Progress Report

The PillMaster

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Introduction

PillMaster is an automated programmable pill dispenser. Through a keypad, the user can program the PillMaster to dispense pills at a specific time.

This document describes the details of our progress, expenditures and our project plan for the next few days. The PillMaster proof of concept is currently in the final stages of construction, integration and testing. The progress is described by addressing hardware and software development cycles. We have been testing each module of the system as it is being developed. A few changes has been made to achieve our goal and meet our budget restrictions. Due to unforeseen problems in testing and integration, PillMaster is currently behind schedule.

Schedule

As shown in Figure 1, our project is now at the Testing/Integrating stage. We divided our group into two smaller groups to work on the mechanical and programming at the same time. Also, compare this schedule with the original ones, we are one week behind the schedule, this is due to some failures in the mechanical system. Specifically, the pill path had to be deconstructed and redesigned. We started integrating and testing each module as soon as they are done to ensure the proof of concept is delivered on time.
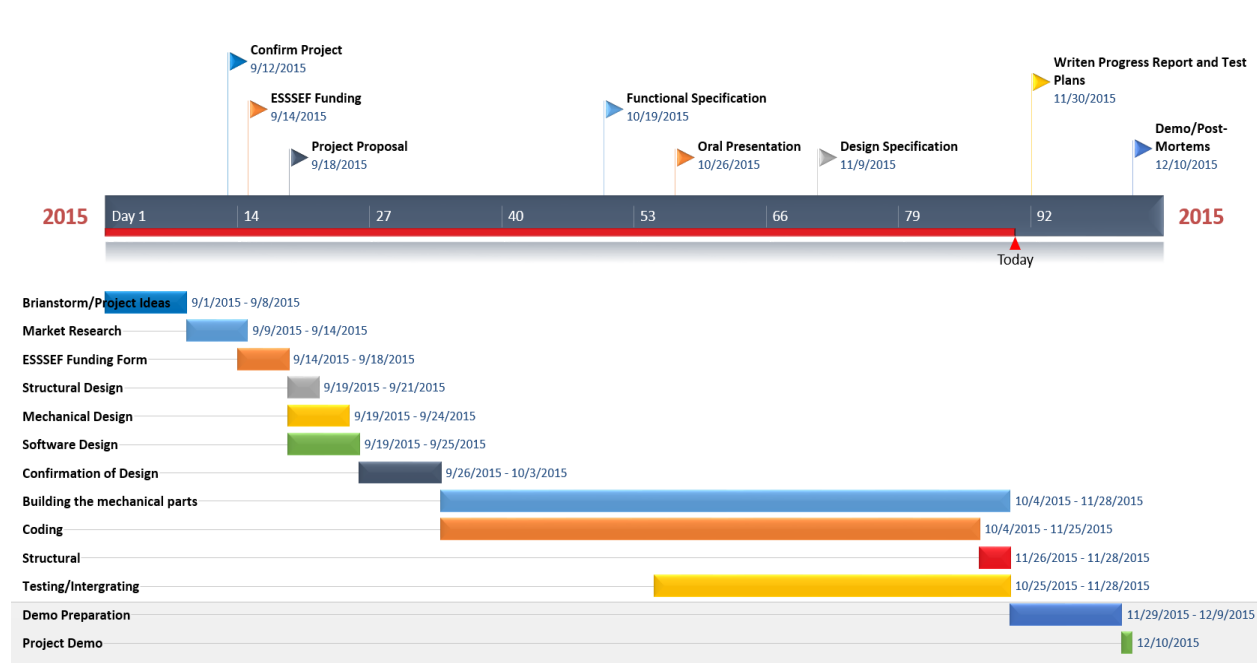

Figure 1: Project Schedule

Financial

Table 1 below describes the breakdown of the budget for the PillMaster. As of today we are under the initial budget of $450 by $35.5. We are not worried about this situation because our final construction is almost finished and we do not foresee any further major expenditure.

Total Expenditures	$485.5		
Servo motors for the shaft x 3	$36	12 keys keypad x 2	$10
DC motor	$17	LCD screen and keypad panel	$26
High torque servo x 2	$70	Cables	$18
Saw blade	$11	Infrared sensors x 3	$30
Black tube containers x 3	$8	Timer x 2	$19
Plastic tubes	$12	Breadboard	$14
Nuts and bolts	$30	L298N Module of Arduino	$23
Protoboard	$10	Aluminum Screen	$16.5
Connectors for coaxial plugs	$2	Plastic boxes x 2	$9
Recycling bin for frame	$12	Wood rod and screws	$12
Microcontroller Mega 2560 R3 Plus	$70	shaft connectors	$30
ESSEF Funding	$450		
Total Remaining	-$35.5		

Table 1: Project Expenditure

Progress

Prototype Frame: For the PillMaster's frame, the team acquired a cubic plastic bin. The bin has been modified to fit all the components of the pill path. The pill containers have been built and they have been mounted as well. At the moment, the servomotors that will be used to rotate the shafts have been acquired and are in the process of being mounted. Every module of the frame is properly tested before and after it is mounted on the frame. What is left of the frame is to mount pill transportation slides, the electronic components and the pill cup tray.

Electronic components: The electronic components have all been tested with the microcontroller board. The team has acquired all of the necessary accessories to connect the frame and the micro controller. What is missing from this part of the system is soldering the components onto a perfboard.

Software: The software of microcontroller is developed on microcontroller and tested with other components. The program can successfully control LCD screen, servo motors and store user schedule in its memory. The missing function is the flexibility of input method; currently the input process must follow a strict order. Also, in program select phase the keypad button 4 to 9 is not used and has not been handled.

Cutter mechanism: Design and construction of the cutting mechanism and preliminary testing of manually cutting pills with the saw blade has been completed ahead of schedule. Integration and further testing with the software, wiring, and pill dispensing mechanism will be completed within the next few days.

Remediation

The main cause of the PillMaster being a week behind schedule is the failing of several fundamental functionalities. Specifically, the pill path had to be re-designed and the original implementations had to be torn apart. In order to deliver the proof of concept in time, the team has taken the approach of unit testing. In other words, we are testing individual modules before any integration is done. Furthermore, we are performing tasks as a team rather than individually. Consequently, the team has input 80 man-hours per week in the last two weeks. The team has decided to continue this trend of work for the coming days until the demo.

Conclusion

The PillMaster is undergoing the final stages of its construction, integration, testing, and debugging. So far, the costs have gone beyond the budget of our ESSEF grant. Furthermore, we are approximately a week behind schedule. However, our group is confident that we can complete our proof of concept before the demo deadline, on December 10, 2015.