Automatic Cocktail Dispenser

Electrical & Computer Engineering

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OBJECTIVE

Goal: Create an automated cocktail dispenser with standardized ingredient portions and different cocktail choices.
1. Dispense the user’s chosen drink with no selection error.

2. Dispense the correct quantity of each ingredient for each respective cocktail with ~10% accuracy (i.e. mass of the finished cocktail is 205g).

3. Mix the drinks uniformly after a successful dispense.
Original Design + Changes
User Interaction Subsystem

Buttons:
- 10kOhm resistor to reduce current
- 1µF debouncing capacitor

LEDs:
- 1kOhm resistor to reduce current
- Current Rating: 35mA
- Voltage Rating: 2V
LDL1117S50R

- Voltage regulator in the original PCB design, but it failed to function when soldered.
  - Voltage Input (Max) - 18V
  - Voltage Output (Min/Fixed) - 5V
  - Current Output - 1.2A
Power Subsystem

**LM7805**

- Used different regulator when breadboarding the circuit.
  - Voltage Input (Max) - 35V
  - Voltage Output (Min/Fixed) - 5V
  - Current Output - 1A
- 12V input to the circuit attached to all positive leads of solenoids/motor
- Regulated 5V connected to ATMEGA328
Load Cell Subsystem

- 1kg Load Cell sensor
- HX711 Load Cell Amplifier (ADC)
- Tested with Arduino Uno for calibration
ATMEGA328P-P

- 1.8V – 5.5V operating voltage
- Satisfied our I/O pin requirement (23)
- 32 KB EEPROM
- Easy to test as our Arduino Uno shares the same microcontroller
- Capacitors chosen to help regulate oscillation
Control

- Original design: MOSFET
- Final design: Darlington Transistor (TIP122)
- Flyback diode prevents voltage spikes (1N4002)
- Resistors used at the base of the transistor limits current
Ratings

• Electric Solenoid Valves
  • 12V DC Operating Voltage
  • Current Rating – 2A
  • Actual Current – 1A

• 50 RPM Gear Motor
  • 12V DC Operating Voltage
  • Current Rating – 600 mA
  • Actual Current – 180 mA
Results
Table 1: Initial Dispense Trials by Solenoid (in grams)

<table>
<thead>
<tr>
<th>Input</th>
<th>Projected Values</th>
<th>Solenoid 1</th>
<th>Solenoid 2</th>
<th>Solenoid 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mocktail</td>
<td>0, 0, 205</td>
<td>0</td>
<td>0</td>
<td>203 (-2)</td>
</tr>
<tr>
<td>Single</td>
<td>41, 82, 205</td>
<td>46.33 (+5.33)</td>
<td>85.33 (+3.33)</td>
<td>202 (-3)</td>
</tr>
<tr>
<td>Double</td>
<td>82, 164, 205</td>
<td>85.67 (+3.67)</td>
<td>163.33 (-0.67)</td>
<td>203 (-2)</td>
</tr>
</tbody>
</table>
### Table 2: Updated Dispense Trials by Solenoid (in grams)

<table>
<thead>
<tr>
<th>Input</th>
<th>Updated Values</th>
<th>Solenoid 1</th>
<th>Solenoid 2</th>
<th>Solenoid 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mocktail</td>
<td>0, 0, 207</td>
<td>0</td>
<td>0</td>
<td>205</td>
</tr>
<tr>
<td>Single</td>
<td>34.5, 78.5, 207</td>
<td>41</td>
<td>82</td>
<td>205</td>
</tr>
<tr>
<td>Double</td>
<td>78, 164.5, 207</td>
<td>82</td>
<td>164</td>
<td>205</td>
</tr>
</tbody>
</table>
Successes

1. Dispense the user’s chosen drink with no selection error.
2. Dispense the correct quantity of each ingredient for each respective cocktail with ~10% accuracy (i.e. mass of the finished cocktail is 205g).
3. Mix the drinks uniformly after a successful dispense.
Challenges

- Voltage Regulation (PCB)
- AVR Programmer
- Inaccurate Drink Selection
Conclusion
• Even "simple" projects require significant R&D and planning
• Extra time should be allotted for unexpected setbacks
• Balancing responsibilities can be difficult
• Realistic expectations are important
• Data collection is crucial for any successful project
• Thoughtful decisions are better than quick decisions
Future Changes/Design Revisions

- Higher RPM motor
- Retractable and/or removable motor
- Quick release tubing for easier cleaning
- On device screen which displays menu and modifies masses according to currently selected drink
- Wider dispensing plate to allow for more cups
- More ingredient containers
• Underage drinking
  • Default drink mocktail

• Website warnings
Questions?
Thank You

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