MDR

Alfred

(Wifi-enabled automated mixed drink maker)

Team 15:
John Fouad, Ben Ivaldi, Chris Wong, Pat Barron

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Team Member Roles

Chris

John

- Chris: In charge of Power/Control system
- John: In charge of rotating bases/serving door
- Ben: In charge of pouring mechanism, pumps
- Pat: In charge of Mobile Interface/Control system

Professor Moritz

Ben

Pat

Problem Statement

- **Time-Saver:** People wait too long at bars trying to get the bartender's attention to order simple mixed-drinks
- **Eliminates Bartender Pouring Errors:** Bartenders can disproportionately pour drinks or provide the wrong drink
- **Alleviates Congestion:** The amount of people around the bar trying to order a drink is a nightmare

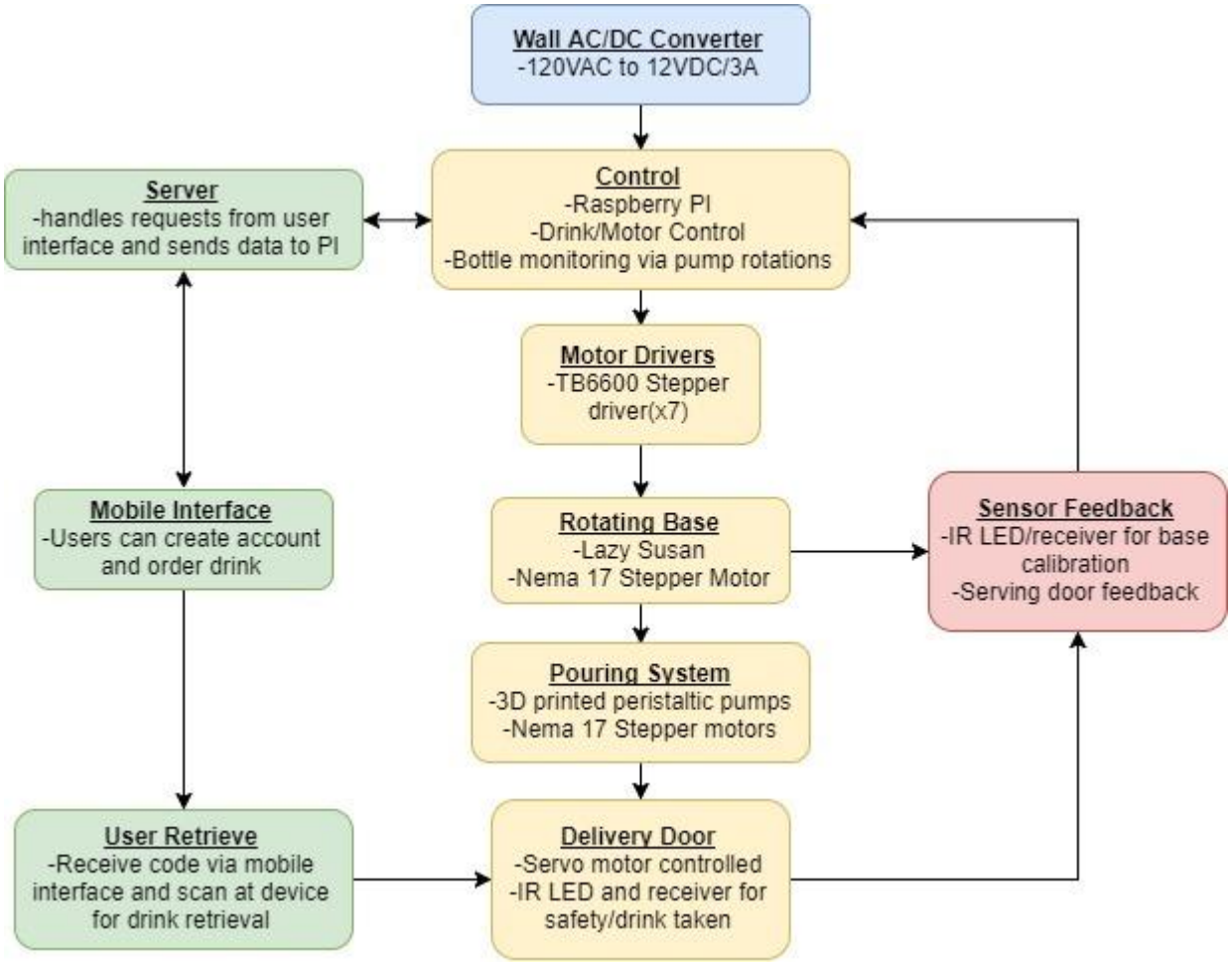
System Specifications

- Order through mobile device
- Pour a perfect drink in under 2 minutes
- Bartender can insert choice of alcohol (750mL) and mixers into dispensers
