**TORRO BY RACHAEL NG** 





# **Initial Research**

I observed my partner for 2 days, seeing where a device may help improve their life.

### Here are the notes I took on my partners daily activities:

- Wakes up late when it rains (is this a bad thing that needs fixing?)
- Forgets to put dirty dishes in dishwasher instead of sink
- Scratches the non-stick pan with metal
- Always forgets where he put his wallet and/or keys
- Forgets about the avocados and lets them go bad (pressure plate, put avacados on, after a certain amount of time it goes off to warn user about when avacados are ripe?)
- Drinks tea so much, but always forgets about it under the coffee maker, lets it go cold
- Uses too much oil while cooking
- Likes to listen to calming music to fall asleep but I find it distracting while sleeping

#### Here are some notes I took for device ideas:

- Personal space sensor senses another person or thing and sound increases as you get closer (covid)
- Brush teeth for 2 min
  - Accelerometer
- Checks temperature of food, if it drops below a certain temperature then it beeps and flashes a light
  - Plate —> hole in plate for light sensor
  - Plate of food covers hole, light sensor indicates you should begin checking temperature
  - Temperature sensor senses if food becomes too cold for enjoyable consumption
  - Beeps and flashes to indicate you should reheat your food
    - Could be useful for food safety (sushi, sashimi, etc.)

My partner loves tea - they drink it up to 4 times a day. The problem they always have is the fact that they put their cup and tea bag under the coffee maker, allow the hot water to fill the cup, but forget to retrieve it! They become too lost in whatever fun things are on their computer, and **leave the cup of tea to slowly become cold** in the kitchen.

For project 2, I want to create a **coaster, that indicates how hot the drink placed upon it is**. Green for hot, yellow for getting cold, and red for room temperature (gross). No one likes drinking room temperature tea when it's usually enjoyed hot!

When hot, the device is silent, and the green light indicates that your beverage is still nice and toasty! The device will make a noise when the tea is becoming cold, to remind the user to enjoy it while it's hot! It will beep 3 times, quietly, every 2 seconds. During this, the light will slowly be turning yellow. As the drink becomes even colder, the light will turn yellow to red, at which point the audio feedback will continue until the user removes the cup from the coaster.

#### What I'll need:

- 12 wires
- -Breadboard
- Arduino Uno
- DC Buzzer
- RGB LED
- 220 Ohm Resistor
- 10k Ohm Resistor
- Temperature Sensor
- Light Dependent Resistor

# **Exploration: Sketches**

I first played with the idea of having a red and green light to indicate when the tea is hot and room temperature. I decided this didn't allow the user to know when it is in between, so I switched to an RGB LED so it could gradient between red, eylow, and green. The light sensor must have a small hole at the top of the coaster to allow light to shine through, and I decided to put the temperature sensor just underneath the top of the coaster. The DC buzzer will sit inside the coaster, and the RGB LED will poke through a small opening on the side of the coaster.

Interactive Objects - ROJECT 2 Indicate when food should be rehealed ->or tea Geemp sensor 4 Pholo /light sensor green when still hot red when needs to 4 green led for RGB led be reheate



# **Fritzing Diagram**







### **The Code**

```
const int tempSensor = A1; // temp pin?

const int led = 9; // Red LED on pin 9 (PWM)

const int light = A0; // Light Sensor on Analog Pin 0

const int min_light = 550; // Minimum Expected Light value

const int max_light = 835; // Maximum Expected Light value

int value = 0; // Variable to hold analog readings

const int speakerPin = 13; // Speaker pin?

double valueTemp = 0; // hold temp values

double valueTemp2 = 1;

int temperture = 0; // the actual temperture calculated
```

```
const int redLed = 9;
const int greenLed = 10;
const int blueLed = 11;
```

```
void setup()
```

```
{
```

```
pinMode (tempSensor, INPUT);
pinMode (led, OUTPUT);
pinMode (speakerPin, OUTPUT);
```

```
pinMode(redLed, OUTPUT);
pinMode(greenLed, OUTPUT);
pinMode(blueLed, OUTPUT);
//console
Serial.begin(9600);
```

```
}
```

```
void loop()
```

```
{
```

```
value = analogRead (light);
valueTemp = analogRead(tempSensor);
valueTemp = valueTemp * 5;
valueTemp /= 1024.0;
valueTemp = (valueTemp - 0.5)*100;
//Temp is at celsius
```

value = map (value, min\_light, max\_light, 255, 0); // map the light reading in reverse value = constrain (value, 0, 255); // constrain values

Serial.println(valueTemp);

if (value>=250) { // Once the Coaster is placed on, enter the following IF STATEMENTS.

