CAPSULE CORPE

Jan 20th 2013

Dr. Andrew Rawicz
School of Engineering Science
Simon Fraser University
Burnaby, British Columbia
V5A 1S6

Re: ENSC 305/440 Project Proposal for a Medical Prescription Dispenser

Dear Dr. Rawicz,

Enclosed in this package is the product proposal for the PillPal medical dispenser, as per our Engineering Science 440 Class. This product will target the elderly, senior homes, and other environments for home use. It provides assistance for user to adhere to a proper prescription regimen and keep medical professionals up to date on their patient's medication in real time.

The attached documentation outlines our proposed product; it includes the project design, finance and funding information, project planning, and our team organization. This document also includes a brief discussion regarding existing technologies and products regarding the medical dispenser.

Capsule Corp consists of four dedicated and intelligent fifth year engineering students from both Electronics and Computer concentrations: Charanpreet Parmar, Izaak Lee, Gurinder Dhaliwal, and, Clark Hsieh. If there are any questions or consideration regarding our proposal, please contact me by phone or email at 604-347-8984 and igl at sfu.ca respectively.

Sincerely,

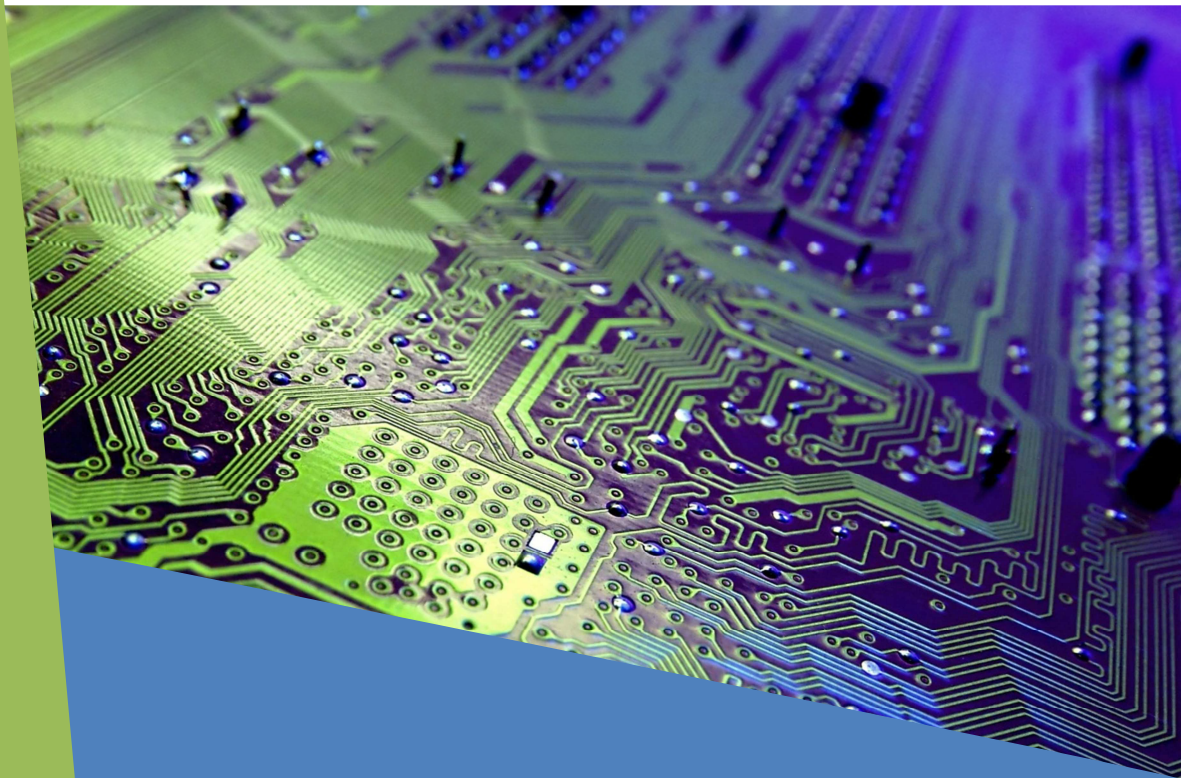Izaak Lee
President and CEO
Capsule Corp

Enclosure: *Proposal for a Medical Prescription Dispenser*

Proposal for PillPal Medical Dispenser

Charanpreet Parmar, Gurinder Dhaliwal, Izaak Lee, Clark Hsieh

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Executive Summary

Imagine waking up in the morning everyday feeling groggy and tired, then immediately required to scavenge through half a dozen bottles to search for that one pill that is required to be taken in the morning. After which sorting through all the various medication bottles many times a day just to find the right combination of pills while following the proper schedule and dosages. We understand that doctors sometimes prescribe a variety of different scheduled medication which can be overwhelming and complex: before meals, after meals, after lunch, before dinner, three times a day, twice daily, or mid afternoon. These complex combinations can be confusing and downright frustrating, especially for someone who require a myriad of different types of medication. These medicines are critical to one`s progress towards better health, but they are associated with feelings of being sick, weak, and helpless. The cumbersome pill regimens are often times forgotten during our eventful days. Whether it be at a meeting, school, shopping or watching TV, patients often forget to take their medication especially when they start to feel better during their road to recovery.

