Automated Bartender

Project Proposal

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Introduction

As we all probably know, cocktails are delicious, but can be quite the hassle to concoct. Not only do you need to know the recipes, but accurately measure all the proportions. This is where our automated bartender will come into play.

We are interested in developing an automated dispensing system that would have the ability to create various cocktails as well as mixed drinks at the push of a button. We plan to implement a user-friendly phone app, which would connect wirelessly to our Bartender so users can choose their drinks at their own discretion.

Current automated bartender appliances that have recently made an appearance to crowdsourcing websites such as Kickstarter and Indiegogo, which are relatively expensive and rely on paraphilic pumps. Not only are these pumps expensive and a hassle to clean and maintain, but they also do not possess the ability to serve carbonated beverages. This limits the mixology the user can experience.

As a result, our primary goal is to redesign this automated system as to not rely on pumps but rather on a pressurized CO_2 system and various valves to dispense the appropriate liquids. Thus, it will also have the ability to serve cocktails as well as carbonated beverages at a fraction of the cost and hassle!

Objectives

Considering we are developing an autonomous system, our most imperative goal is to provide a hassle free, wireless, user friendly experience that will rival the need for a bartender. Our automated bartender will have the precision to dispense ten separate beverages, which will provide the user with a plethora of various cocktails and mixed drinks.

In addition, considering we are engineers from the UIUC, we plan to integrate an actuating dispenser that will have the ability to move to three separate locations. At each location, there will be a display for the users' name and selected beverage. As orders begin to flow and a queue develops, our robot will efficiently fill each drink order given the corresponding user places a cup in the appropriate location.

We believe this is far more interesting than a single dispensing location like current robotic bartenders on the market.

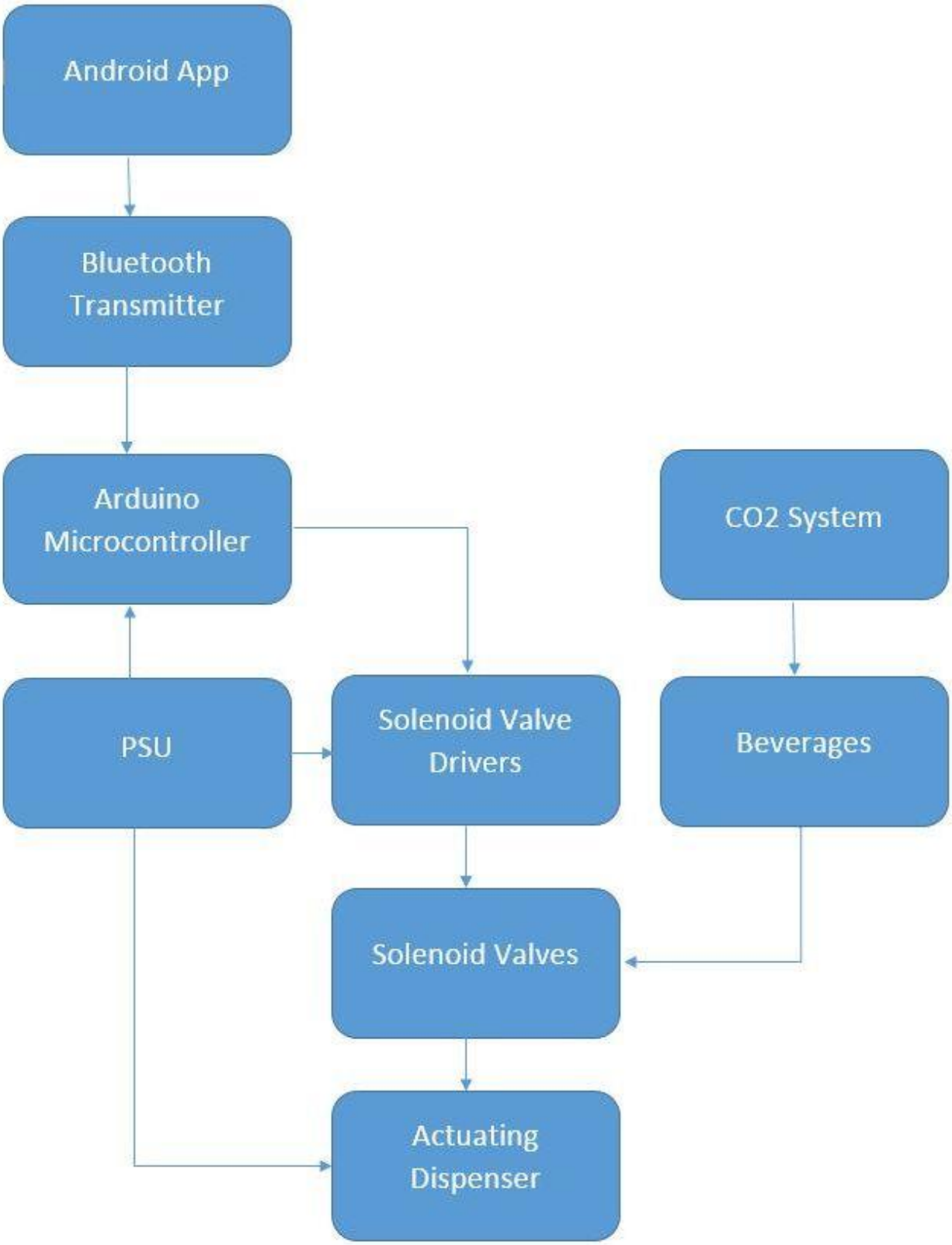
Benefits:

- Hassle free experience.
- Alcoholic beverages at the push of a button.
- Significantly cheaper than current products on the market.
- Multi User functionality.

