Automated Bartender Presentation

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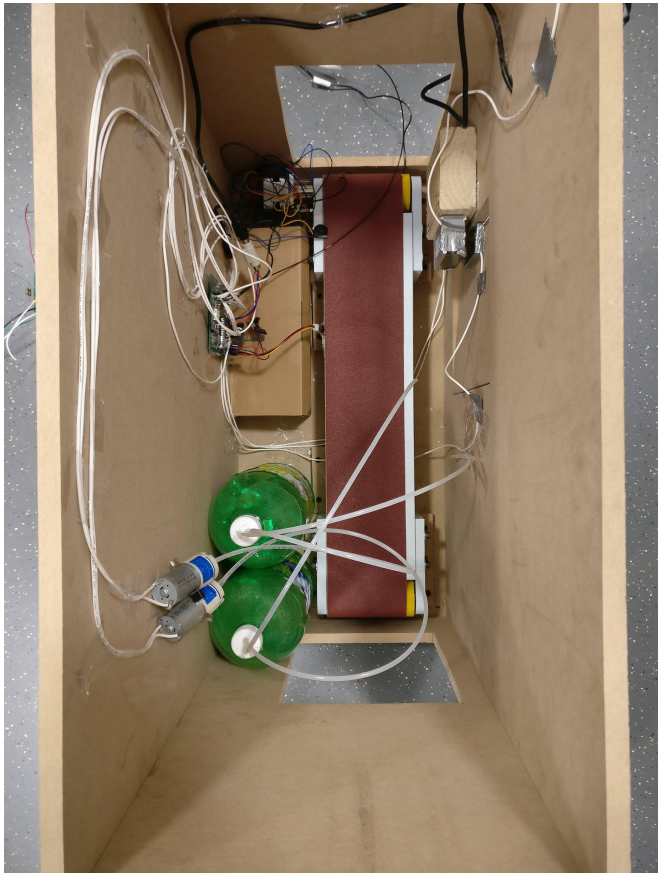
Project Introduction

- Emphasis on preventing sexual assault in social bar setting
- Microprocessor controlled bartender
- Requests made through mobile application
- Beverage is securely prepared according to custom order



