UCF Senior Design I

MedSpencer: Household Medicine Dispenser that can Dispense Prescription and Non-Prescription Medicines on a Schedule, for use by Multiple Individuals

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Initial Project and Group Identification Document

Divide and Conquer

Group 6

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Project Narrative

For people with illness and health complications, it can be difficult to keep track of different medicines and each medicine's dosing schedule. It's important to follow the schedule carefully in order to avoid an overdose or missing a dose. In addition, it's possible for prescription medicines to be consumed by the wrong person, especially when they're stored unprotected in a home medicine cabinet. Our solution to these issues is the Medspencer, a device that dispenses the right medicines to the appropriate person.

The goal of this project is to accurately schedule and track multiple individual users' medicines, and dispense a single dose at the appropriate times. The Medspencer would be implemented in the household, for use by the family. The Medspencer should eliminate the risks of overdosing and missing a dose. It should also eliminate the risk of someone else taking and using a medicine that is not prescribed to them. An administrator (such as a doctor, caretaker, or head of household) programs the users' ages, prescriptions, and schedules into the Medspencer, and refills the medicines.

The features of the Medspencer are described as follows. Each user is programmed into the Medspencer, and they can access the Medspencer by inputting their ID. Prescription drugs can be added to the dispenser and can only be dispensed to the user(s) they were prescribed to. Prescription drugs can be programmed as 'mandatory' or 'as needed'. Non-prescription drugs are also available to all users. Each medicine has its own programmed dosing schedule (some are taken once a day, twice a day, etc, depending on the user's age). When it's time for a user to take the next dose of a 'mandatory' drug, the Medspencer will send a notification to the user. When a user accesses the Medspencer, it will check if it's time for the next 'mandatory' drug dose (based on the medicine schedule and the user's last dose time). If it's time, it will dispense the medicine. Then the Medspencer displays options for the user's prescription 'as needed' drugs and non-prescription drugs. The user may request a medicine. Then the Medspencer will check whether enough time has passed since the last dose of that chosen medicine, and it will decide whether to dispense the requested medicine.

While there are a few household medicine dispensers on the market, they are quite expensive and do not have the same features described above. For example, the Livi Automated Medication Dispenser is $2000 to buy, or available at a monthly subscription price of $80/month; the Philips Automated Dispensing Service is available at a monthly subscription price of $60/month. Both are intended for use by one person, and there is no identification system to ensure the correct person is taking the medicine. These home devices don't allow for a user to choose from a selection of optional drugs. They also only dispense solid medicines. The two mentioned medicine dispensers send phone alerts to caregivers and physicians, however it seems they are not connected to the users' phones.

Currently we are speaking with a potential sponsor and advisor for this project.

Specifications/Requirements

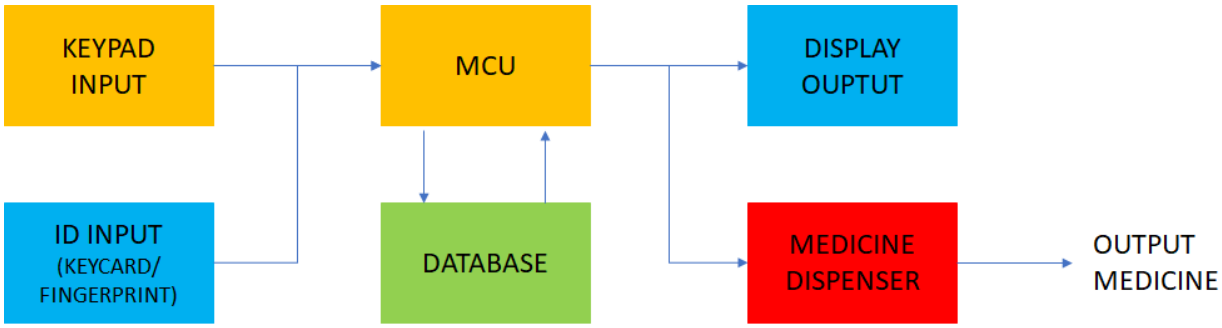
Hardware

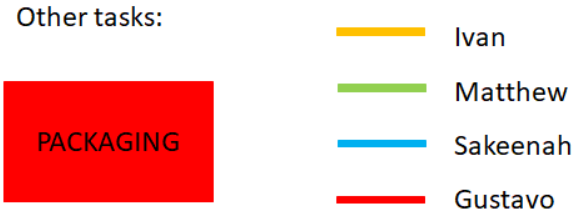
- Cost: Ideally this should be a cheap product, as it is meant for in-home use
- Internal containers for [SOME NUMBER] different kinds of pills
- A fingerprint scanner to ensure medicine is going to the appropriate patient
- Device will have to be plugged into wall power, as well as have a connection to the Internet

