



Xypnios
INNOVATIONS

DISPENSALERT

**Progress
Report**

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Overview

The research and development phase of DispensAlert is well underway at Xypnios Innovations. Over the last three months, the team at Xypnios Innovations has strived towards achieving the key functional requirements we proposed in the functional specification.

For the main unit, we are currently finalizing the integration of all the key hardware components (MCU, LCD, Barcode scanner, Stepper Motors). In addition, the graphical user interface via the touch-screen LCD panel is close to being complete. As for the wristband unit, integration of its hardware components has been tested and the team is presently working on the software portion of the unit.

Technical Developments

Main Unit:

Microcontroller Development Board

We were successful in uploading test code to the microcontroller development kit and tested our method by making LEDs blink. Furthermore, we were able to establish connection with the touch-screen liquid crystal display (LCD). We programmed the microcontroller in conjunction with the touch-screen LCD to present a graphical user interface.

Touch-screen Liquid Crystal Display

We were successful in commanding the touch-screen to output images and text. More extravagantly, we learnt how to upload personal bitmaps to the built-in memory to be used as backgrounds for our graphical user interface. We have completed implementing a graphical user interface that will allow the user to adjust and save the real-time clock via touching the LCD panel. This real-time clock will be vital to our project as most of the medication dosage requirements stem from this reference clock. We are in the process of building a data structure that will hold pertinent information such as quantity, dosage per day/week, and so forth. We have completed drawing the necessary backgrounds/icons that will be used in the graphical user interface.

Barcode Scanner

Barcode scanner was able to read a variation of barcode standards and output the correct string of characters into a serial port capture program. We are now able to send a serial trigger command to the barcode scanner from the MCU through the interface of the touch-screen LCD. The serial trigger command will trigger the barcode scanner to turn on such that the user can scan their medicine label. Upon completion of a successful scan, the barcode scanner will turn off and stay inactive.

Stepper Motors

We have built two stepper motor driving circuits that are able to drive two stepper motors independently. One stepper motor driving circuit is hand-soldered onto a permanent printed circuit board, whereas the other stepper motor driving circuit is currently residing on a breadboard.

By controlling the clock input to the stepper motor, we are able to vary the speed. We obtained smooth movements from the stepper motor by feeding it a square-wave input from the frequency generator. We also replicated this movement by producing a code that was able to utilize one of its 47 general input/output ports of the microcontroller development board to generate a clock signal with sufficient voltage requirements to drive the stepper motors.

Pill Dispensing Mechanism

The pill dispensing mechanism is in its testing stage. We have constructed one prototype cartridge container for the pills. The assembly of the second cartridge is pending the testing results of the first cartridge in order for us to make any correction or improvements. The cartridge is currently being tested with the stepper motor to produce specific angular synchronized rotations.

Wristband Unit:

MCU

We have added a RS232 connection to the MCU in order to interface with a PC for programming and debugging purposes. We have successfully flashed the chip with several primitive programs and are now working on our project code and testing that. The MCU will run a main loop which will operate the menu system of the wristband as well as wait for interrupts from the timer and the wireless module.

Wireless Module

We constructed a simple circuit to test the transmitter / receiver pair in an environment similar to what we expect the devices to operate under normal conditions. We found that the input signal must be above 1V to be useful but the higher the voltage, the cleaner the output signal. The waveform of the input signal does not affect the waveform of the output signal provided that the amplitude is sufficiently large – it always comes out as a square wave since the modules deal with digital logic.

Interfacing With Components

We have connected the vibrating disk motor to the output of one of the pins of the MCU and are able to make it actuate on command through a small program. We are now in the process of connecting the wireless receiver to an input pin and sending signals to the MCU as an input to the timer function. Once the individual component code is working we will bring them in to the main program and run them in unison.

Budget

The development of the DispensAlert™ system is currently tracking under our initial budget of \$850. Xypnios innovations has spent a total of approximately \$625 on components for the DispensAlert™ prototype. These funds have been disbursed from the \$600 we received from the Engineering Science Student Endowment Fund (ESSEF). We are in the process of putting together an application to the Wighton Fund to fill in the remaining line items of our budget. Once all prototyping is complete, and if we decide to no longer pursue this endeavor, all excess funds will be returned to the Wighton Fund.

Human Resources / Group Dynamics

The Xypnios Innovations team has been working well together during the documentation and prototyping phases. By including both the main unit and the wristband unit team members in our e-mails and by holding meetings where everyone is present, each team member has a good and clear idea of what others are doing. In addition, the communication and collaboration within each team is in great shape. Great care is being taken by both teams to ensure the compatibility of the main and the wristband units. We are all still friends and are enjoying the opportunity to work together on the DispensAlert system.

Outstanding Requirements / Action Items

The major item remaining to be completed is for both parts of our group to integrate the wireless pieces into their parts of the project. We will then need to integrate our two parts and attempt to have the two parts communicate with each other. Due to the challenges of interfacing external components, we left ourselves as much time as possible in order to give ourselves the best chance to have a working product at the end of the day.

Once that is completed, we will need to perform a thorough testing of all components followed by a testing each of the completed products as a whole. Once satisfied with the proper functioning of each of the systems as a whole, we will be testing how well they function together and adding anything necessary to help them work together. After all testing has been completed we will be encasing both parts in a more aesthetically pleasing case. Once encased, we will once again verify that no formerly proper connections have been broken and verify functionality. We will then demo the finished product and breathe a deep sigh of relief.