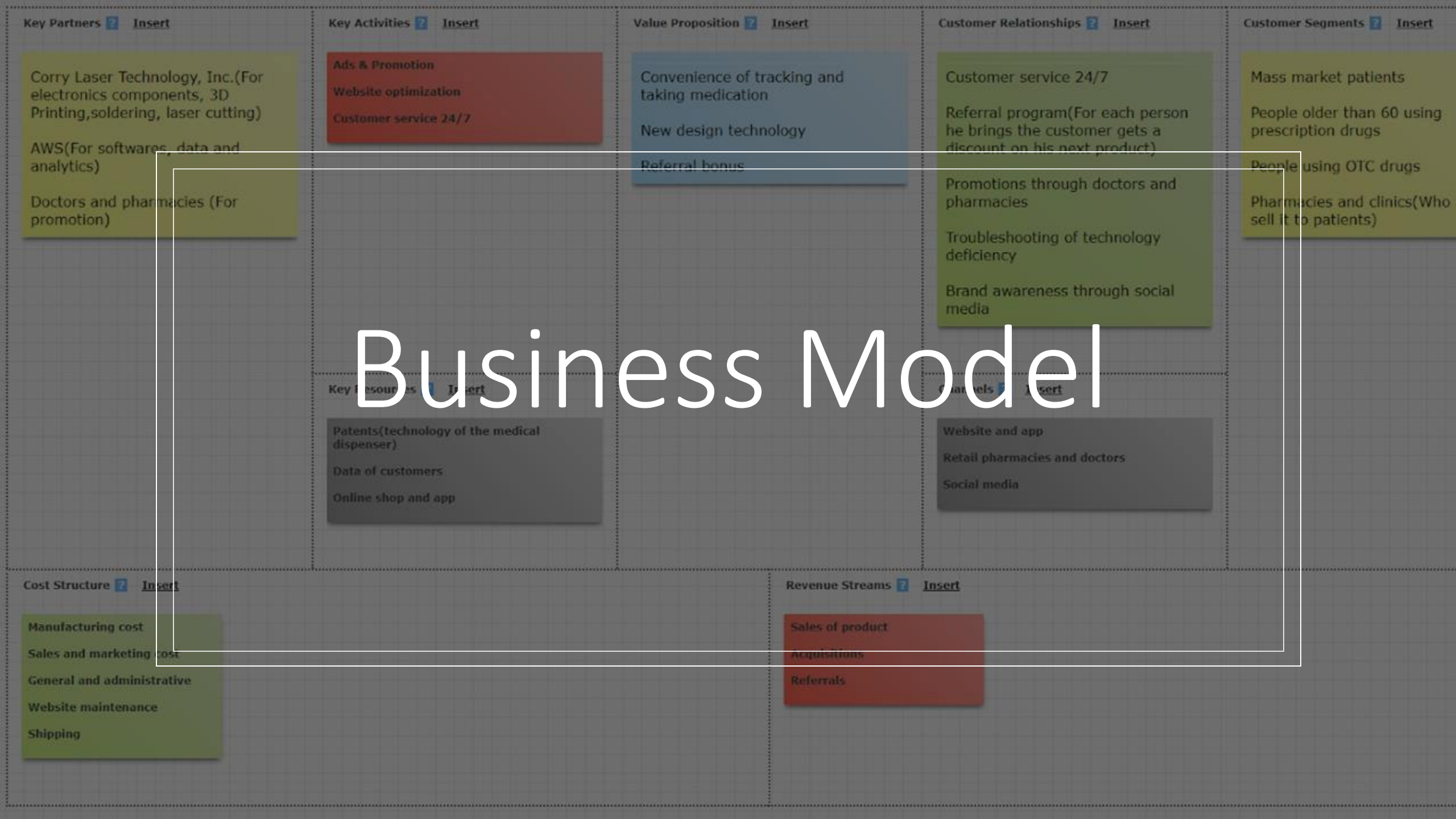








Business Model



Economics: First three years of business

- **Year 1: 2000 Units Sold**

Gross Profits: $100,000
Cost of Goods: $30,000
Operating Expenses: $54,080
Loan Repayment: $18,000
Net Income: -$2,080

No labour costs are counted in this year as the team has not started paying themselves yet.

Year 2: 4000 Units Sold

Gross Profits: $200,000
Cost of Goods: $60,000
Operating Expenses: $234,080
Loan Repayment: $16,500
Net Income: -$110,580

Labour costs are counted resulting in a large deficit.