"Although these medications are effective in combating disease, their full benefits are often not realized because approximately 50% of patients do not take their medications as prescribed"

- Brown and Bussell, 2011

This problem with the way we deal with sickness inspired us to come up with a solution. The PillPal. A smart, user friendly solution to managing medication which will help the user lead a more normal life. Using our expertise in hardware and software design, our team hopes to make the PillPal as affordable as possible while maintaining the desired usability. This makes the PillPal a viable option to a wide range of people due to the cost effectiveness and intuitiveness of the system. We believe our team has the necessary synergy and expertise to succeed in implementing these tasks. With simplicity and reliability in mind, we believe we can build a versatile solution suitable for anyone to be able to use.

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Glossary of Terms

UART - Universal Asynchronous Receiver/Transmitter

OCR - Optical Character Recognition

FTDI - Future Technology Device International

IEC - International Electrotechnical Commission

LCD - Liquid Crystal Display

APEG - Association of Professional Engineer and Geoscientists

GUI - Graphic User Interface

MTBF - Mean Time Between Failure

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Introduction

The PillPal is a simple device with the potential to revolutionize the way we approach prescribing medicine. Gone will be the days of bumbling around with pill bottles and having to double check the dosage and time. No more need to remember if you've taken your medicine and no more need for your loved ones to worry.

The PillPal is designed to allow a minimal level of interaction required. Once the label has been read and the pills have been stored into the container, all of which should only take a few brief moments, the PillPal will only need to be again interacted only when it is dispensing medication or when a refill is needed. The PillPal will automate creating a schedule for you and ensure you adhere to it. The PillPal is able to read and contextualize medication by reading the label and then using extracted information to automatically generate a schedule for your medication. Using Wi-fi connectivity, it is capable of alerting caretakers by email and SMS when the medication is not taken at the allotted time. Its intuitive GUI will ensure that the user can adjust their schedule as they see fit and allow a full level of customizability for their lifestyle. Using a well thought out and intricate mechanical design of internal mechanisms, it is capable of dispensing and allocating medication based on the aforementioned schedule. Although there are similar products, they are nowhere near as capable as the PillPal. A breakdown of features can be seen in Table 1 below.

Table 1 – Breakdown of Medical Dispenser Features (source* E-Pill)

	MD1	MD2	MD2 Plus	MD3	PillPal
Pill Capacity*	15	20	20	20	300
Alarm Duration	60 min	Continuous	Continuous	Continuous	Continuous
Key Lock	✓	✓	✓	✓	✓
AC Power		✓	✓	✓	✓
Patient Display		✓	✓	✓	✓
Caregiver Notification		Upgrade Available	✓		✓
Tamper Proof				✓	✓
Email Notification					✓
Phone call Notification					✓
LCD Touch Screen Display					✓
Personalize Schedule					✓
Automated Pill Allocation					✓
Record Usage Statistics					✓

*Volume equivalent to number of Aspirin sized tablets
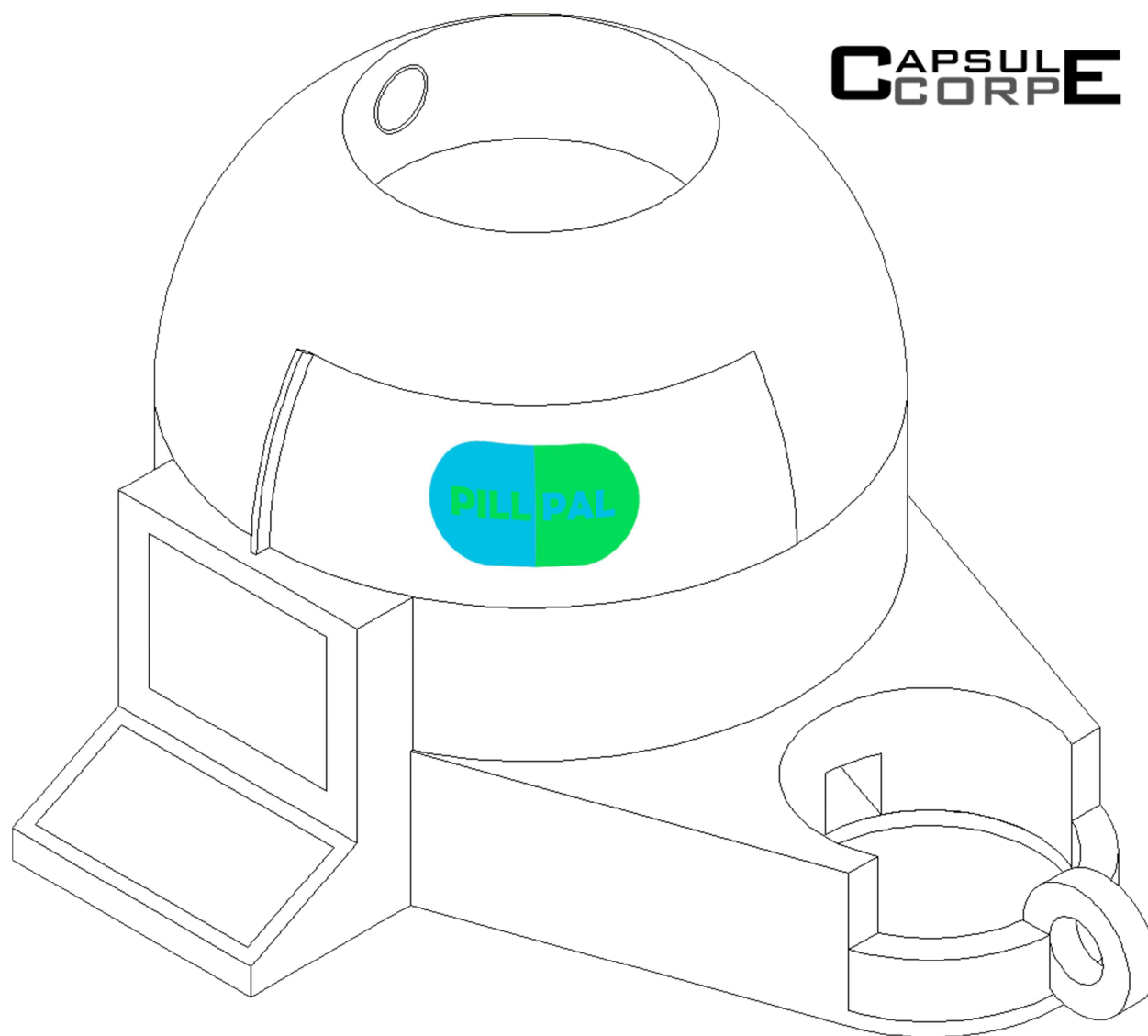
Our proposed design can be seen below in Figure 1