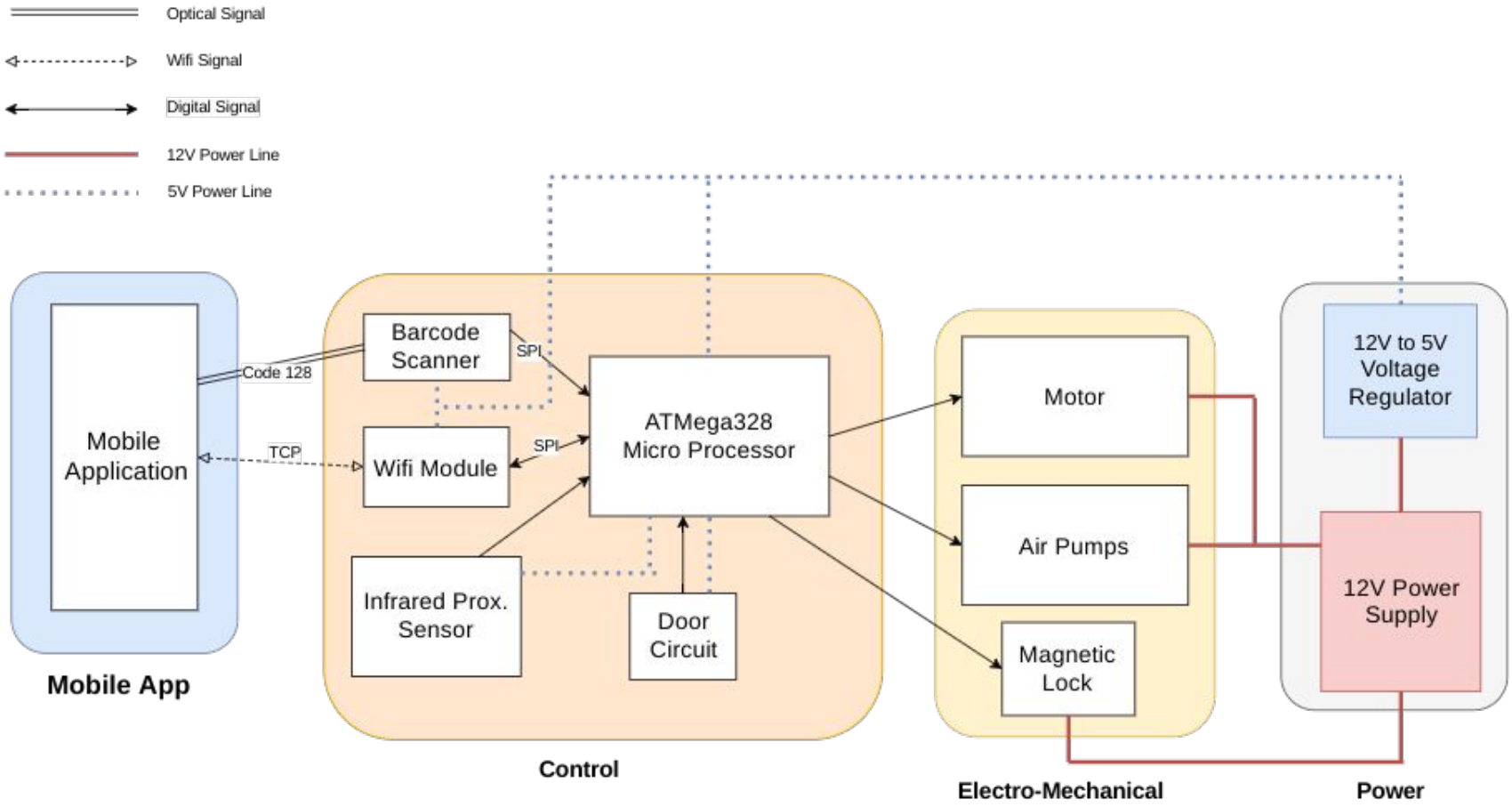
Objective

Enhance and secure the traditional bar setting

Requirements:

- ➔ **Secure**
  Authentication in every transaction
- ➔ **Efficient**
  Order now, pay now, enjoy now
- ➔ **User-friendly**
  Provide a simple interface for the machine

Block Diagram



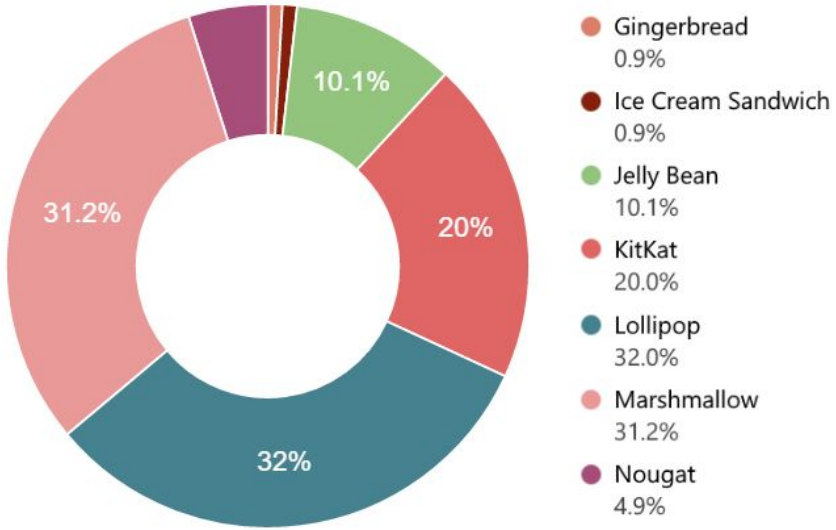
User-friendliness:

Mobile application

Our mobile application allows users to order their drinks from any location within wifi range. It provides a simple interface and a facebook login for convenience.

