

# The SchedMed/YouMed/My SchedMed



# UCF

**University of Central Florida**

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EEL 4914: Senior Design 1

Initial Project and Group Identification Document

(Divide and Conquer 1.0)

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## **Table of Contents**

Project Description

    Motivation

    Project Goals

    Project Function

Requirements Specifications

Block Diagrams

    Software

    Hardware

Project Budget and Financing

Project Milestones

## **Project Description**

### **Motivation**

Sometimes, it can be easy to forget to take your daily supplements. Everyone has their reasons for not taking them or forgetting to. They may have busy schedules every day from work or other activities and may feel too tired to take them. They may have a lack of motivation because they don't feel like getting up to pour some water and finding which pill or supplement they have to take at that certain time. Another reason people may forget is because they may have dementia. To give a brief explanation, Dementia is an impaired ability that makes people forget simple things and tasks. It is most common for people ages 65 and up to have Dementia. While some people may downplay it, forgetting a simple task such as taking supplements or pills every day can lead to terrible health issues. For example, if a person goes a few days without taking their daily supplements, the efficiency of the immune system can decrease. As a result, the person's body can be left vulnerable to any sickness or disease. Once a sickness enters the person's body, it'll become significantly more difficult for the immune system to fight back on it compared to someone that takes their supplements every day. Our group wants to create a machine that helps solve this issue.

### **Project Goals**

The goal of our project is to create an easier way for consumers to take their daily supplements and dosages. We also want to remind people of when to take said supplements.

To make one's life easier by creating a mechanism to facilitate everyday supplementation needs. A relatively small, robust, and interactive machine that will allow any user to have a professionally approved, yet personalized supplementation agenda. Including dosage, schedule, and needed supplement. The SchedMed will also help prevent any inaccurate and potentially dangerous dosing amounts. This will be done by logging each individual user's supplement needs, and only dispensing the needed dosage at the scheduled time. Eliminating any misuse of supplements, and preventing un-prescribed person(s) having access to said supplements. Authorized personnel will prescribe the SchedMed, along with the needed dosage, schedule, and of course supplementation. If appropriate, an administrator, such as a care-taker, and/or nurse will ensure proper supplement use, and scheduling, as well as new filling of necessary prescription. Ultimately, making the SchedMed individually unique, and suited to each patient.

## **Project Function**

The function of this project is to develop a machine that dispenses not only the pills for the consumer, but also the appropriate amount of water needed to take with the pill. An app will be developed to allow the user to make the proper settings and configurations for the machine. The app will also allow the user to set reminders for when they need to take their daily supplements.

The SchedMed is an automated pill-dispenser that can be personalized in several ways. The user or patient will be notified of what supplement is to be taken, and when to take it. This notification system has yet to be decided upon, but may include an application for a smartphone, an audio signal from the actual SchedMed, or even a vibration. Once notified, the user will then interact with the user interface via LCD Display, an application, number-pad, and/or a scanner of some sort (Such as Fingerprint Scanner). During this process the user will gain access to a prescribed supplement dosage that has previously been programmed into the SchedMed, and supplied, by a licensed professional.

The needed supplement will be received by the SchedMed by an internal mechanism that can accurately retrieve just the needed dosage. This receiving mechanism will then feed to a dispensing mechanism that will ultimately output the supplement. Within this process a sensor, scanner, or a similar technology will ensure the supplement has been received, and dispensed, thus the SchedMed will know to log this supplement transaction and reduce correlating inventory.

This inventory technology will also keep track of prescription refills, and anticipate when a refill will be needed. The associated app can then potentially notify a doctor, or a pharmacist to then put the prescription refill process in motion. The user can then either decide to pick up the refill in person, or have it shipped to a preferable location.