Figure 1 – Proposed Design for PillPal

Summary of product

Capsule Corp's core team of engineers has composed a preliminary design for a medical pill dispenser. Our team of engineers designed a unique product to be dynamic such that it is suited for personal and commercial use. Simplicity and ease of use are the core focus of the UI and feature implementation behind this product while ensuring it is usable for all ages. Our products contain a unique feature that utilizes the optical character recognition (OCR) technology to read standardized prescription bottle and extract information about the medication, after which the system then automatically generate a medication schedule for this particular patient. Not only does our product eliminate the complex procedures involved in medication preparation but it also has all of the latest communication technology available on other products in the market. The PillPal has a generously sized LCD touch screen for ease of reading and menu manipulation, audio alarm, email, phone, and text message reminders to allow for maximum flexibility to the user.

The automated system, which utilizes both mechanical systems, coupled with a graphical user interface (GUI) performs the designed functions. To start the process, the user is to simply place the prescribed bottle in the specified location and allow the automated process to begin. The bottle is read using a camera and the letters are identified using OCR technology to extract and utilize all the relevant information available on the prescription. Once all the necessary information is gathered and stored into the system, the pills are allocated into their own container for storage until its expiration date or until all medication is consumed.

Once the loading phase is complete, the device is ready to be placed into service. Upon the time to take medication, the device will begin to allocate the required pills. The pills will be collected using a vacuum arm and placed into the temporary allocation tray. The pre allocated medication will remain inside the PillPal and only dispensed externally when the user physically confirms with a touch of the LCD screen. If the user does not acknowledge after some time with the various reminder methods, the pre allocated pills are transferred to a secure holding section and the caretakers, family members, and medical professional are notified of the missed medications.

Overall the Pillpal, our medical dispenser, consists of four modular parts:

1. Label Reader - Using OCR technology, information is read directly off the pill label.
2. Pill Allocation - The automated process will load the pills into the correct container.
3. Pill Dispensing - The final phase where the pill will be dispensed for the patient to consume.
4. LCD Touch Screen - The information is conveyed to the patients through an interactive GUI which was designed for usability and to be intuitive for our target audience.

Our expertise in the engineering field will allow Capsule Corp to design the most advanced pill dispenser to exist in the market today.

Scope of Work

Label Reader

Our team's knowledge in image processing is phenomenal. Our team will implement optical character recognition (OCR) to initiate our automated process. Using a high resolution camera to take an image of the pill bottle, coupled with the processing power of the Raspberry Pi to process the image, PillPal is capable of determining and storing the patient's pill regimen without any complex manual programming.

Our engineers have tested the OCR technology with open source software called Tesseract. The Tesseract software converts images of text into a string which can then be parsed for information. Thus by taking picture as the bottle rotates, a complete label is produced once stitched together. Through this technique and implementation, Capsule Corp plans to create a label reader suitable a variety of standardized pill bottles of different size and shape.

Pill Allocation

The process of segregating the each type of medication to their own individual storage is automated using a UART serial communication between the Raspberry Pi and the MSP 430 micro-controller. The dispenser is ready for use after all the desired prescriptions are transferred into the PillPal. Pill allocation is the process of which the PillPal prepares the correct mix of prescriptions. The assortment of pills required to be taken are pre allocated to a holding cup internally after which the user is notified of the scheduled medication. Only with the user's confirmation would then the medication be dispensed to be consumed by the user.

Capsule Corp's design team has designed a vacuum arm used to pick up pills. The vacuum is capable of drawing up to 5.8 PSI and is designed to pick up a dynamic range of pills sizes. Using the design of a vacuum is the most ideal pill gripper as it can pick up various different size pills using a standardized technique. In addition to the flexibility it provides, this design requires the least amount of moving parts. Utilizing such a simplified design, the mean time between failure (MTBF) is thus extended. The simple up down motion of the vacuum arm is sufficient to physically manipulate any pill or capsule required by the user's prescription. The simplicity and the over compact design of the vacuum module is the highlight of our design implementation.