User-friendliness:
Mobile application

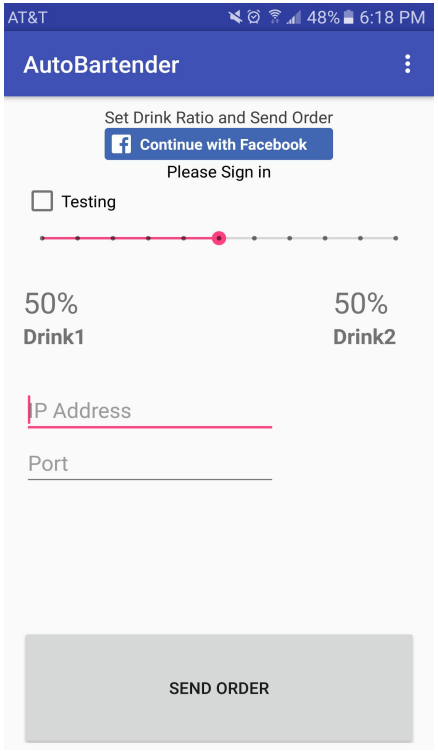
- Supports Marshmallow and Lollipop Android OS
  - 63.2% of platforms

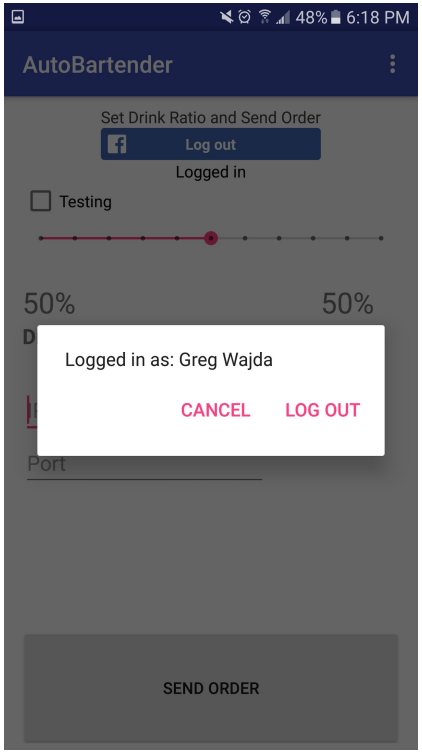


https://en.wikipedia.org/wiki/Android_version_history

User Interface

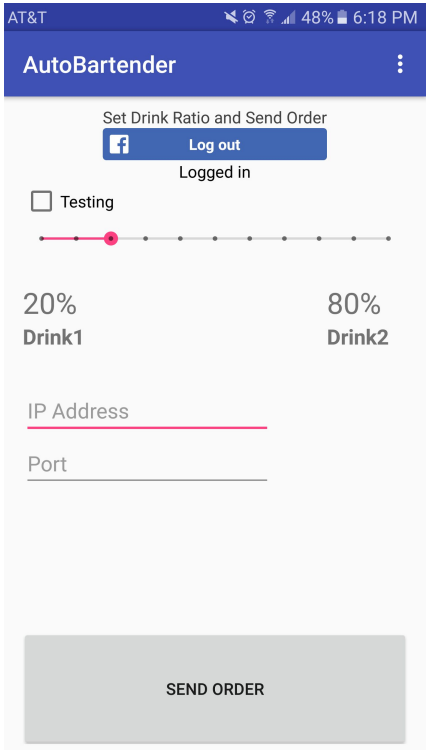
- Login Screen
  - Used to verify user before ordering
  - Can be used for payment, verify 21 years of age, etc.