### Requirements Specifications

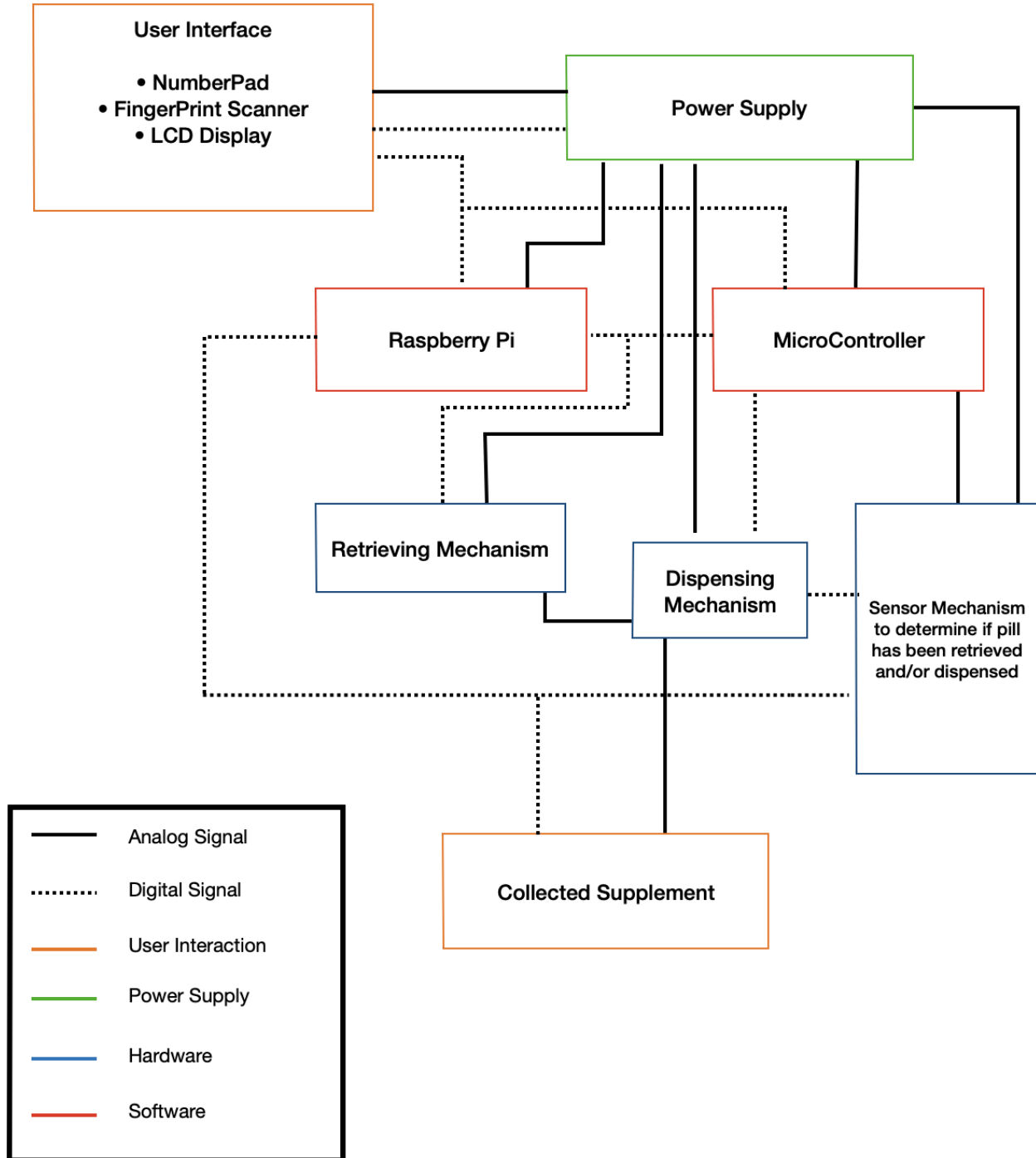
| Requirements & Specifications |   |
|-------------------------------|---|
| Hardware                      | <ul style="list-style-type: none"><li>● Stable foundation, supported with small rubber grips/platforms?</li><li>● Supplements will be easily accessible when dispensed, as well as when in need of refill</li><li>● Dispensing Motor/Technology<br/>(Possibly a rotating wheel of some sort, or a small chamber triggered/opened by mechanical lever)</li><li>● Relatively affordable, durable, and light-weight material</li><li>● Long-Lasting &amp; Efficient Power Supply<br/>(Batteries?, AC Power Plug?, USB?, USB-C?)</li><li>● Keypad and/or fingerprint access capability</li><li>● Dispense smooth &amp; efficiently</li><li>● Can Handle anywhere from 3-5 prescriptions at a time</li><li>● Overall a relatively affordable product</li></ul> |