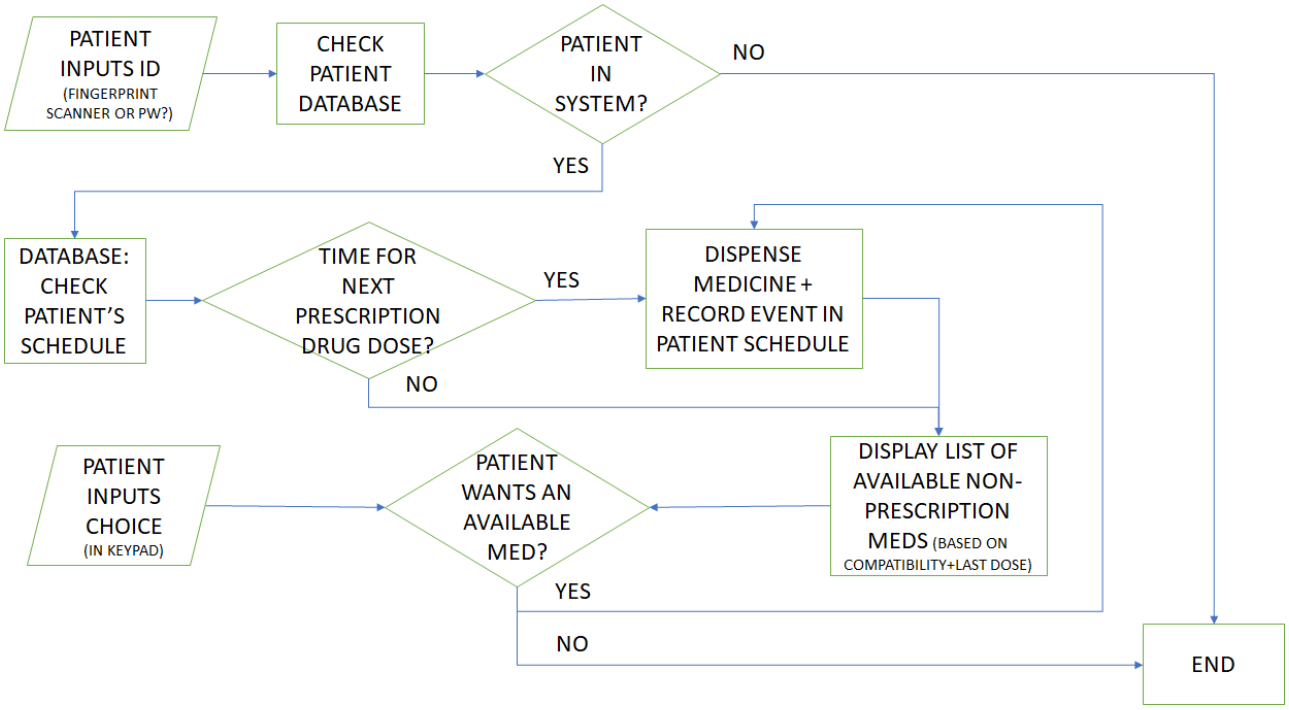
Software

- Any number of different patients and prescriptions can be registered
- The Medspencer will have the ability to send SMS messages to any number of registered phone numbers. These phone numbers can be classified as patient or caregiver
- Distribution events can be scheduled for any hour

Block Diagrams







The status of each block as of 1/26/2018:

- Each block is currently being researched
- None of the blocks have been purchased or acquired
- All blocks are in design process
- None of the blocks are being prototyped
- None of the blocks have been completed

Initial Project Milestone

Number	Task	Start	End	Status	Responsible
Senior Design I					
1	**Ideas**	1/15/2018	1/17/2018	Completed	Group 6
2	**Project Selection & Role Assignments**	1/15/2018	1/24/2018	Completed	Group 6
	Project Report				
3	Initial Document – Divide & Conquer	1/18/2018	1/28/2018	Completed	Group 6
4	Table of Contents	1/28/2018	2/10/2018	In Progress	Group 6
4	First Draft	TBA	TBA	In Progress	Group 6
5	Final Document	TBA	TBA	In Progress	Group 6
	Research, Documentation, & Design				
6	Schematics	TBA	TBA	In Progress	Group 6
7	Microcontroller	TBA	TBA	In Progress	Group 6
8	PCB Layout	TBA	TBA	In Progress	Group 6
9	Recording & Data abstraction	TBA	TBA	In Progress	Group 6
10	Dispenser	TBA	TBA	In Progress	Group 6
11	Keypad + ID input	TBA	TBA	In Progress	Group 6
12	Display	TBA	TBA	In Progress	Group 6
13	Packaging	TBA	TBA	In Progress	Group 6
14	Order & Test Parts	TBA	TBA	In Progress	Group 6
Senior Design II					
15	**Build Prototype**	TBA	TBA	In Progress	Group 6
16	**Testing & Redesign**	TBA	TBA	In Progress	Group 6
17	**Finalize Prototype**	TBA	TBA	In Progress	Group 6
18	**Peer Presentation**	TBA	TBA	In Progress	Group 6
19	**Final Report**	TBA	TBA	In Progress	Group 6
20	**Final Presentation**	TBA	TBA	In Progress	Group 6

Budget

$35 Raspberry Pi
$50 PCB (Oshpark $5*sqinch)
$50 Fingerprint Scanner
$50 Housing

Dispensers: (x10)
- $10 Motor
- $5 Container

Sub Total: $335

*2 Murphy's Law

Total: $670

The prices listed are estimates from online research and quotes from the manufactures. Therefore, the prices may change in the future once the final product is implementing. As of now, there is no sponsor for the project and all of the costs will be taken care of by the group. We are currently discussing with a potential sponsor and advisor.

Sources

Market research:

- https://www.bd.com/en-us/offerings/capabilities/medication-and-supply-management/medication-and-supply-management-technologies/pyxis-medication-technologies/pyxis-medstation-system
- https://www.theseniorlist.com/2017/09/automated-medication-dispensers/
- https://www.lifeline.philips.com/pill-dispenser/health-mdp.html
- https://liviathome.com/features
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- https://www.wow2012.org/services/philips-safety-technology
- https://www.amazon.com/Dispenser-pill-prescribed-medications-narcotics/dp/B001LNYFDS
- https://www.epill.com/epillstation.html?gclid=CjwKCAiA47DTBRAUEiwA4luU2Tswn_3nTO9fNmcqTvIsQHdNo9PyNhNZkHmYIzvRnmxzmO5KREDV5hoCqUIQAvD_BwE