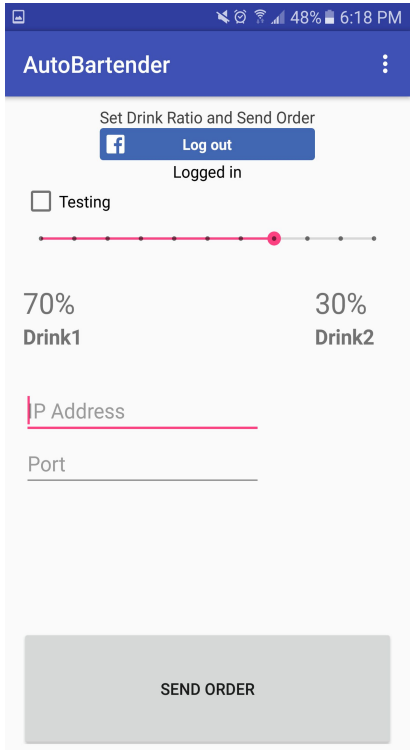




User Interface

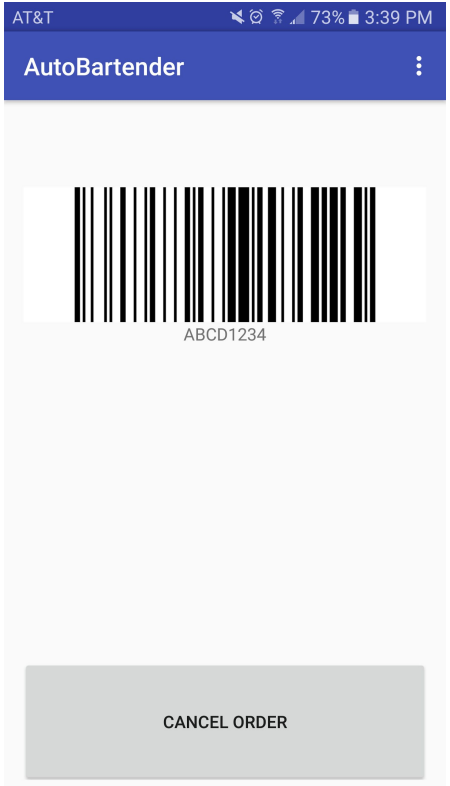
- Use slider for desired drink ratio
  - Can be anywhere from 0%:100% to 100%:0%
- Send order!
  - Sends 6 Bytes of drink info to user





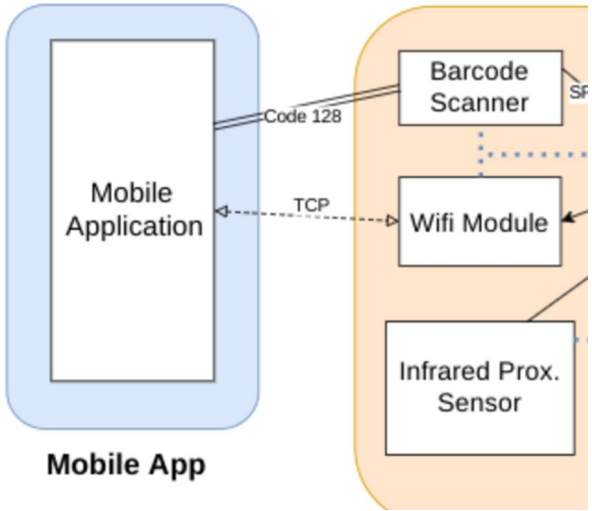
User Interface

- Scan barcode to open lock
  - Receives 10 Bytes of barcode data, then creates it on screen



Interaction with other modules

- Sends drink orders over WiFi
  - 6B packet describing what drink ratio a user desires
- Drink order determines duration of pumps
  - RATIO * FIXED_TIME_INTERVAL = POUR_DURATION
- Receives randomly generated barcode
  - 10 Bytes of alphanumeric characters
  - Provides 36^{10} possible codes



Power

- 12V 5A Power Supply
  - Powers 2 Air Pumps, Electromagnetic Lock, Motor
- 12V to 5V Voltage Regulator
  - Handles up to 1A
  - Powers ATmega328, Motor Driver, Scanner, Wifi Module, Sensor, Circuit