High Resolution Camera

Thomas Diaphragm
Pump and Actuator

Vacuum Tube

Pill Funnel

Protective Layer for Pills

Dispenser Funnel

Pill Container

Pill Dispenser Compartment
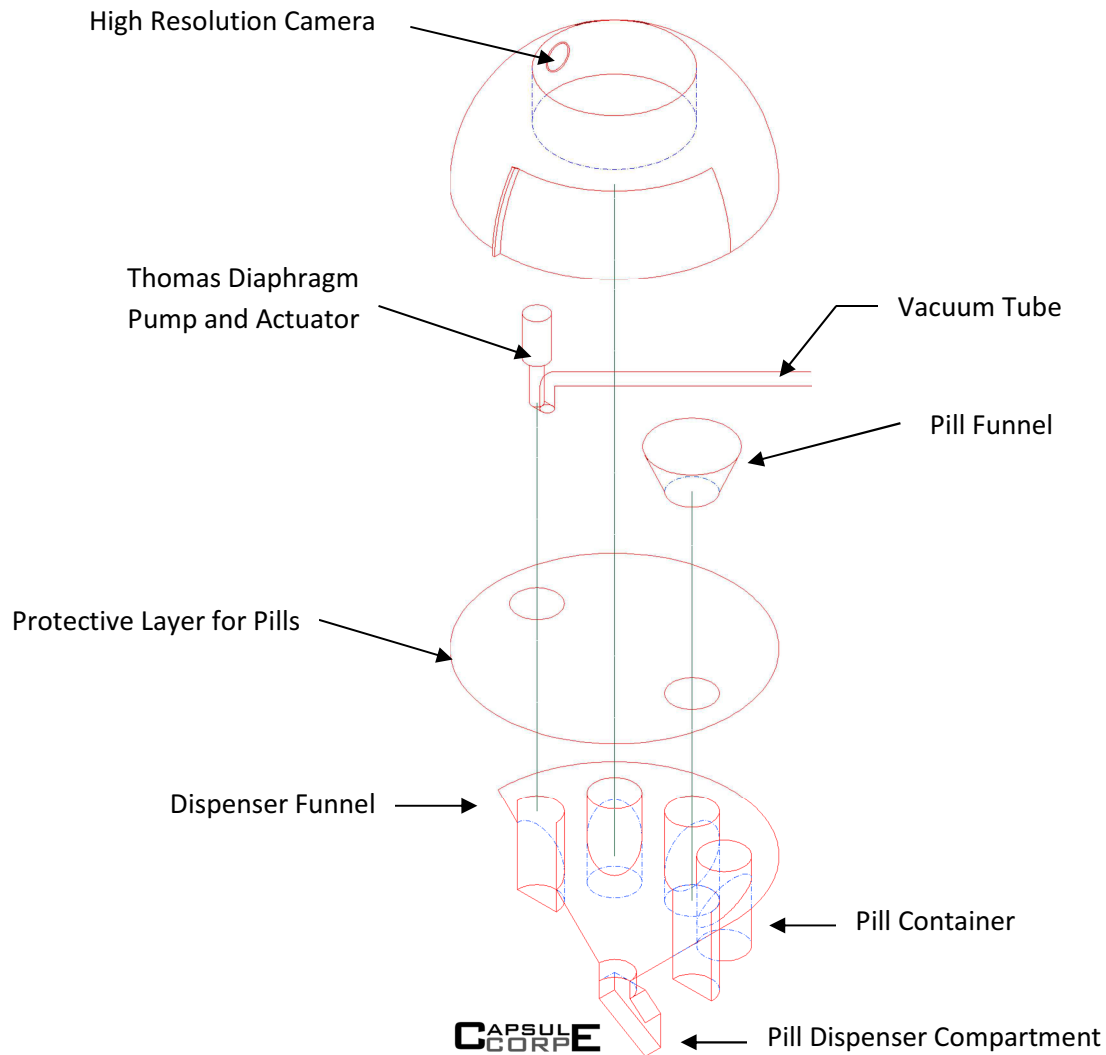
Figure 2 – Pill Dispensing Mechanism

LCD Touch Screen & Software

Through Capsule Corp's management team, the large HD LCD touch screen justifies its own cost. The large LCD screen is capable of clearly displaying information in a large format to be easier on the eyes. The multi-purpose screen is is designed to have the ability to display information regarding multiple patients, personal pill schedules, and complex routines. Through this screen, the user is able to interact with our software to customize it to their personal needs. The GUI design will focus on simplicity and clarity to minimize the information density to avoid confusion and enhance readability.

