Beverage Dispenser

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BACKGROUND

The motivation that gave us the idea of our project is the inconsistency of adult beverages. We as a team wanted to create a beverage dispenser that creates the perfect cocktail mixture ratio. We have designed a beverage dispenser that creates one perfect drink that is consistent with satisfaction. The desired consumer of our design project is intended for bars, restaurants and household consumer.

Figure 1

Credit: amazon.com

Usability and Functionality

Figure 2

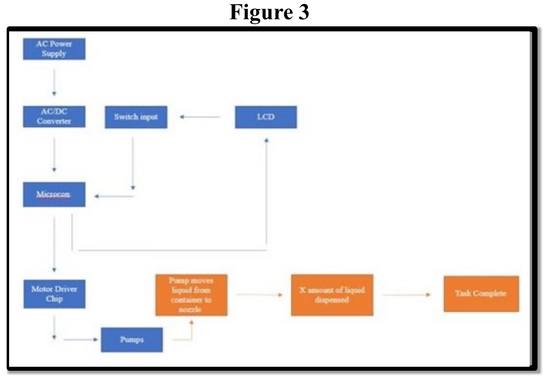
Credit: nationaltoday.com

We as a team decided to go with a typical serving of alcohol 1.5 Fl oz per 10.5 Fl oz mixture. The design we want is a see-through design. So, the consumer can see the project in action. The power source is a AC-DC converter that powers the components of the design. We want our design to dispense 12 Fl oz in under a minute and 24 Fl oz in under 2 minutes.

PROPOSED SOLUTION

Our proposed solution has three buttons which are programed to do specific functions. The LCD screen will display the prompt “Press Start” which the user will then press the button on the left to start the process. The LCD then displays “12 or 24” which the user will then decide whether they want 12 or 24 Fl oz dispensed. The middle button corresponds with the 12 Fl oz option and the right most button corresponds to the 24 Fl oz option. Once the user inputs the desired amount the LCD will display “Dispense (12 or 24) fl.” At this time the motors will turn on and start dispensing both liquids simultaneously. Once both liquids have been dispensed the LCD will display “Enjoy!” and then reset back to “Press Start.”

Figure 3

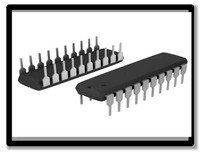


SYSTEM DESIGN

1602 Module Liquid Crystal Display

The LCD can display 32 characters at the same time. It has standard 16 pin interface with I2C functionality.

L293D Motor Drive



The motor drive is a 4 channel chip. It can withstand up to 1 amperes of current. The motor drive can handle a supply voltage of 3.5V to 36V. The design of our project utilizes 2 of the channels to power the pumps.

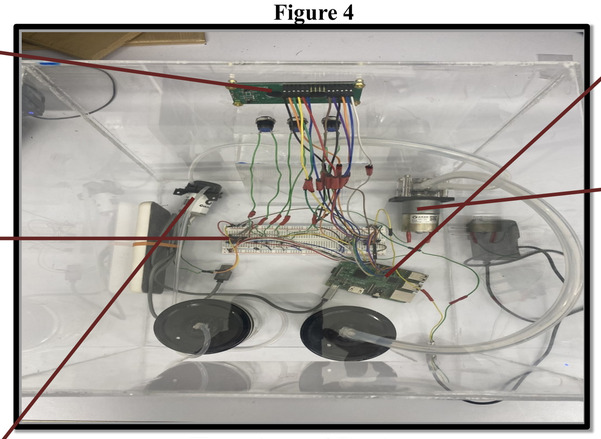
Gikfun 12V Dosing Pump

The pump has a flow rate of 0-100 ml/min. The pump uses 2mm ID x 4mm OD food grade silicon tubing..

Code

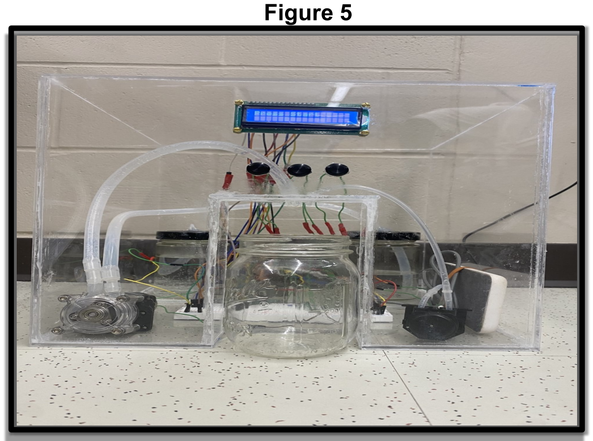
We used Thonny which is an integrated development environment for Python which comes with the Raspberry Pi 3. We started by initializing all the GPIO pins needed for the buttons, motor driver chip, and LCD. Each button has a specific function within the code. Once a button is pushed the code calls back the function and performs the desired task. The first function is for the left most button which when called displays a new message on the LCD saying “12 or 24.”

Figure 4



Top view of Design

Figure 5



Front view of Design

Raspberry Pi 3 Model B

The Raspberry Pi is a universal microcontroller with 40 GPIO pins which were used to send inputs and outputs to and from the microcontroller. We utilized the GPIO pins with an LCD, motor driver chip, and buttons.

Hilitand 12V DC Peristaltic Pump

The Hilitand is a peristaltic pump which has a flow rate of 0-400 ml/min. The pump uses 6mm ID x 10mm OD food grade silicon tubing. The pump operates with 12V DC voltage and 0.5-1.4A DC current. This is the main pumped used for the mixer container for our design.

Acrylic Sheet Plexiglass

The electronics are housed in a case that is 1/8th in thick. The plexiglass is scratch and smear resistant. The plexiglass is an ultra-clear finish. The plexiglass is easy to cut and bore holes into; using a Dremel and a drill. This option was chosen for the demonstration of our project .

Code cont.

The second function corresponds to the middle button and when it is called it turns both motors and the enable signal to high and keeps them at high for 45 seconds which is the time it takes to dispense the correct amount of liquid. The function then switches the signals to low to turn off the pumps and displays the message “Enjoy!” on the LCD. The third function does the same as the second function but uses the right most button and runs the motors for 90 seconds before turning them off.

FUTURE DIRECTION

- Redesign the casing to be smaller
- Add a touchscreen display for increased functionality
- Reduce the overall noise of design
- A catch tray for any spilt liquids
- Add more chooses for consumer desires
- Increase and relocate liquid containers

REFERENCES

“L293D.” *L293D Data Sheet, Product Information and Support | TI.com*, Texas Instruments , Jan. 2019, https://www.ti.com/product/L293D.

Raspberry Pi. “Buy A Raspberry Pi 3 Model B.” *Raspberry Pi*, https://www.raspberrypi.com/products/raspberry-pi-3-model-b/.

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