Power

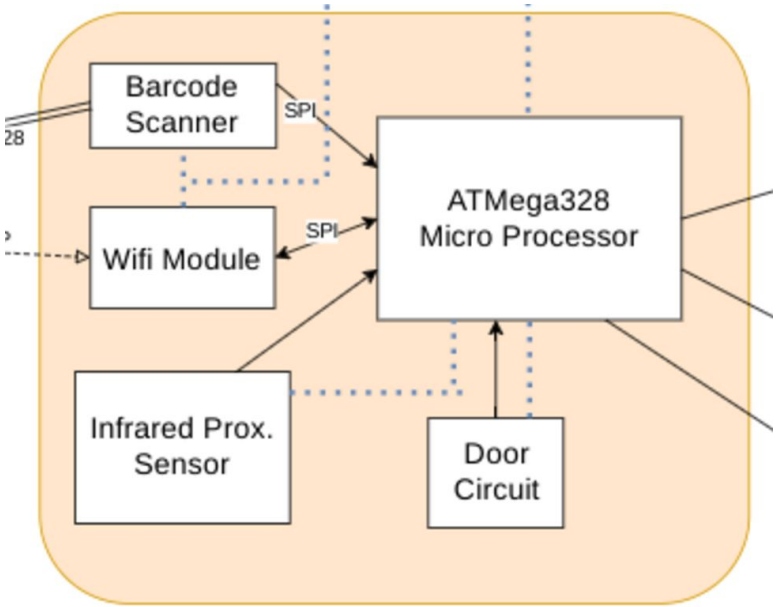
- 12V power source measured at 13.6V
- P = IV

Part	**Rated Values**	**Final Measured Values**
Air Pumps (x2)	0.3A * 12V * 2 = 7.2W	0.08A * 13.6V * 2 = 2.176 W
Electromagnetic Lock	0.1A * 12V = 1.2W	0.11A * 13.6V = 1.496W
Motor	0.33A * 12V = 3.96W	1A * 13.6V = 13.6W
5V Parts	1A * 5V = 5W	1A * 5V = 5W
Total	17.36 W	22.272 W
	17.36 W = 12V * 1.44A	22.272 W = 13.6V * 1.638A

Security & Efficiency:

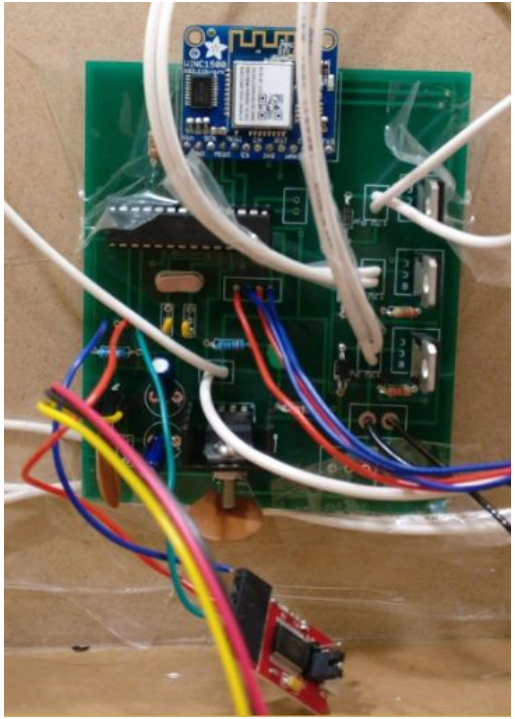
Control

We reach our high-level requirements of Security and Efficiency by using the ATmega328 to control various modules within our project.



Microprocessor

- ATmega328p with flashed Arduino bootloader
- Direct interface with WiFi module
- Programmable through Arduino