Features:

- Wireless Android App functionality
- Up to ten various beverages
- Multi location dispenser

Design



Automated Bartender Block Diagram

Block Descriptions

Android App

The android application will allow users to see which drinks are currently available from the Automated Bartender. It provides a photo of the various drinks along with description of ingredients and proportionalities. It will allow the user to order their drink at the touch of a button. Our app will interface with the microcontroller through the Bluetooth transmitter.

Bluetooth Transmitter

The transmitter will be coupled to our Arduino microcontroller, allowing it to interface with the android smartphone through Bluetooth. It will function as both a transmitter and a receiver to properly interface with the Android app.

Arduino Microcontroller

This is the main controller on the bartender itself. It will interface with the Bluetooth transmitter to send and receive data from the app. It will also be controlling the various electronic devices on the bartender, such as the solenoids and the actuating dispenser. The Arduino will also be running code of its own to properly interface the various components.

PSU

The power supply unit will power the Arduino and Bluetooth transmitter, solenoids, and the actuating dispenser. Currently, we plan to purchase a PSU with the possibility of creating our own if necessary.

Solenoid Valve Drivers

Considering our solenoid valves will be operating at 12VDC, we need to create relay system since our microcontroller cannot output such high voltage or current. Thus, we will construct a transistor amplifier network so that our small signal from the microcontroller can actuate the valves accordingly.

Solenoid Valve

These valves, which are initialize by our valve drivers, control the liquid dispensers. They will be strategically programmed to dispense an exact amount of liquid.

Actuating Dispenser

The actuating dispenser will consists of all ten, food grade silicone tubes from our various beverages coupled to a single actuating nozzle controlled by an electronic solenoid or stepper motor that will position to three locations accordingly. Above each location will be a display. As a queue of orders forms, they will be displayed at the various locations. Once the

corresponding user places their cup under the location, the actuating dispenser will finish its current process and proceed to the next order.

CO2 System

This will be the heart of our system and will provide a constant output pressure to our various beverages. Unlike other automated bartenders, which rely on paraphilic pumps, our system will function on a constant CO_2 pressure. This will both drastically decrease the construction cost as well as provide the luxury to dispense carbonated beverages.

Beverages

There can be up to ten various beverages attached to our automated bartender, which will provide the users a plethora of various cocktails and mixed drinks.

Requirements and Verification

Requirement	Verification	Points
Android Application	Create a user-friendly Android application that will interface with our automatic bartender unit via Bluetooth shield. The Automatic Bartender will be able to integrate a total of ten various beverages, all which are described and pictured wirelessly on our android application.	30
Microcontroller & Solenoids	The microcontroller will be used to control the solenoid valves for our CO2 system. The microcontroller will be coupled to our solenoid driver circuit so that a small signal digital output will initiate our solenoid valves to dispense the corresponding quantity of beverage.	30
CO2 System	Our Automatic Bartender will utilize a system consisting of one way CO2 valve caps, a CO2 regulator, and a CO2 canister to pump the liquids through our food grade silicone tubing system. The system should be able to pump X ounces of liquid per second.	20
Actuating Dispenser	The actuating dispenser will allow us to have three-cup stations that use reflective optical sensors to detect whether or not a cup was placed at the appropriate cup station. The system will then position the dispenser above the correct cup and dispense the drink as specified by the user.	20

Cost and Schedule

Name	Hourly Rate	Hours Invested	Total Cost
Andrew	$30.00	225	$6,750
Mithun	$30.00	225	$6,750
Matthew	$30.00	225	$6,750
Total		675	$20,250

Labor

Item	Cost	Quantity	Total
CO2 Regulator	$50.00	1	$50.00
CO2 Canister	Free	1	Free
Microcontroller	$20.00	1	$20.00
Bluetooth Shield	$10.00	1	$10.00
Power Supply	$10.00	1	$10.00
Pneumatic Electric Solenoids	$8.90	10	$89.00
Food Grade Silicone Tubing	$50.00	1	$20.00
LCD Display Module	$9.00	3	$27.00
Bottle Cap Fittings	$2.50	10	$25.00
One Way CO2 Valves	$.50	10	$5.00
Transistors & Sensors	$.20	20	$4.00
Total			$260.00

Parts

Section	Total
Labor	$20,250.00
Parts	$260.00
Grand Total	$20,510.00

Grand Total

Schedule

Week	Task	Duty
February 6th	Finalize Proposal	Andrew
February 16th	Prepare Mock Design Review	Matthew
February 23rd	Research Bluetooth + Microcontroller Interface	Mithun
March 2nd	Finalize Research & Purchase Parts	Andrew
March 9th	Research Sponsorships	Matthew
March 16th	Assemble Two Liquid Dispensers & Program Microcontroller	Mithun
March 23rd	Expand Liquid Dispensers	Andrew
March 30th	Integrate Actuating Dispenser	Matthew
April 6th	Finalize Assembly	Andrew
April 13th	Finalize Android App	Mithun
April 20th	Finalize Demonstration	Matthew
April 27th	Finalize Presentation	Andrew
May 4th	Lab Checkout & Finalize Paper	Mithun