



# BEER – 0 – MATIC

**Mechatronics Design Project**



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**Group 13**

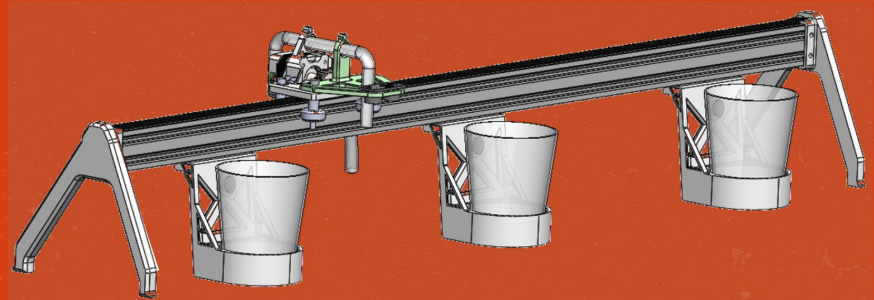
# Problem

Imagine entering a crowded bar, hoping for a drink. However, the bartender is so overwhelmed with orders that she is unable to attend to you. Your day has been ruined!



# Solution

Well, we have a solution.  
Beer-o-matic is here to help!



# Demo



## Spout moves to left limit

The left limit is the rest position for the spout

When a button is pressed



## Spout travels to cup location

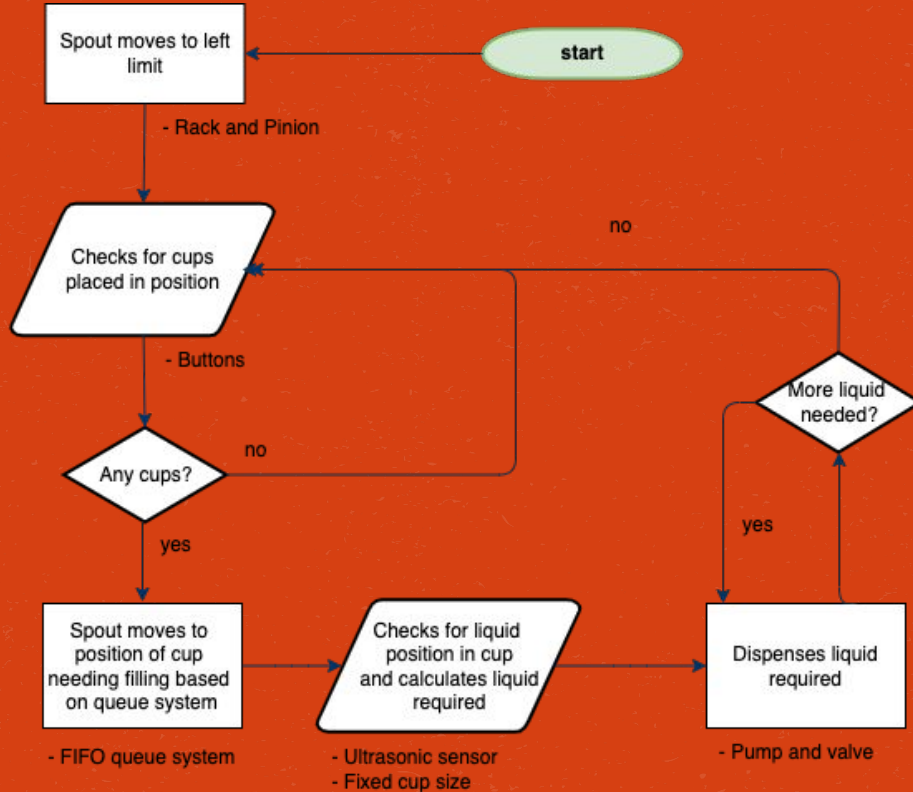
It verifies it is at the correct position using the IR sensor