The PillPal medical dispenser itself is the integration of all our said components of: the label reader, pill allocation, and LCD touch screen. These separate design components are tied together by the described intelligent software.
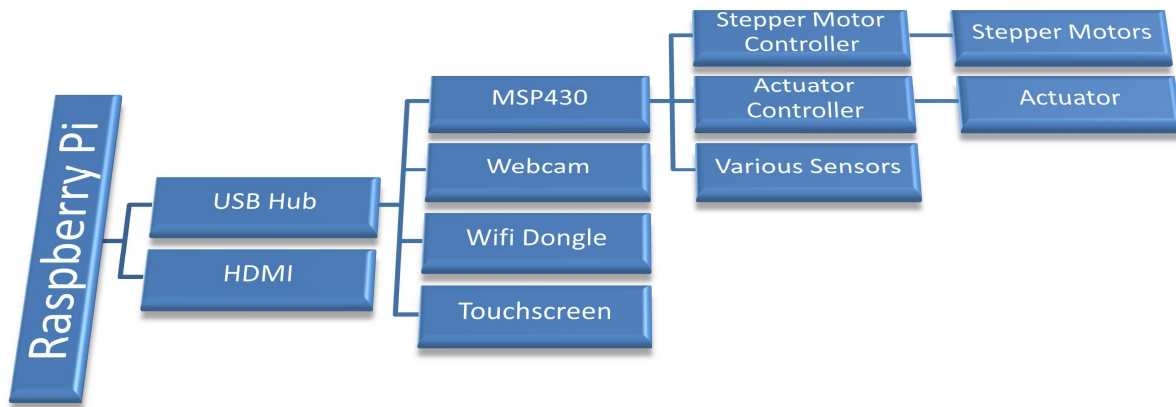
Figure 3 - Hardware Interface

Risk/Benefit Analysis

Capsule Corp is determined to deliver and design top quality products. We understand that medical products have an especially high demand for safety, quality and reliability. With all mechanical parts, there exist a risk of failure, thus we choose to simplify our design and minimize the degree of freedom for each component to maximize reliability. During the process of our design we will continue to critically analyze our methods and solutions to ensure a sufficient standard is reached. We will continue to obtain feedback from peers, professors, and graduate students outside of our immediate team to avoid traversing the dangerous path of groupthink.

"All participants in the medical product development and delivery system have a role to play in maintaining this benefit-risk balance by making sure that products are developed, tested, manufactured, labeled, prescribed, dispensed, and used in a way that maximizes benefit and minimizes risk."

- U.S. department of Health & Human Services, 2009

IEC 60601

Through multiple internal meetings, Capsule Corp has discussed and raised concerns regarding the technical standards for the safety and effectiveness of medical electrical equipment. The IEC 60601 is the Canadian medical electrical equipment standard. Following this document as a guideline, Capsule Corp shall meet the safety standards for product production and use.

Mechanical Parts

Due the complicated nature of mechanical parts, our engineers are to keep the design as simple and reliable as possible. Although there were many working designs which were designed initially, we chose to pursue the vacuum due to its versatility in picking from multiple different pill sizes. Other solutions, while viable, may have difficulty dealing with a variation of pills. These other implementation shall remain only as a contingent design in case the vacuum does not work as desired. As of now, the design consists of a simple actuator to move the vacuum and a motor to move the pill compartments, as well additional motors for other integrated systems such as the image stitching and the dispensing mechanism.

Project Understanding

Our team of engineers has been involved with many projects which are closely related to the task outlined below. For that reason, we are confident in our product design. Capsule Corp has focused on providing an overview of important considerations during the course of our products life cycle. We wish to provide an indication of the project team's understanding to both the technical and broader operation issues essential in a project such as this.

Project Timeline

We understand that this project runs on a specific timeline. Our project manager has devised a schedule to ensure deadlines for deliverables are met. The engineering team will ensure that all design considerations are written in the functional specification document and any modifications to the final design shall be corrected in the design specification document.

Project Life Cycle

Capsule Corp understands the complexity of beginning a project. Our team of engineers has used the iterative design process for various projects and is accustomed to the capricious dynamics of the design process. Figure 4 highlights the iterative design process.
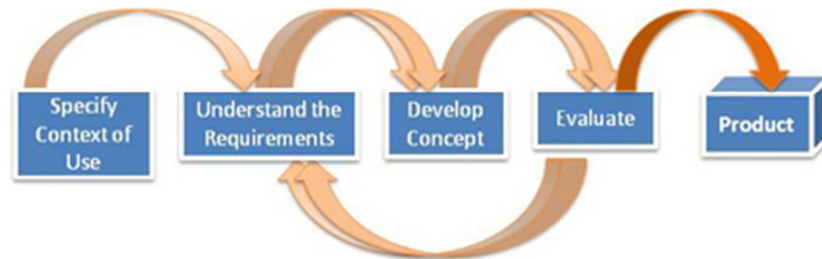
Figure 4 – Product Cycle

As the project progresses, we continue to evaluate and analyze our designs through rigorous testings. Our team of engineers will continue to advance on the completion of the product through the iterative design method.

Engineer Journals

Capsule Corp is a professional company which adheres to the APEG code of ethics and professional conducts. We at Capsule Corp carry with us at all time our engineering journals to site, record, and calculate all problems related to our product. To take a step further, Capsule Corp provides its engineers with online submission of product documents. This allows for CEO's and project managers to track the pace of the project and determine the necessary steps to ensure deliverable deadlines are met.

Key Personnel

Project Team

Capsule Corp. understands that Professor Whitmore and Dr. Rawicz are expecting excellence from a team of and 5th year engineering students. It is this unique team dynamic and many years of teamwork that has shown proven experience in a number of key areas. Our company will complete all given tasks in a professional, timely, reliable and cost effective manner. Capsule Corp's team of CEO, project

managers, Hardware and Software Developers provides experience and has demonstrated excellent track records of delivering projects under any circumstances.

Our team had been active since day one of formation, such that it allowed us to formulate ideas, obtain structure, understand each other, and most important of all, acclimate ourselves to this particular team and its working environments. We currently are and will continue to meet on a weekly basis for short administrative discussions to update our status and plan our actions to work with each other. Most of the time these information's are communicated in real time with the help of technology and other communication methods such as: online group chat, cell phone, text messages, and email. This enable us to acquire near instant consensus from the team to which action immediately follows. Examples in the areas such as administration, documentation consistency, and hardware procurement have allowed us to function effectively and efficiently.

