Arduino. “Arduino and Stepper Motor Configurations.” *Arduino and Stepper Motor Configurations | Arduino Documentation*, ArduinoDocs, 25 Jan. 2022, docs.arduino.cc/learn/electronics/stepper-motors/.

I selected this source because of the nature of my project. I am designing an electrical device that can perform the action of turning an agitator plate, which dispenses the medication. One way that this action could be accomplished is with a stepper motor. This source teaches me about using stepper motors and programming them. It also provides a very detailed schematic of the stepper motor interacting with the Arduino and its IC chip, which comes in handy in the project as well. I can trust this source because it is directly from the Arduino company, which also manufactures the board I am using to power the entire project.

Donahoe, Gerald F. “Estimates of Medical Device Spending in the United States.” *Estimate-Medical-Device-Spending-United-States-Report-2021.Pdf*, AdvaMed, June 2021, www.advamed.org/wp-content/uploads/2021/12/Estimates-Medical-Device-Spending-United-States-Report-2021.pdf.

This source is reliable because extensive research was conducted in its creation. The author cites other research papers and conducts their own research with the Bureau of Economic Analysis. These are all signs that this source, which analyzes the medical device economy, has been completed by a professional with a lot of data. This source isn’t useful in the building phase of my project, but it is data that backs up why my capstone is needed. Over the years, medical expenses have risen, and along with that, so have medical device expenses, although at a much slower rate. This is why cheaper solutions like DoseMate are needed.

Hosseini, Mazi. “PCB Design in Fusion: The Complete Guide to Modern Electronic Product Development.” *Arshon Inc. Blog - We Offer Complete End-to-End Electronic Design and Manufacturing Services*, Arshon Inc. Blog, 27 May 2025, arshon.com/blog/pcb-design-in-fusion-the-complete-guide-to-modern-electronic-product-development/.

This source is reliable because it was published by Arshon Inc., which is a PCB and electronics manufacturer based in the USA. They have 18 years of experience designing PCBs, which is the skill that I want to learn to create the schematic for my capstone. In this blog, they are giving step-by-step instructions on how to use Fusion 360 to design PCBs, which is the software that I am using to do all of my designing in. I selected this source specifically because it was very detailed in areas where other sources would have skimmed over, such as the vocabulary used with this skill.

Mugisha, Gift Arnold, et al. *A Framework for Low Cost Automatic Pill Dispensing Unit for Medication Management*, IEEE Xplore, 9 Nov. 2017, ieeexplore.ieee.org/document/8102411/.

This is a trustworthy source because it is backed by research from institutions like the Canadian Institute of Innovation and Development. There is a lot of preliminary research that has gone into this study. I chose this research paper because it's similar to what I want to accomplish. The researchers are creating a low-cost, automatic pill dispenser that uses locally sourced materials such as wood and plastic. It's a more crude version of the pill dispenser that I aim to create. Although DoseMate will be more complex than their design, they implement useful features like audio notifications and a medication delivery system that I can implement into my design.

Nuggexts. "How Do I Use HX711 and a Load Cell?" *How Do I Use HX711 and a Load Cell? - Other Hardware / Sensors - Arduino Forum*, Arduino Forum, 24 Apr. 2024, forum.arduino.cc/t/how-do-i-use-hx711-and-a-load-cell/1251675.

This is a post on the forum by a random person on the internet, so it could be sketchy. However, the Arduino forum is a place where people help each other, and it seems like just that. Some people are replying to the question about using the HX711 chip and the load cell, which includes code and diagrams. I chose this source because I am facing the same problem with the HX711 chip and am figuring out how to connect it to the load cell and the Arduino. This source makes it really easy for me to take the existing code, modify it to my situation, and get the load cell working.

Ptmd. "What Are the Disadvantages of Smart Pill Box?" *Repeat Prescriptions Ordered Online | NHS Pharmacy | Pharmacy To My Door*, Pharmacy To My Door, 13 Feb. 2024, www.pharmacytomydoor.co.uk/what-are-the-disadvantages-of-smart-pill-box/.

This source is reliable because it is from a pharmacy based in the UK. Since the topic is on medicine dispensers, the information that they give is relevant and backed by experience. I chose this source because it provided a lot of background information on my project. I wanted to know if my solution would be impactful, and looking at both the benefits and disadvantages of smart pill boxes, I come to the conclusion that my project will be beneficial. One of the main concerns in this source was the cost and privacy of these pill boxes, which will be eliminated with DoseMate because it's going to be 3x cheaper than the market and be completely open source.

ukw64. "RTC Example Giga R1 Board Set Time Zone." *RTC Example GiGa R1 Board Set Time Zone - Mega / GIGA R1 WiFi - Arduino Forum*, Arduino Forum, 12 Jan. 2024, forum.arduino.cc/t/rtc-example-giga-r1-board-set-time-zone/1210220.

This was one source that I looked at but never used after rethinking my process. Initially, I wanted the time on the pill dispensers to be tailored for your specific region, but I realized that pills are taken in intervals of time, so the time zone isn't important, as long as time is moving forward and being tracked. Although the creator of this post isn't a reliable source, there is a commenter from the official Arduino team who posted a response about using the epoch time and using that to change the timezone, since Epoch is how time is generally stored on the computer. While the majority of the source wasn't helpful, I was still able to implement the epoch time into my code.

Vilaça, João L., et al. *A Review of Current Pill Organizers and Dispensers*, IEEE Xplore, 5 Oct. 2021, ieeexplore.ieee.org/abstract/document/9551894.

I trust this source because the researchers were very clear on their research methodology. They explain that they find pill dispensers from the search engine and test them on capacity, privacy, connection, portability, and more features. I selected this study because it does a lot of the research on current pill dispenser technology for me. A lot of the brands I already knew, like Hero and MedaCube, are in this study, along with some unknown brands, Livi and Medimi. This source gives me an opening into current technologies and see where I can take and improve on with my pill dispenser.

Workshop, DroneBot. "Arduino GIGA WiFi - First Look." *Arduino GIGA WiFi - First Look - YouTube*, YouTube, 27 Mar. 2023, youtu.be/FsQ9kMp2GoY.

This is a YouTube video where they give an in-depth overview of all the capabilities of the Arduino Giga board, which includes the code. I think that it is reliable because this channel specializes in microcontroller projects, which utilize boards like the Raspberry Pi, Arduino Pico, and the Giga. I chose this video specifically because when I started this project, I wanted to build the pill dispenser around a single microcontroller, and the only one with enough pins was the Giga. So, through this video, I learned that the Giga had WiFi capabilities built in, and I didn't need to buy an ESP32 to connect to the WiFi again, which was very useful.

Zheng, Anzong, et al. "Minimizing Material Consumption of 3D Printing with Stress-Guided Optimization." Edited by Valeria V. Krzhizhanovskaya et al., *Computational Science – ICCS 2020: 20th International Conference, Amsterdam, The Netherlands, June 3–5, 2020, Proceedings, Part V*, U.S. National Library of Medicine, 25 May 2020, pmc.ncbi.nlm.nih.gov/articles/PMC7302548/.

This research article is trustworthy, and it is published on an official .gov site. I selected this article because I wanted to see if I could reduce the weight on DoseMate by removing material from it, but still keeping the structural integrity. This article explains how contouring the inner walls by following a formula can reduce the weight of the object

while maintaining the structural integrity. Although I didn't end up using the information in the source, I thought that it was fascinating and a possibility for future projects. It is similar to Fusion's topology optimization algorithm, which simulates the stress on an object and then subtracts or adds material until the point of stress is properly supported.