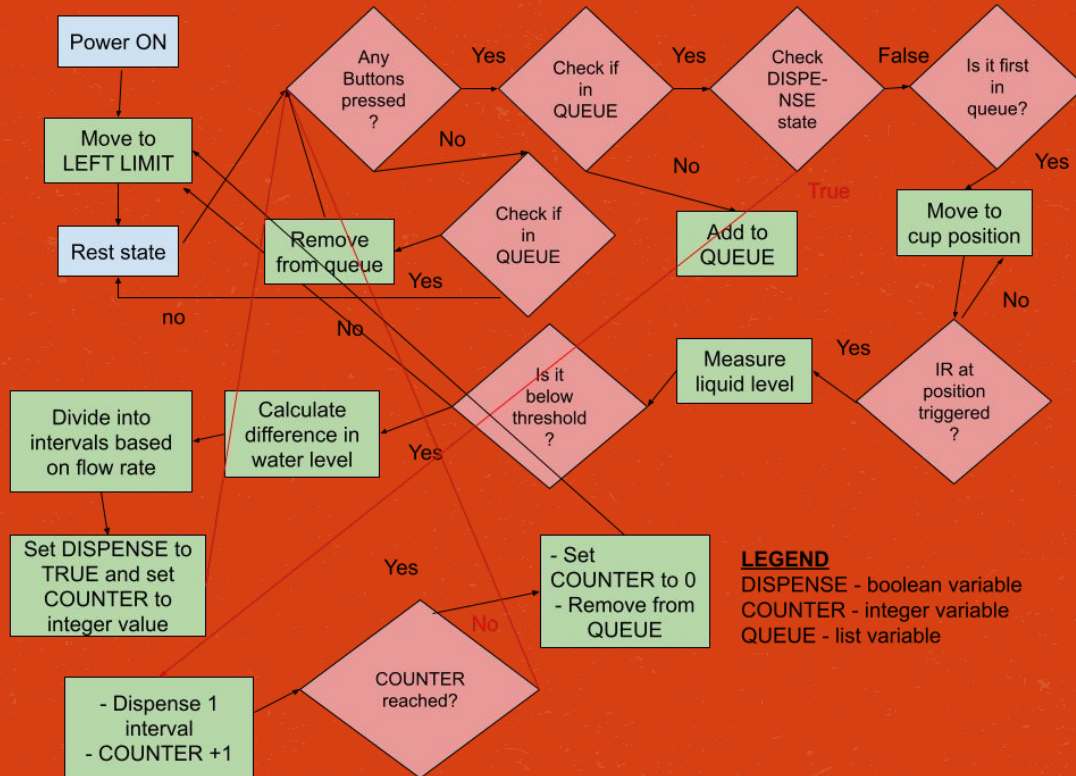
## Pours amount of liquid required

The ultrasonic sensor calculates how much liquid is required

# Logic Diagram

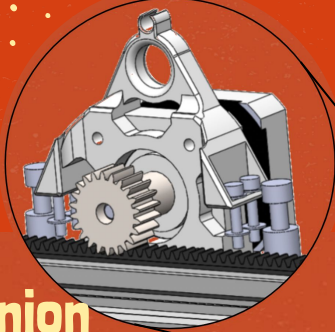


# Logic Diagram



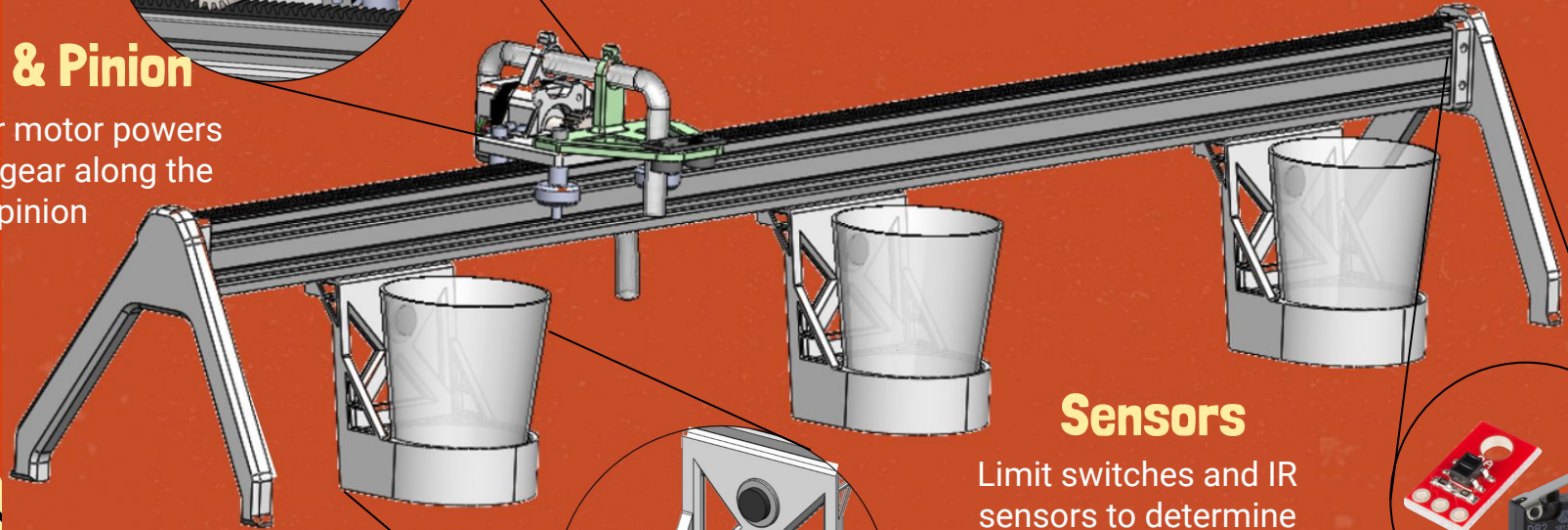


# Physical characteristics



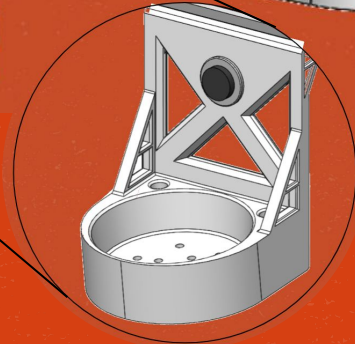
## Rack & Pinion

A stepper motor powers the rack gear along the pinion



## Cup Holder

By pushing the button, the spout travels over to dispense the beer



## Sensors

Limit switches and IR sensors to determine spout's location, creating a closed loop system





# Program logic

## Position tracking: indexing

Using the limit switches and IR sensors, we are able to keep track of the position of the spout

## Safety considerations

The pump is programmed to turn off when the motor is running, and vice versa.

When the spout hits the limit switch, it changes the direction of travel.

## Queue system

If 2 buttons are pressed simultaneously, the spout will serve one user before serving the other.





# Engineering principles

## Pump System

Vol. of cup = 500ml

Time to fill empty cup = ~3s

Flow rate = Vol./Time = ~200ml/s

## Ultrasonic Sensor

1. Determine rate of height increase = flow rate/surface area
2. Ultrasonic sensor detects distance of liquid in the cup
3. Time to dispense = distance/ rate of height increase

## Check valve

Beer is pumped from the keg and a check valve prevents dripping (single direction flow)





# Materials

## Fluid Pump

1. 3V Pump
2. PVC Hose(1m length, 6mm inner diameter)
3. Container (10L)
4. Check valve

## Linear Movement Spout

1. Stepper Motor and Driver
2. PLA filament for printing
3. Push button switch, toggle switch, limit switch
4. Voltage regulator
5. IR sensor, ultrasonic sensor
6. Wheel bearings
7. Aluminium T-slot profile (1m)



## Future work

- Test out pump with actual beer, calibrate ultrasonic sensor to add in the additional height gain due to beer head
- Add in additional spouts for different types of beers