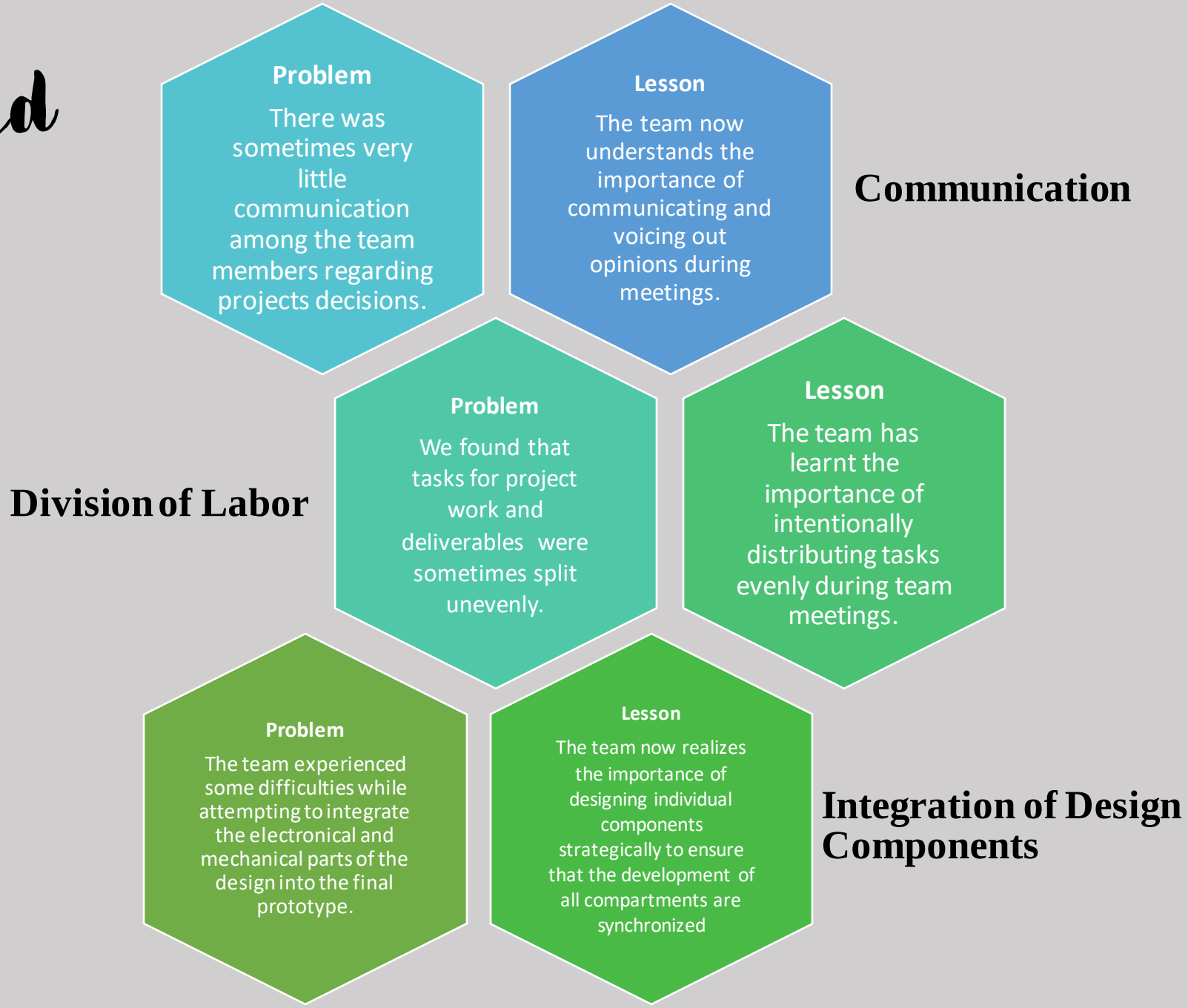
Year 3: 8000 Units Sold

Gross Profits: $400,000
Cost of Goods: $120,000
Operating Expenses: $234,080
Loan Repayment: $0
Business Tax: $5,409.60
Net Income: $39,670.40

The company begins to **make a profit**.

The break-even point based on costs and profits is 7022 units per year.

Problems Faced & Lessons Learned



Future Work

- Refine the prototype and add novel features to stand out from other products
- Develop the product for mass manufacturing to reduce product cost (PCB, injection molding, bulk orders)
- Market the product using online ads

Conclusion

Our medication dispenser has been developed to a notable standard. Moreover, the economic analysis conveys the well-developed relationship of the product with the client’s needs and all business-related factors. This indicates that the project can be further developed into a profitable business.

Thank you for Listening!

Team Z10 – Daily Dose Dispensers

References

- Amato Debra, *5 Things To Remember If You Take Medication*, **California Business Journal** https://calbizjournal.com/5-things-to-remember-if-you-take-medication/.
- **https://www.123rf.com/stock-photo/archery_target.html?sti=mw90nmlqnsrz4c44fi|**