- Choice of 4 different drinks
- Does not spill the drinks
- Tab system to order drinks
- Drink served to correct customer using door system
- Rotatable base to access different cups to dispense the liquids

System Specifications (cont'd)

- 8 cups with ice placed onto base
- 15.9" diameter base
- Dispenses correct proportions of liquids into each specific drink
- Failsafes:
  - Sensor to make sure cup is removed before closing door
  - Sensor to detect correct orientation of base

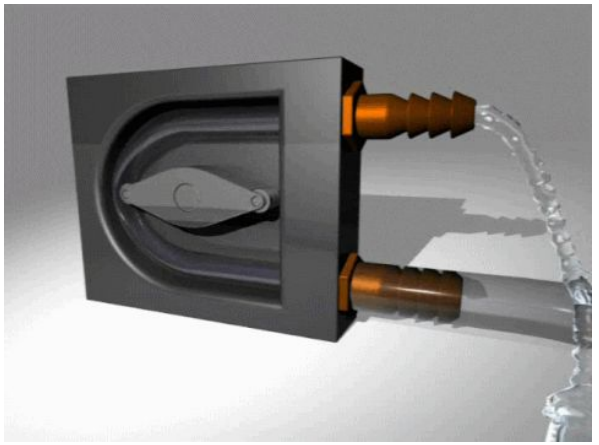
Block Diagram



Pouring Mechanism/Pumps

Peristaltic Pumps

- Precision volume dispensing used for medical dosing
- Allows liquid to travel without touching electronics
- Food safe
- Allows for bottle level monitoring



Motors

- Rotating base - Nema 17 stepper motor
- Opening/closing door around completed cup - servo motor
- Pumps for getting soda/juice - Nema 17 stepper motors

