Memorandum

To: Andy Sheaff, Professor
CC: Nuri Emanetoglu, Professor
From: Chris Eustis and Slater Claudel
Date: November 24, 2015
Subject: Mr. Pour - Progress Report #3

Mr. Pour is an automated beverage dispenser. The machine allows a user to select recipes consisting of four different liquids allowing accurate creation of the drink of choice. This memo describes a brief overview of the project, multiple enhancements to increase the scope of the project, as well as how a further depth of understanding will be achieved per these enhancements and the overall workings of the project.

This project contains many various components that are being tied together to create one cohesive unit. Because of the different parts that make up Mr. Pour, many aspects of the project are in different stages. These stages can be seen in Figure 1:
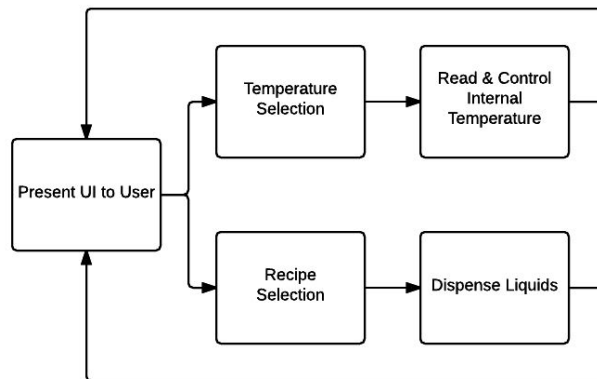

Figure 1. Project Overview

Further described below, a touchscreen interface is currently being developed for the user to interact with the machine. With this interface, two main functions are available to the user as seen in Figure 1. The first is temperature selection, where the user will be able to select an internal temperature of the machine between a range of 35℉ and 55℉. This temperature will be compared with the current internal temperature and will turn on or off a thermoelectric Peltier module to maintain the temperature. Additionally, the user will be able to select a recipe of choice and the machine will dispense the appropriate liquids and create the desired drink.

To expand the scope of the project, two major improvements include developing a user interface using a touch screen device, as well as connecting the project to the internet via a wireless connection. The touchscreen would allow for expanded functionality of the project and a more intuitive, user-friendly interface over a simple terminal program on a computer. Connecting the project to the internet also enhances the functionality of the project. Doing so would allow a user to connect and operate the machine wirelessly from any internet-connected device. To describe further understanding and depth of design per each of these improvements, both the expansion of the touchscreen and wireless capabilities are explained.

The touchscreen will be a 5.0 inch TFT resistive touch screen [1] that is controlled using SPI protocol with an Arduino Uno. There are libraries available to assist in the development that will help increase the understanding of how the touchscreen and driver [2] work. In order for communication between the Arduino and our currently

implemented AVR microcontroller to occur, a certain communication protocol will be needed to send data to and from each device. This communication will allow input from the touchscreen to be sent to the AVR, where the data will be evaluated accordingly and vice versa.

Ultimately, the touchscreen will allow for all the user interfacing functions that are currently implemented via a serial terminal to be further increased and replicated. Currently, the AVR utilizes the C programming language only. Expanding the interface with the mentioned touchscreen would allow for the use of the C++ programming language, thus increasing the scope of the project to multiple languages. To develop a better understanding of the C++ programming language, various example projects and libraries focused in graphical user interfaces (GUI) are available online for reference and to use as a guide to develop our own GUI for the project.

Currently, the project requires a computer, connected to an FTDI programmer, running a serial terminal to interact and operate the machine. Improving the user interface to a touchscreen would allow the FTDI programmer and computer to be removed from the project, creating a completely self-contained, portable project without reliance on any outside sources.

Adding a Wi-Fi module to the project will greatly increase the ability to expand functionality and knowledge in different areas. Currently, the ESP8266 WiFi module [3] is being used to add wireless capabilities to the project. To understand how wireless communication is used with this module and how our project will implement this functionality, research in the area is necessary. Using wireless communication requires an understanding in a multitude of areas. A website will need to be developed in which control of the machine will be available the same as it would via a touchscreen or computer terminal. This means knowledge in web development is necessary, including HTML5, CSS3, and possibly AngularJS/JavaScript to write logic that will be used by the Arduino and AVR microcontroller. This increases depth of knowledge by again adding additional languages to the project. Additionally, it may be beneficial to create an API, as well as utilize a database to store user information and recipes, to simplify the web development coding process and provide persistent data for the machine.

Once wireless capabilities are available within the project, a website for the machine, hosted on the ESP8266 module, plans to use secure connections to a browser. A user will be required to login to the website if they desire to use the machine, thereafter having full capabilities as if they were at the machine itself. If the machine does not have an internet connection, the touchscreen will use its own GUI where the user will have the ability to interact normally.

In addition to increasing our depth of knowledge in the areas mentioned in this memo, additional aspects of the project require a depth of understanding. A DC-DC converter is currently implemented to take a 12 V DC supply voltage and convert it to a 5 V DC voltage to power various components. Additionally, a MOSFET is being used as a switch to enable and disable the thermoelectric Peltier module. Research and analysis on the DC-DC converter, MOSFET, and thermoelectric Peltier module, as well as other aspects of the project, have and continue to be done to create a better understanding and increase our depth of knowledge.

References

[1] '5.0 40-pin TFT Display - 800x480 with Touchscreen', *Adafruit.com*, 2015. [Online]. Available: http://www.adafruit.com/products/1596. [Accessed: 23- Nov- 2015].

[2] 'RA8875 Driver Board', *Adafruit.com*, 2015. [Online]. Available: http://www.adafruit.com/products/1590. [Accessed: 23- Nov- 2015].

[3] S. Board, S. Arduino, S. 3.3V, S. Thing and W. ESP8266, 'SparkFun WiFi Shield - ESP8266', *Sparkfun.com*, 2015. [Online]. Available: https://www.sparkfun.com/products/13287. [Accessed: 23- Nov- 2015].