The DISPENSER

Finding/Defining a Problem Space

So to begin our brainstorming at first, we thought heavily about ideas that communicate between boundaries to gain a problem space we deemed practical. Leading us to come to a consensus over the boundary of people vs time. In order to create our project, we thought in greater detail about the groups that value convenience and often need help, which for us was the elderly. Leading to our final focus with our project on fighting medical nonadherence, the inability to comply with scheduled prescription medication due to memory loss/ complications, which affects millions of citizens over 65 today.

Generating solutions

So to bridge the boundary of memory and medical adherence we brainstormed a pill dispenser that also serves as an alarm. In theory, it would be an automatic pill dispenser that dispenses necessary pills at a certain time that would have been previously determined by the user. The device would know the day and time and would be able to understand if the inputted pill time is the current time and then dispense the necessary pill(s) from a compartment, further gaining the person’s attention with buzzing sounds.

Ideas of a dispenser

So to understand how the device itself would function, we needed to think of features and moving parts that would work together and function as one. First, we thought of a way to code a pill dispenser that connects to the real time and perform a dispensing at the correct inputted time. In addition to the code, how would our dispenser look? We needed to have a screen, buttons, a housing for pills themselves, and something that allowed the pills to move from their held container to the tray for user pickup.

Implementing our chosen solution

In SolidWorks, we designed a mechanism that would move using a servo motor, gear, and a series of well-designed holes that would allow the pill to fall one at a time. This took many attempts of trial and error as we experimented with multiple ideas for this mechanism that was allowed within the time of 3D printing at FYELIC. *Explain Solidworks mechanism*

Implementing our chosen solution part 2

We found the previous ideas of using 3 compartments of pill tubes to be too demanding, considering the time and budget available. Because from our experiments with prototypes we needed a large breadboard to actually achieve the functionality we desired. And for the housing of the circuits, we decided that our design needed to be down scaled to just one tube to obtain maximum efficiency.

Evaluating Results

We tested each of part of the code separately, yet we encountered an issue in the code of obtaining real time. So, we researched the using of a real-time clock module that would gain the real time of the day that we could input in the code and then use a bunch of if statements that satisfy the conditional of the current time and the user inputted time being equal to allow for the dispensing.

Our Final prototype

After countless attempts to optimize the housing and inner system itself, we found our final prototype that was one compartment for pills that was connected to a mechanism that uses a servo motor and gear to dispense one pill into a ramp at the inputted time to then fall into our tray for the person to pick up. In this designed mechanism, there is a cross-section (TRANSITIONS TO BUTTONS WORKING VIDEO OF BUTTONS WORKING*).

Errors in Design

In our design process, we, of course, encountered various obstacles in designing our project. From coding to housing complications further causing us to look back and prioritize aspects of functionality over other areas of design. For example, our previous ideas of having three compartments was collectively understood to be unobtainable in the time restraint available.

Later improvements

If unrestrained in time, we thought of many improvements that we could make to this project to achieve our previous desired device:

- Change Housing
- Change wood housing to another material
- Allow for more times to be set
- Allow for more compartments
- Better appearance overall