|                 |  |
|-----------------|--|
| <b>Software</b> | <ul style="list-style-type: none"><li>● Notification System<br/>(Maybe an Audible Noise?, Vibrations?, Text Message?, Email?, ..etc)</li><br/><li>● Triggerable Dispensing Motor</li><br/><li>● Light System<br/>(Maybe to signal ON/OFF, around display, or as part of notification system)</li><br/><li>● Time-Setting Capabilities<br/>(Schedule dispensing times, maybe incorporate a 'sleep' setting to save power?)</li><br/><li>● Passcode/Fingerprint Capabilities</li><br/><li>● Can add large amount of patients &amp; prescriptions</li></ul> |
|-----------------|--|

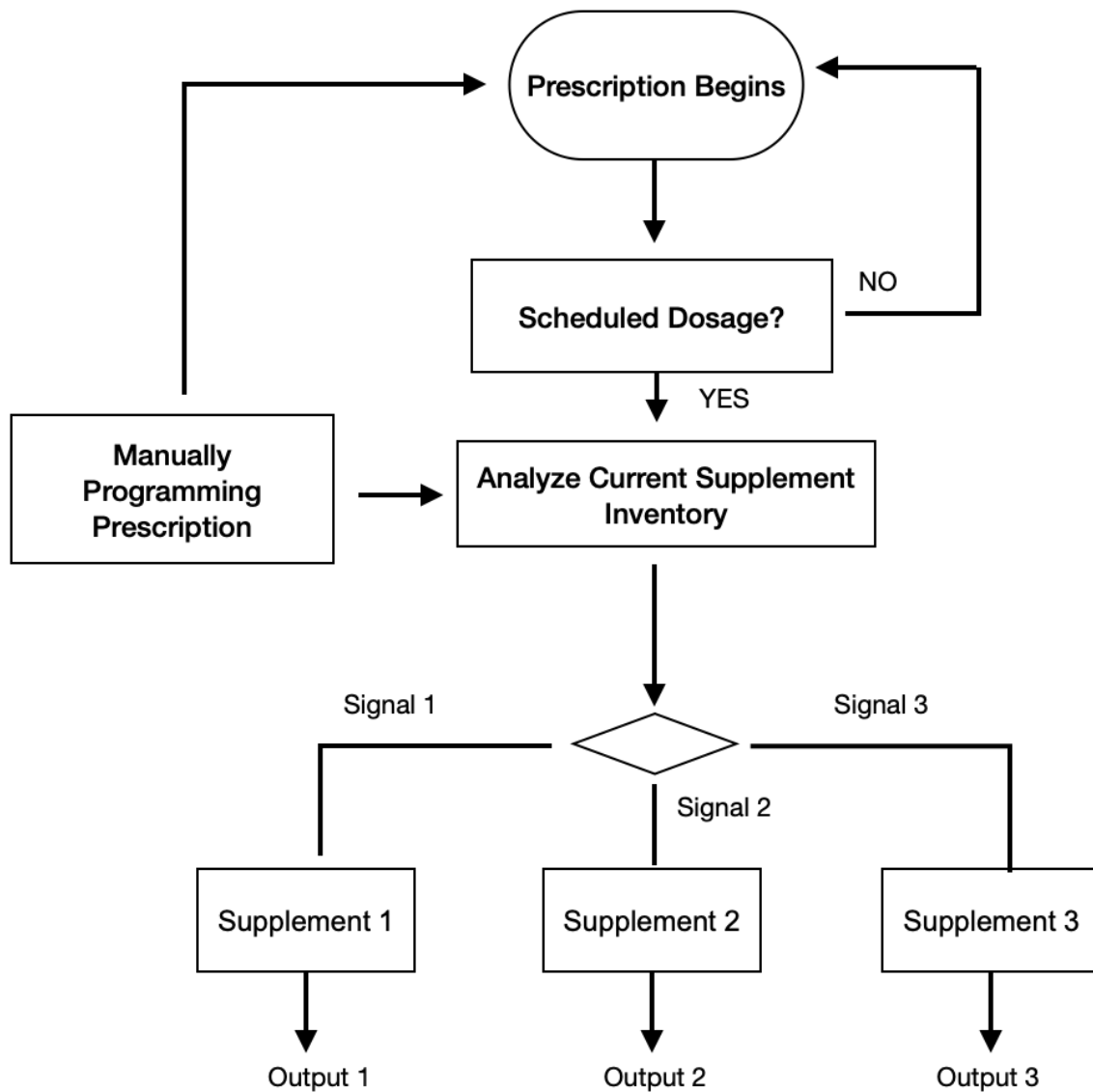
- As the scope of this project/design becomes more defined these requirements & specifications are likely to change. This helps outline a structure within which to follow, and navigate as we develop the product.

