#### MDR

# Alfred (Wifi-enabled automated mixed drink maker) Team 15: John Fouad, Ben Ivaldi, Chris Wong, Pat Barron

December 11, 2017

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### Team Member Roles



Chris: In charge of Power/Control
 system

Professor

Moritz

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



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

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### 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

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### 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**



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### 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



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### Motors

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

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# 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

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### 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</li>

#### **Bartender State Machine**



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# 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



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# 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



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# 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





- 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

- 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

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- 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

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# **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



- 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



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- 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

1	De				Jan					Feb				Mar				Apr			
	Dec 10	Dec 17	Dec 24	Dec 31	Jan 7	Jan 14	Jan 21	Jan 28	Feb 4	Feb 11	Feb 18	Feb 25	Mar 4	Mar 11	Mar 18	Mar 25	Apr 1	Apr 8	Apr 15	Apr	
MDR Presentation and Website r			elease																		
		Draf	t of Report																		
							,	Add	ress feedback	and finalize	report										
V			n <del></del>		1			(	Convert arduir	to functions t	o be impleme	ented usin	g the pi (Ben/Jo	ohn)							
a								Con	struct addition	al pumps an	d ordering ac	lditional m	otors								
3													Improving web	site (users c	an create ac	counts, order	drink, notify	users when o	frink is ready	1	
2													Improving data	abase (handle	e multiple or	ders at once,	link accounts	with server	and control s	ystem)	
2									mplement ser	ving door											
5											Imple	ment fails	afe systems								
4														P	CB layout/de	sign (Chris a	nd Pat)				
5			n n									CDR	Preparation								
K			N												4			FPR Pr	eparation		
																	Completion	on of Design			
																	Improven	nent of housi	ng		

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#### Questions??

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### Just In Case



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