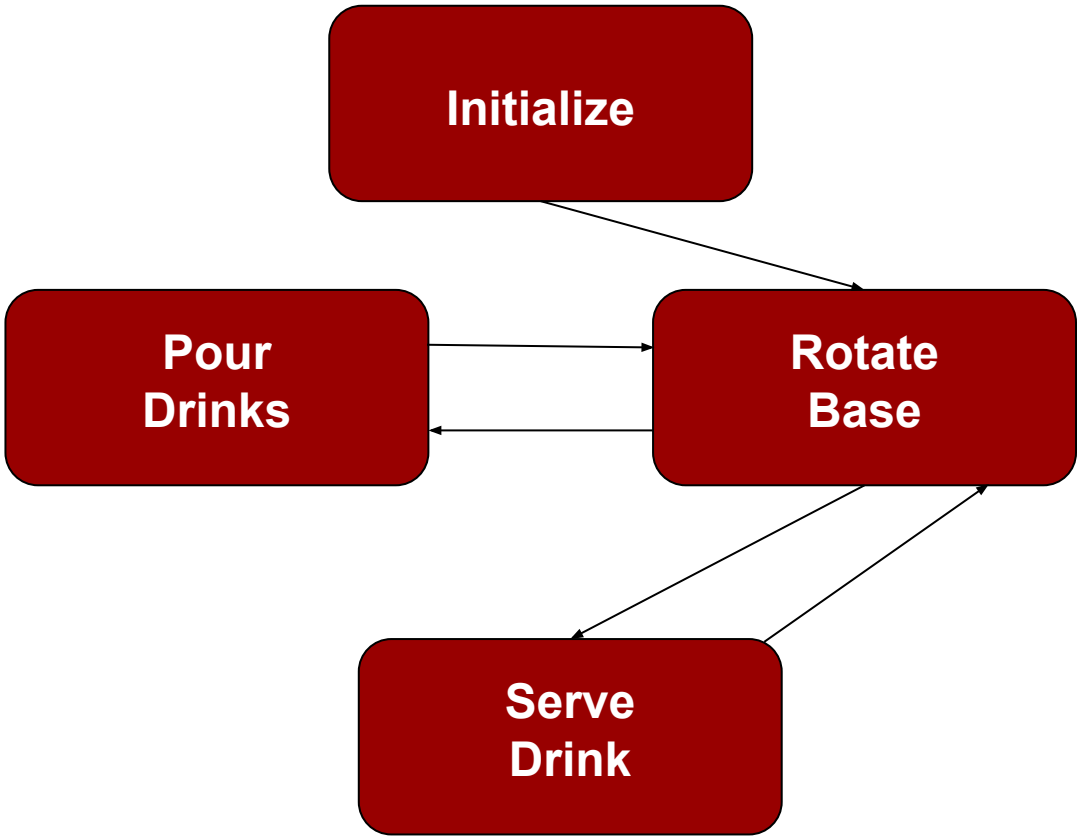
Power/Control

- 1800W maximum
- AC to DC converter/Step down voltage
- PCB amplifies signal from Raspberry Pi for motors
- Server running on website (TCP)
- Single-board computer for main control and interface between server and machine
  - Can use additional microcontroller units for additional input/output processing, which can be controlled by Pi
- Interrupts triggered by serving door/personal identification

Measured Power Consumption

- Each stepper motor has a measured peak current draw of ~450mA @ 12V
- Peak power consumption per stepper motor ~5.4W
- 6 Pump Motors + 1 Base Motor = 7 Stepper Motors
- Servo Motor ~5W
- Raspberry Pi ~12.5W
- Total Power Consumption ~55.3W << 1800W

Bartender State Machine



Mobile Interface

- Customers can order through a website after creating an account
  - Crossplatform
- Customers can order from selections on drink menu
- Server will interface with the hardware to make the drink
- Customers are notified when the hardware is finished making the drink
  - Given a personal identification code
- Customers can use personal identification code to open the serving door and retrieve their drink

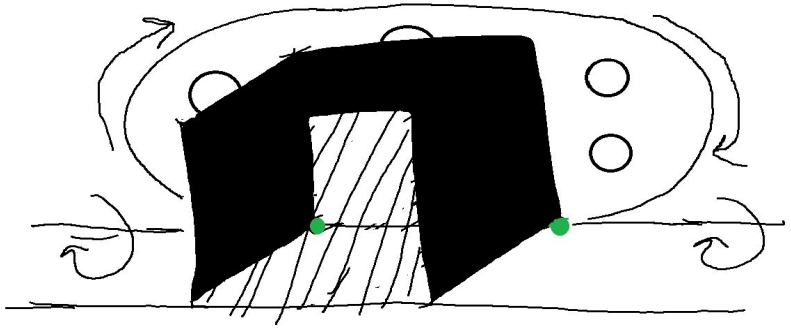
Server State Machine

Rotating Base/Cup Holder

- Cups will be placed on circular positions on a rotating platform (15.9” diameter)
- Circular platform will be covered with rubber to increase friction
- Tray will be mounted on lazy susan base, rotating using a stepper motor