## Block Diagrams

### Hardware Block Diagram



## Software Block Diagram



- These blocks(Pages 8-9) are still in a research and development phase, will be adjusted throughout this project. None of these blocks have been prototyped, nor reached a finalized state.



## Project Budget and Financing

|                 |  |   |   |
|-----------------|--|---|---|
| <b>Hardware</b> | <p>Computer(Such as, Raspberry Pi, Banana Pi, NanoPi,...etc.)</p> <p>Estimated Price: <b>\$30-50</b></p> <p><a href="https://www.raspberrypi.com/products/raspberry-pi-4-model-b/">https://www.raspberrypi.com/products/raspberry-pi-4-model-b/</a></p>  | <p>PCB(Standard Panel Size 18 x 24 inches)</p> <p>Estimated price: <b>~\$5-7 per square inch</b></p> <p><a href="https://oshpark.com">https://oshpark.com</a></p> | <p>Some sort of Access Scanner?</p> <ul style="list-style-type: none"> <li>● FingerPrint</li> <li>● Passcode/Number-pad</li> <li>● Facial recognition?(Too expensive)</li> </ul> <p>Estimated Price:<br/>Finger Print Scanner <b>\$20-30</b><br/>Number Pad <b>\$20-30</b></p> <p><a href="https://www.digikey.com/catalog/en/partgroup/keypad/54804">https://www.digikey.com/catalog/en/partgroup/keypad/54804</a></p> |
|                 | <p>Hardware Housing Estimate<br/>-Including Costs for Housing material for whole unit and each individual component<br/>-Solder/wiring<br/>-Other electrical Components(Power Supply etc.)<br/>- Dispensing Motor<br/>- Pill-Housing, and containers</p> <p>Estimated Price: <b>\$50-200</b></p> |   |   |
| <b>Software</b> | Not really sure what to put here   |   |   |
| <b>Total</b>    | <p>Roughly <b>\$203-375</b></p> <p>This is best case-scenario, will likely be higher</p>   |   |   |

- This budget is subject to change as the scope of the project becomes more developed/established. These totals are likely to increase due to potential error/mistakes that unfortunately must be expected and accounted for in the long haul. This is why aiming for the upper end of the anticipated budget spectrum will give us the financial insurance to deal with these issues as they come.

## Project Milestones

We have laid out our project milestones with both Senior Design 1 and 2. The exact dates for Senior Design 2 are yet to be determined.

### Class Milestones SD1

The milestones are listed below in Table # for Senior Design 1. The milestones are required for the completion of Senior Design 1, as well as guide us along throughout the course in order to maintain consistent progression.

| Milestone                   | Due Date | Status       |
|-----------------------------|----------|--------------|
| Divide and Conquer          | 6/3/22   | Finished     |
| Bootcamp Assessment         | 6/10/22  | Not Finished |
| Divide and Conquer 2        | 6/17/22  | Not Finished |
| Standards Assignment        | 6/24/22  | Not Finished |
| 60 Page Documentation Draft | 7/8/22   | Not Finished |
| 100 Page Submission         | 7/22/22  | Not Finished |
| Final Paper                 | 8/2/22   | Not Finished |

**Table 1.** Senior Design 1 Milestones

## Class Milestones SD2

Here are the major milestones listed for Senior Design 2. Since the group are currently not taking Senior Design 2 at the moment, the due dates for each component are rough estimates.

| Milestone       | Due Date                   |
|-----------------|----------------------------|
| Critical Design | Early SD2 - Exact Date TBA |
| Midterm Demo    | Mid SD2 - Exact Date TBA   |
| Final Demo      | End SD2 - Exact Date TBA   |

**Table 2.** Senior Design 2 Milestones