Company

Izaak Lee, 5th Electronic Engineering – Project Manager

Izaak Lee is a 5th year Electronics Engineer with the completion of many projects. Mr. Lee is a well rounded engineer with knowledge in both mechanical and electrical design. Mr. Lee has complete projects such as the NTSC Single Filter Circuitry, and the SCARA Robotic Arm Control. The participation in the SPEC Engineering Club has allowed him to be involved in the planning and designing of many projects and is currently working on a project involving embedded programming with the TI's MSP430 series microcontroller.

Mr. Lee is currently employed as a junior design engineer at PBA engineer Ltd. and works on various projects involving system designs and security projects. His knowledge continues to grow as he is exposed to real world experiences. Mr. Lee's experience in document tracking and drafting skills will become an asset as project progresses through the design and implementation phases.

Mr. Lee will serve as the CEO and Project Manager for this project.

Clark Hsieh, 5th Electronic Engineering – Hardware Developer

Clark Hsieh is a 5th year engineering student who has completed 2 terms of co-op in a business and engineering project based environment. Mr. Hsieh also has numerous experiences working in teams to complete in class projects such as the design of a playback device on a FPGA and circuitry to filter and decode the NTSC signal.

Mr. Hsieh has been a core member of an engineering club SPEC dealing with administrative work and managing the financial assets, therefore is well practiced in coordinating with others. He is currently leading a team to design and build simple electronics circuitry display and control LED's in a fashion to be a functional clock.

Mr. Hsieh will be performing the duties as a CFO and Hardware Developer on this project.

Gurinder Dhaliwal, 5th Computer Engineering – Software Developer

Gurinder Dhaliwal is a 5th year Computer Engineering student who has 16 months of co-op experience in software and hardware verification. Mr. Dhaliwal is well rounded in both the hardware and software aspects of computer engineering. Throughout his academic career, he has gained a strong background of digital design on an FPGA, software development in C++, embedded programming in C and Assembly, image processing, and robotics. Mr. Dhaliwal has completed various projects that cover many aspects of computer engineering such as course scheduling software, audio controller on a FPGA, face detection using image processing, and the robotic arm control of the SCARA robot.

Mr. Dhaliwal will work as a CIO on this project.

Charanpreet Parmar, 5th Electronic Engineering – Firmware Developer

Charanpreet Parmar is a 5th year engineering student with 2 terms of coop experience in both testing firmware for RAID controllers and writing robotic navigation code in C++. He also has experience working with embedded coding, primarily showcased through participation in the SPEC engineering Club. Charanpreet has experience working on multiple projects which include some basic image processing and compression, controlling a robotic arm (SCARA) and navigator (Powerbot), developing games on a FPGA (Battleship), analog filter design and signal decoding, and embedded programming using a wide range of microcontrollers.

Mr. Parmar will advise as the CTO on this project.

Availability

Table 2 – Team Personnel and Availability

Design Team	Company Position	Availability	
Clark Hsieh	CFO, COO	75%	
Charanpreet Parmar	CTO	85%	
Gurinder Dhaliwal	CIO	98%	
Izaak Lee	CEO	85%	

Budget

The table below outlines some materials and their costs with a 15% contingency. Some of these costs have already been incurred as we desire to some hands on testing as soon as possible to aid in our research and development. Some examples of the items that we have already placed orders for are: Vacuum pump, Raspberry Pi, and some assortments of standardized capsules sizing.

Table 3 – Tentative Budget

Equipment List (Include brand and model # if possible)	Estimated Unit Cost
Stepper Motor x4	$135.60
Stepper Controller x1	$129.90
Linear Actuators x1	$89.95
Acrylic Sheets x1	$59.94
LCD Screen Touch Screen x1	$135.00
Vacuum Pump x1	$90.00
Plastic Tubing and Accessories	$50.00
Wi-Fi Dongle x1	$50.00
USB Camera x1	$100.00
TI MSP430	$13.46
Test Capsules (Assorted)	$14.00
Raspberry PI	$50.00
Estimated Shipping Costs	$80.00
Total Cost	$997.79

Funding

Our current project is a prototype for a commercializable product. The prototype will require substantially more capital for research and development than the actual cost of a production model due to the economies of scale.

All the costs related to this project are currently meticulously documented, kept up-to-date and easily accessible by all members. We review and track of our expenditure regularly during our meetings to ensure mutual agreement on every detail related to flow of dollars. Our current system allows us to track the expenditures of individual team members and grants us the ability to compensate each other fairly and accurately.

The cost of this project is substantial and thus a few avenues to seek funding were considered. We first contacted Sparkfun and applied for sponsorship at their Marketing and Educational division and are currently waiting on their response. After which we prepared a presentation for the Engineering Science Student Society (ESSS) and pitched our project to a panel of judges to and received the full amount we asked for from them. We are currently in the works to put together paperwork to pursue the Wighton Fund via the contact person Dr. Andrew Rawicz.

In the end if the costs of the project exceed our acquired funding, we as a team all agreed to equally share the direct expenses incurred during the project duration.