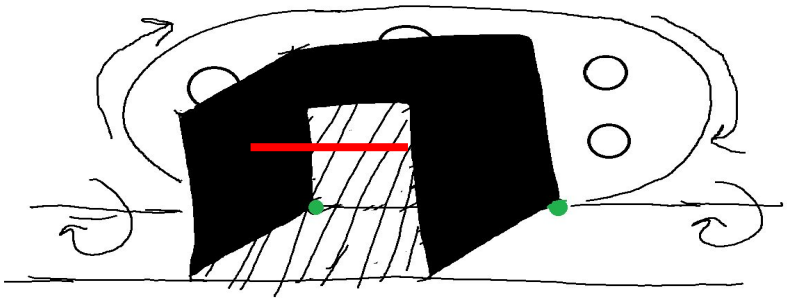
Serving Door/Cage

- Vending door will be automated by servo motor
- Vending door will auto-shut after being opened and cup is taken
- Back side of door will drop down 3 walls around cup so interior of machine isn't exposed to user



Failsafe Sensors

- Infrared tripwires are distributed to increase confidence in the system
  - AIRSUNNY three Leg Infrared Diode LED IR Emission and Receiver
    - Operating Distance 18~20m
  - Placed at serving door to see if cup is retrieved
  - Placed at base for position calibration



MDR Deliverables

- System that can pour a drink given a set input
  - All initial instances are set by the team (i.e. cups with ice, full bottles, drink selections)
- Server and website are implemented
  - Users can post to database
- Will pump out exact amounts of each liquid
- Base will rotate to place correct cups under pumps

MDR Deliverables

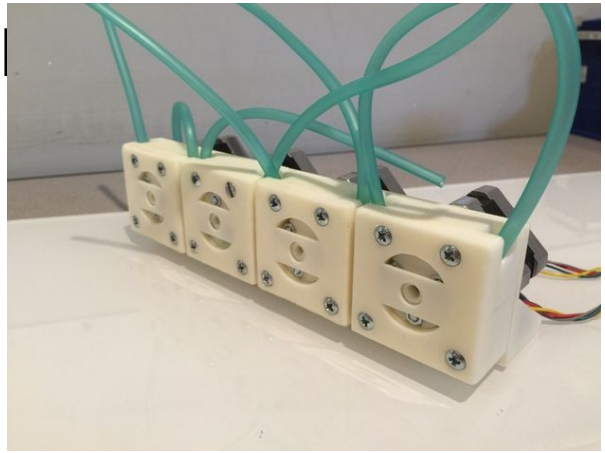
- System that can pour a drink given a set input
  - All initial instances are set by the team (i.e. cups with ice, full bottles, drink selections)
  - System can pour one drink from two specific positions on tray

MDR Deliverables

- Server and website are implemented
  - Simple HTTP server setup to serve web pages
  - Persistent socket connection between server and Pi is set up for communication of drink order
  - Website implemented using HTML, JS, and CSS

MDR Deliverables

- Will pump out exact amounts of each liquid
  - Stepper motors in 3D-printed peristaltic pump holders hang above rotating base
  - Motors rotate a specific amount to pump out liquid amounts - 1.5 ounces and 4.5 ounces res| for demo