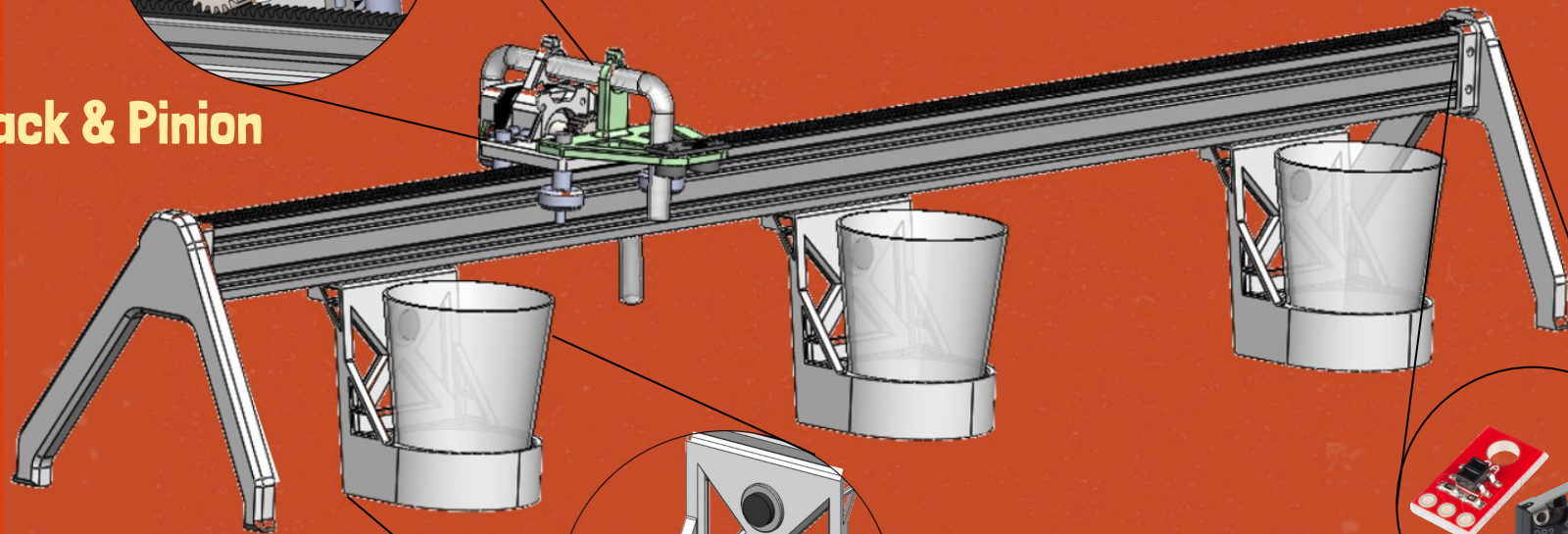
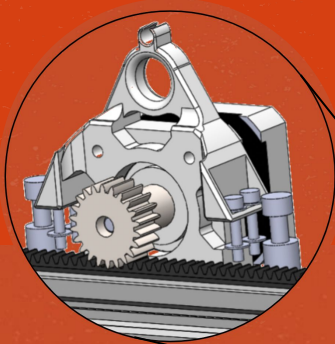
# Thanks!

Now, you'll be able to get your glass of beer  
just at the push of a button!

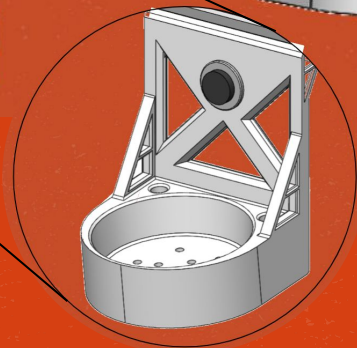


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by **Slidesgo**, including icons by **Flaticon**, and  
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**Rack & Pinion**



**Cup Holder**



**Sensors**