Schedule

Our project is scheduled to be completed in a 4 month period. A key feature our schedule is that it is very balanced and has sufficient time for integration, testing, and the completion of deliverables. Figure 5 below displays our gantt chart.

Task Name	Start	Finish
Research	Sun 12/16/12	Sun 2/17/13
Project Proposal	Mon 1/7/13	Mon 1/21/13
Functional Specification	Tue 1/22/13	Mon 2/11/13
Design Specification	Tue 2/12/13	Mon 3/11/13
Implementation	Tue 2/12/13	Fri 3/15/13
Create GUI and drivers	Tue 2/12/13	Fri 3/8/13
Develop embedded code for microcontrollers	Tue 2/12/13	Fri 3/15/13
Implement mechanical components	Tue 2/12/13	Fri 3/15/13
Implement OCR module	Tue 2/12/13	Fri 3/15/13
Integration	Sat 3/16/13	Mon 4/1/13
Testing/Debugging	Sat 3/16/13	Sun 4/7/13
Documentation	Mon 1/7/13	Mon 4/8/13

Figure 5 – Gantt Chart

As can be seen from Figure 5, ample time has been given for each phase of our project. The first five weeks will be spent researching, planning, and understanding the main requirements. Then we will move on to the longest phase of our project, the implementation. We have split up the four main tasks to each engineer such that the implementation can be done in parallel.

Throughout this project there will be key milestones which will need to be met in a timely manner. These can be seen below in Figure 6.
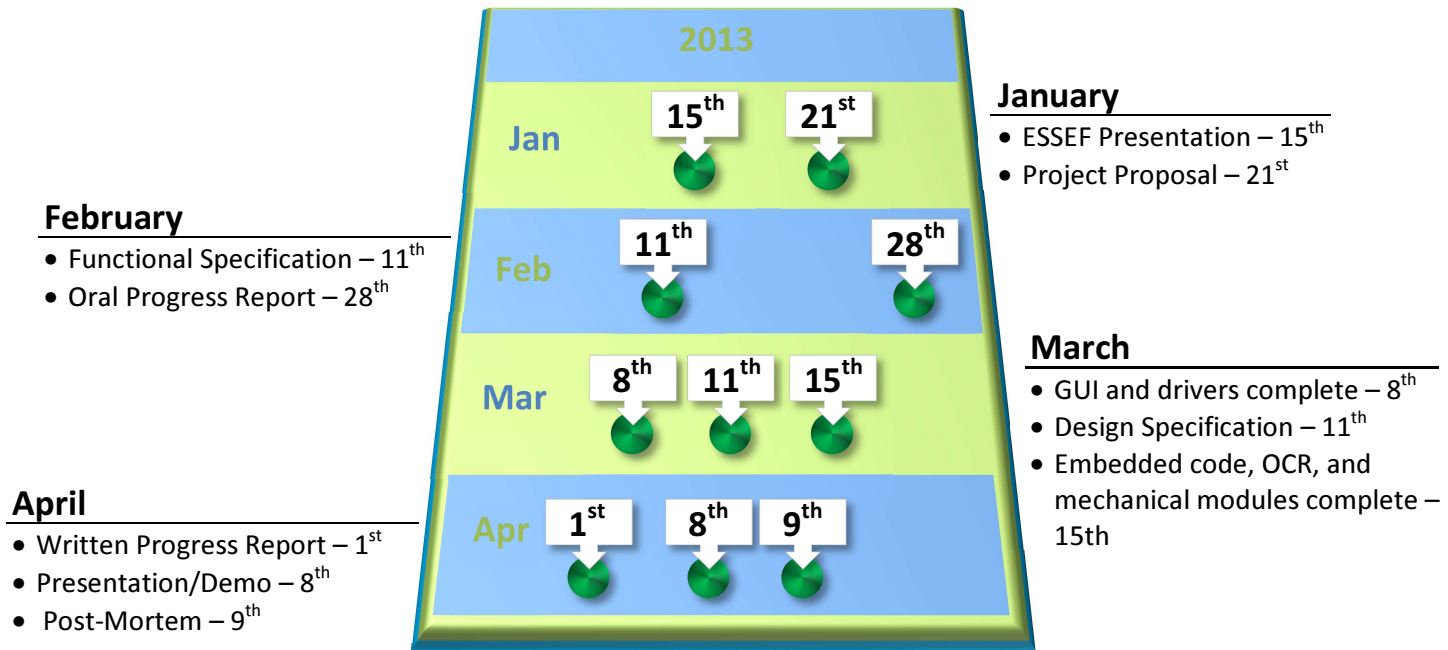
Figure 6 – Milestone Chart

February
- Functional Specification – 11th
- Oral Progress Report – 28th

April
- Written Progress Report – 1st
- Presentation/Demo – 8th
- Post-Mortem – 9th

January
- ESSEF Presentation – 15th
- Project Proposal – 21st

March
- GUI and drivers complete – 8th
- Design Specification – 11th
- Embedded code, OCR, and mechanical modules complete – 15th

Conclusion

Capsule Corp is dedicated to improving the health of its users through the assistance of the PillPal medical dispenser. This product ensures the adherence of the user to their medication regimen as prescribed by their medical professional. Through technology, advance connectivity along with numerous methods to gently remind the user of their daily medication, users can rest assure to allow PillPal to dispense their complicated daily medications reliably. This gives the user freedom and peace of mind to allow them to better enjoy their daily activities.