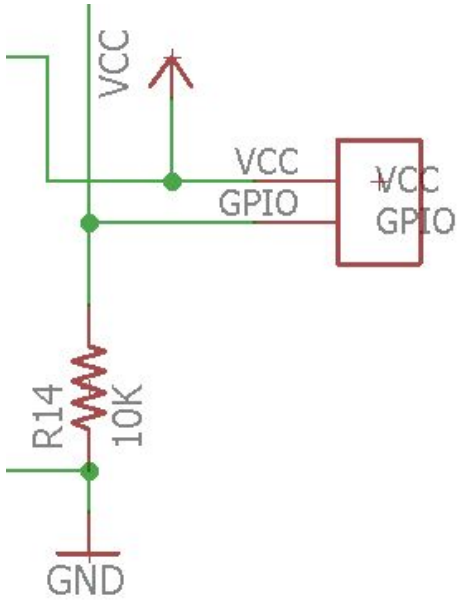


Barcode Scanner

- Communicates over PS/2 protocol
- Scans 10 character Code128 barcodes
- Controlled from ATmega328

Door Circuit

- Used to determine whether door is open or closed
- Conductive lock allowed straightforward mechanical assembly

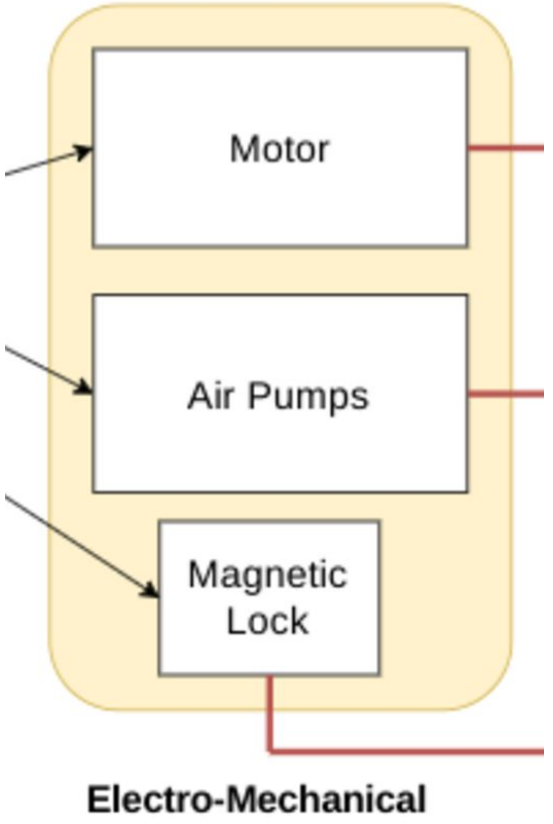


Infrared Sensor

- Powered with 5V line
- Outputs 0V to ATmega when cup detected
- Outputs 5V to ATmega when cup not detected
- Marks the pouring station in front of the door

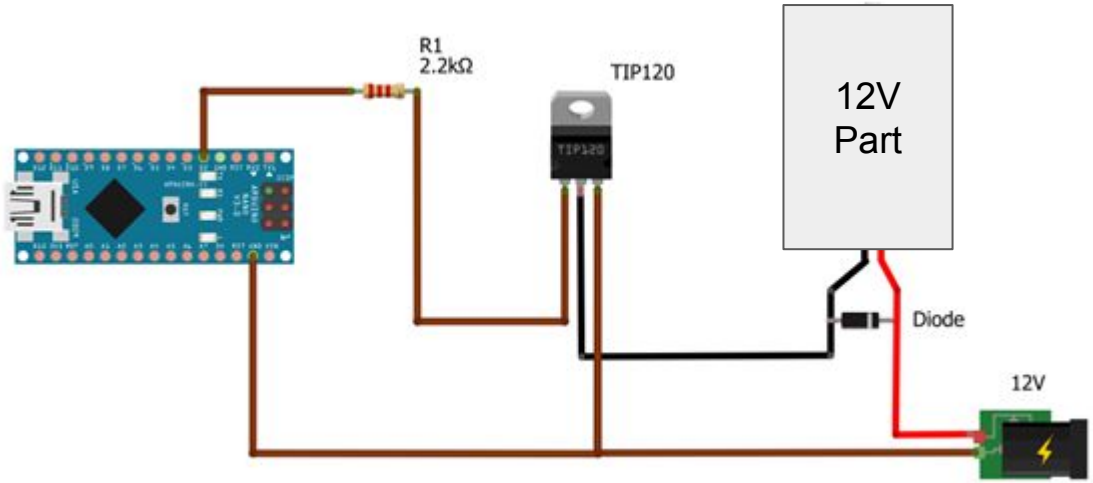
Security & Efficiency: Electromechanical System