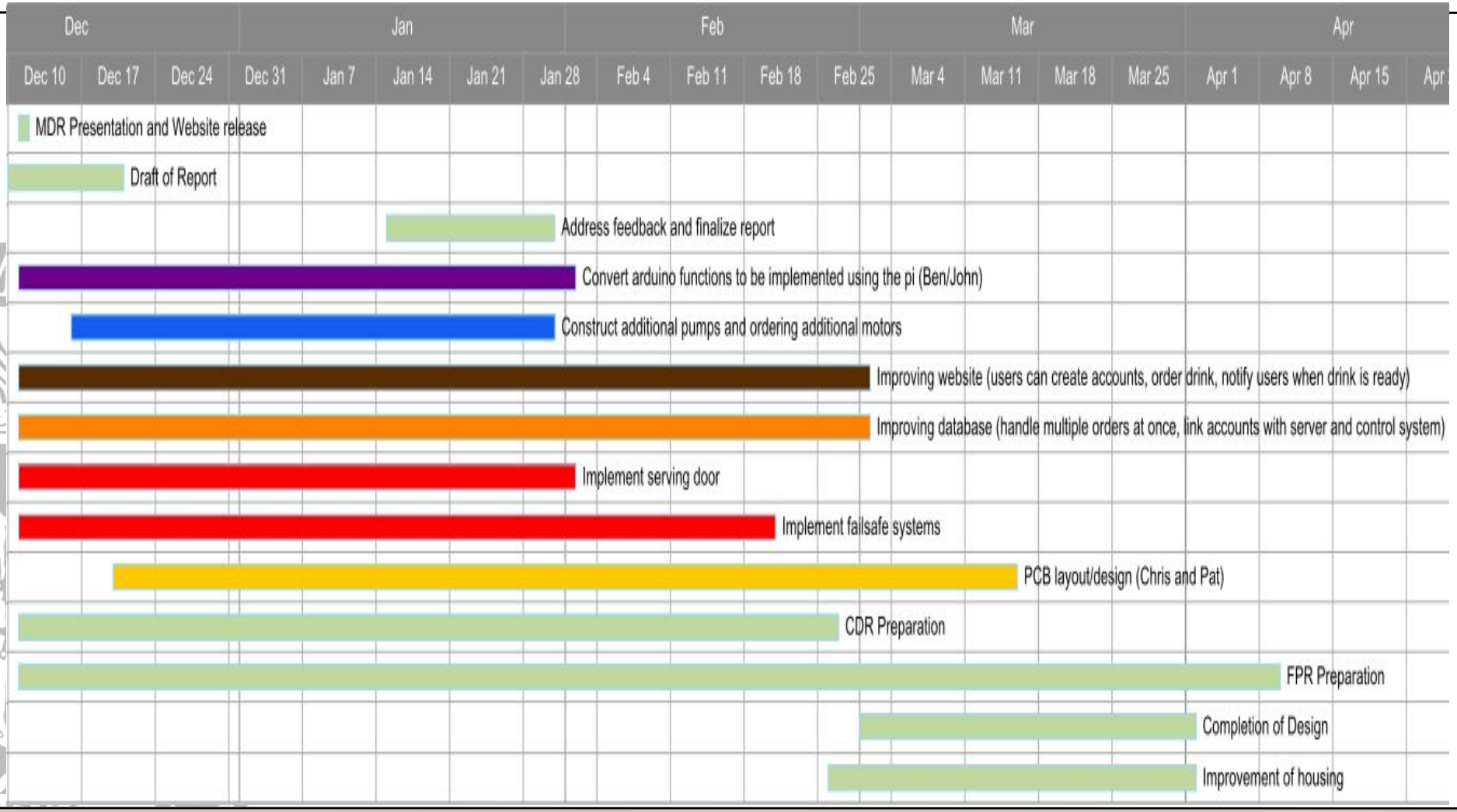
MDR Deliverables

- Base will rotate to place correct cups under pumps
  - Base rotates with the help of a Nema 17 stepper motor
  - Pre-defined sections of rotating base, relative to pre-defined starting position, move to specific area under pumps so liquid can be dispensed
  - Base rotates to next position via shortest path

CDR Deliverables

- Users can access our website and order a drink
- User will receive an updated status when their drink is complete, along with a personal identification code
- Server system and bartender system are fully integrated
- Fail safes are implemented
- Upscale pump system to 6 pumps
- Serving Door added

Gantt Chart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Dec 31
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Jan 28
Feb 4
Feb 11
Feb 18
Feb 25
Mar 4
Mar 11
Mar 18
Mar 25
Apr 1
Apr 8
Apr 15
MDR Presentation and Website release
Draft of Report
Address feedback and finalize report
Convert arduino functions to be implemented using the pi (Ben/John)
Construct additional pumps and ordering additional motors
Improving website (users can create accounts, order drink, notify users when drink is ready)
Improving database (handle multiple orders at once, link accounts with server and control system)
Implement serving door
Implement failsafe systems
PCB layout/design (Chris and Pat)
CDR Preparation
FPR Preparation
Completion of Design
Improvement of housing

Questions??

Just In Case