This documentation provides an overview of the product and our approach towards the solution of medication adherence. Our method is reliable, cost effective and up to date regarding the current technology available in the market. The product will be innovative with the features such as the advance touch screen along with the intuitive control.

The Gantt chart along with the planning schedule outlines our projected progress on this project over the next four months. The budget information and brief technical outline included will help demonstrates our management skills and thus will put us well on the way to achieve the goals of this product proposal.

References

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Appendix

ID	Task Name	Start	Finish
1	Team Development and Project Initiation	Sun 12/16/12	Mon 1/21/13
2	Team Meetings	Sun 12/16/12	Thu 1/10/13
3	Initial team meeting to determine team skills and knowledge	Sun 12/16/12	Sun 12/16/12
4	Discuss and assign administrative roles	Fri 12/28/12	Fri 12/28/12
5	Determine proper documentation styles and filing	Fri 12/28/12	Fri 12/28/12
6	Determine funding and budget	Fri 12/28/12	Thu 1/10/13
7	Understand and confirm all project deliverables	Thu 1/10/13	Thu 1/10/13
8	Project Initiation	Sun 12/16/12	Mon 1/21/13
9	Meeting to determine project idea and susceptibility	Sun 12/16/12	Sun 12/16/12
10	Update meeting minute template	Fri 12/28/12	Tue 1/1/13
11	Prepare inventory spreadsheet	Fri 12/28/12	Tue 1/1/13
12	Look into tesseract OCR	Fri 12/28/12	Tue 1/1/13
13	Determine cost and reliability of vacuum	Fri 12/28/12	Tue 1/8/13
14	Identify and confirm all project issues	Fri 12/28/12	Thu 1/10/13
15	Research company and product name	Fri 12/28/12	Sun 1/13/13
16	Bring proposal template	Fri 12/28/12	Thu 1/17/13
17	Research image processing	Fri 12/28/12	Mon 1/21/13
18	Look into and buy capsules	Tue 1/1/13	Tue 1/8/13
19	Research LCD screens	Tue 1/1/13	Tue 1/8/13
20	Meeting to assign project roles	Tue 1/8/13	Tue 1/8/13
21	Order vacuum	Tue 1/8/13	Mon 1/14/13
22	Create preliminary gantt chart for ESSEF presentation	Tue 1/8/13	Fri 1/11/13
23	Complete and submit ESSEF form	Thu 1/10/13	Fri 1/11/13
24	Create ESSEF presentation powerpoint	Thu 1/10/13	Tue 1/15/13
25	CAD for company and product logo and preliminary product design	Sun 1/13/13	Mon 1/14/13
26	Create first release of gantt chart for proposal	Wed 1/16/13	Mon 1/21/13
27	Work on project proposal	Thu 1/17/13	Mon 1/21/13
28			
29	ESSEF Presentation	Tue 1/15/13	Tue 1/15/13
30			
31	Project Proposal	Mon 1/21/13	Mon 1/21/13
32			
33	Project Design Plan	Wed 1/16/13	Mon 2/4/13
34	Detailed Engineering	Wed 1/16/13	Wed 1/23/13
35	Kick off meeting to implement project design	Thu 1/17/13	Thu 1/17/13
36	Determine parts and design	Thu 1/17/13	Thu 1/17/13
37	Prepare detail drawings	Thu 1/17/13	Wed 1/23/13
38	Prepare 30% Functional Specification	Wed 1/23/13	Wed 1/23/13
39	Parts Testing	Wed 1/16/13	Fri 2/1/13
40	Ordering and shipping of all parts	Fri 1/18/13	Fri 1/18/13
41	Initial phase of testing - Testing of feasibility	Thu 1/17/13	Tue 1/22/13
42	Secondary phase of testing - Determining exact parts and 2nd round of ordering	Wed 1/23/13	Mon 1/28/13
43	Third phase of testing - Testing for precision	Tue 1/29/13	Fri 2/1/13
44	Prepare 30% Technical Document	Fri 2/1/13	Fri 2/1/13
45	Prepare 60% Functional Specification	Fri 2/1/13	Fri 2/1/13
46			
47	Project Testing	Sat 2/2/13	Mon 4/8/13
48	Integration of project segments	Sat 2/2/13	Mon 3/25/13
49	Evaluate design and proceed to integration	Sat 2/2/13	Mon 3/4/13
50	Review and determine user acceptance	Tue 3/5/13	Mon 3/25/13
51	Test for user acceptance	Tue 3/5/13	Mon 3/25/13
52	Prepare 60% Technical Document	Mon 3/25/13	Mon 3/25/13
53	Finalization	Tue 3/26/13	Mon 4/8/13
54	Prepare 100% Technical Document	Mon 2/25/13	Thu 3/7/13
55	Prepare 100% Functional Specification	Wed 2/6/13	Mon 2/18/13
56			
57	Functional Specification	Mon 2/11/13	Mon 2/11/13
58	Oral Progress Report	Thu 2/28/13	Thu 2/28/13
59	Design Specification	Mon 3/11/13	Mon 3/11/13
60	Written Progress Report	Mon 4/1/13	Mon 4/1/13
61	Presentation Demo	Mon 4/8/13	Mon 4/8/13
62	Engineering Journal	Mon 4/8/13	Mon 4/8/13
63	Post-Mortem	Mon 4/8/13	Mon 4/8/13