We achieve our high-level requirements of Security and Efficiency by using the lock, motor, and air pumps to securely make a drink



Transistor Circuit

- Used to control our pumps and electromagnetic lock



Electromagnetic Lock

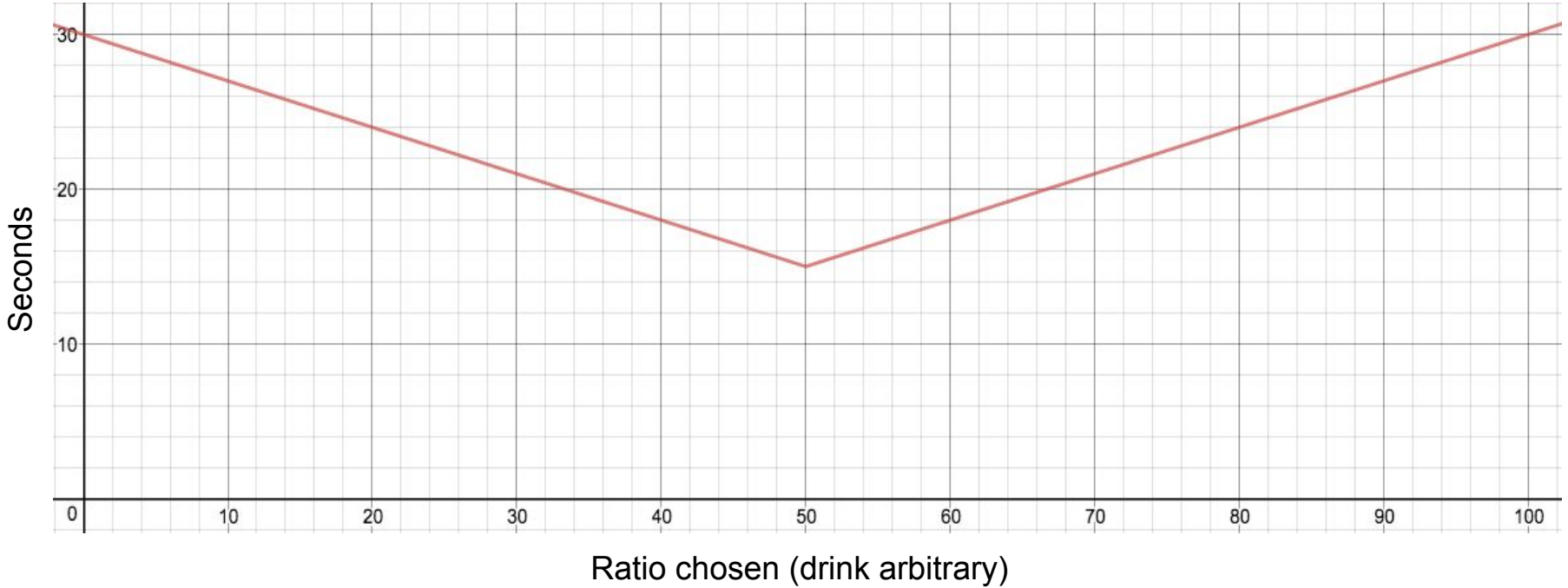
- Turns on with 12V differential applied to both terminals.
- Controlled with transistor circuit from ATmega328
- 100lbs of holding force

Pouring System

- Air pumps turn on with 12V differential applied to both terminals.
- Controlled with transistor circuit from ATmega328
- Our goal was to pour a drink in 30 secs

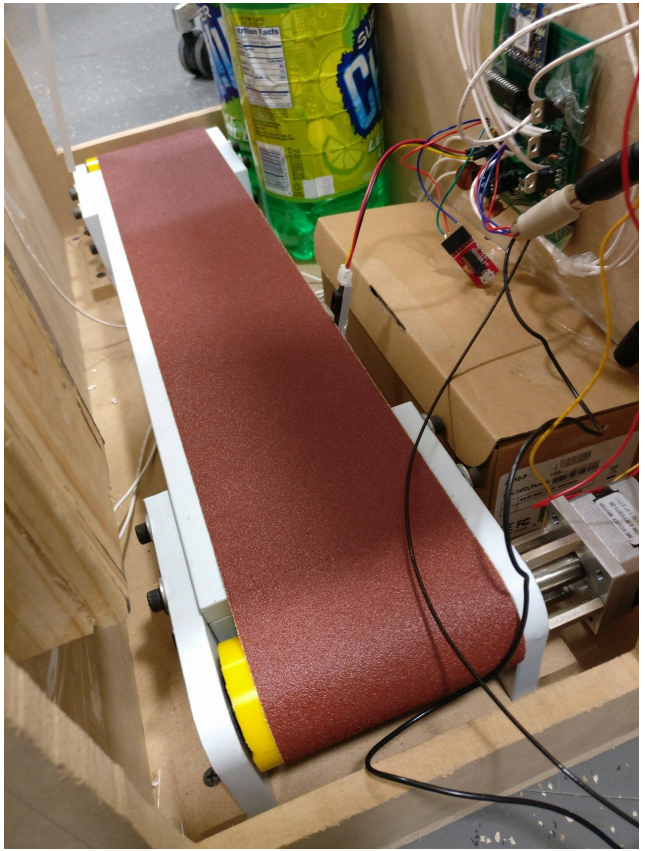
Pouring duration

Pouring rate per pump: 0.4 oz / sec



Motor

- Bipolar Stepper Motor
- A3967 - Microstepping Driver with Translator
  - Converts PWM signal from ATmega328 into signals for each of the motor's 4 wires.
  - Controls max current allowed to motor
- Current calculated using reference voltage (Vref) and sense resistor (Rs)
- I = Vref / 8*Rs



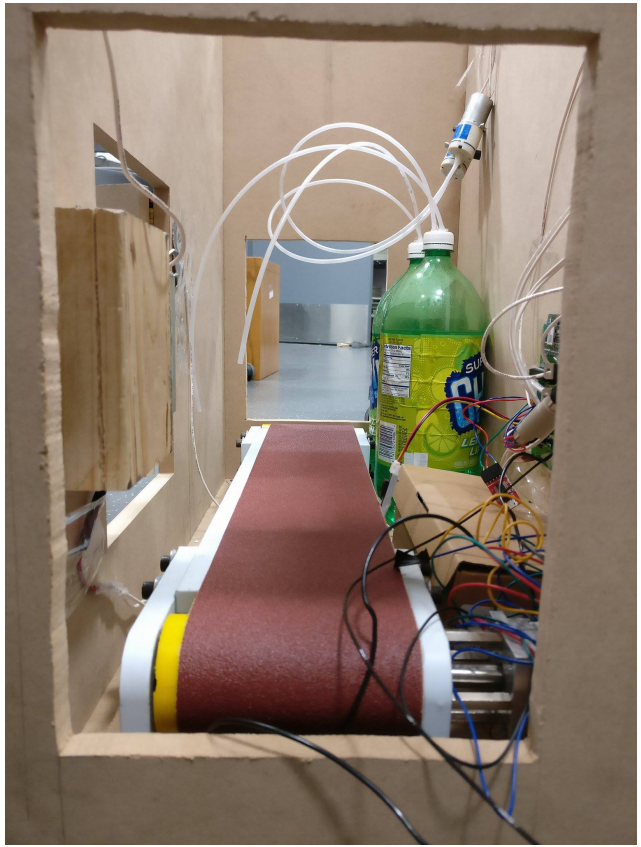
Conclusions

What we would do differently:

- Use more powerful motor
- Use more accurate power supply

Future work:

- Add more pouring stations
- Larger door or new system for multi-drink orders



Questions?