Serial.println(valueTemp2); // Constant update of which mode allows for easy test if (valueTemp2 == 1){ // MODE 1 // Switch cases weird with arduino, so basic if statements are the goto

```
if(valueTemp <= 40){ // If temperture is less than 40, blink red.
Serial.println(valueTemp);
Serial.println(valueTemp2);
digitalWrite(redLed, HIGH);
delay(200);
digitalWrite(redLed,LOW);
delay(200);
Serial.println(valueTemp);
```

}

if (valueTemp > 40 && valueTemp < 42) // If temperture is greater then 40(41), and less then 42(41)

{

```
digitalWrite(greenLed, LOW);// buffer
```

```
digitalWrite(blueLed,LOW);
```

digitalWrite(redLed,LOW);// Turn all the LED's off and play a slight buffer to stop flickering lights.

}

```
if (valueTemp >= 42){ // If temperture is greater then 42 (43), enter MODE 2 valueTemp2 = 2; // mode switch
```

```
analogWrite(redLed, 0);
analogWrite(greenLed, 255);
analogWrite(blueLed, 0);
tone(speakerPin, 440);
delay(500);
noTone(speakerPin);
delay(30000);// put 30 second delay
Serial.println(valueTemp);
Serial.println(valueTemp2);
```

```
}
}
if(valueTemp2 == 2){ //WE ARE NOW IN MODE 2
```

if (valueTemp >= 42){ // Once termpeture is greater then 42, continue to play a green LED for 30 seconds.

```
Serial.println(valueTemp);
analogWrite(redLed, 0);
analogWrite(greenLed, 255);
analogWrite(blueLed, 0);
tone(speakerPin, 440);
delay(500);
noTone(speakerPin);
delay(30000);// put 30 second delay
Serial.println(valueTemp);
Serial.println(valueTemp2);
```

```
}
```

if (valueTemp >= 40 && valueTemp < 42) // If temperture is greater then 40 (41) and temperture is less than 42 (41)

{

digitalWrite(greenLed, LOW);// ANOTHER BUFFER FOR GREEN YELLOW
digitalWrite(blueLed,LOW);

digitalWrite(redLed,LOW);// Turn all the LED's off and play a slight buffer to stop flickering lights.

}

if (valueTemp >= 30 && valueTemp < 40) { // If temperture is greater then 30(31-39) and less than 40, drink is cooling down

Serial.println(valueTemp);

analogWrite(redLed, 255); // Display a yellow light because drink is cooling down analogWrite(greenLed, 255);

analogWrite(blueLed, 0);

delay(20000); // 20 second delay

```
tone(speakerPin, 440); // 3 buzzes
delay(500);
noTone(speakerPin);
delay(500);
tone(speakerPin, 440);
delay(500);
noTone(speakerPin);
delay(500);
tone(speakerPin, 440);
delay(500);
```

```
noTone(speakerPin);
delay(500);
```

}

```
if (valueTemp > 28 && valueTemp < 30) { //- > Buffer Between Lights (29) buffer point for no flicker
```

```
analogWrite(redLed, 0); // buffer off
```

```
analogWrite(greenLed, 0);
```

```
analogWrite(blueLed, 0);
```

```
Serial.println(valueTemp);
```

```
Serial.println("baffer");
```

```
}
```

```
if(valueTemp <= 28){ // red beeping part(27)
  Serial.println(valueTemp);</pre>
```

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analogWrite(redLed, 255); // play red continously as the drink has cooled under 28 degrees.

```
analogWrite(greenLed, 0);
analogWrite(blueLed, 0);
delay(10000); // 10 second delay
tone(speakerPin, 440); // 3 buzzes
delay(500);
noTone(speakerPin);
delay(500);
tone(speakerPin, 440);
delay(500);
noTone(speakerPin);
delay(500);
```

tone(speakerPin, 440); delay(500); noTone(speakerPin); delay(500); tone(speakerPin, 440); delay(1000); // last 1 second noTone(speakerPin); delay(500);

} // mode 2 curly bracket

```
} // value curly bracket
if(value<250){ // IF THE COASTER IS NOT ON OR TAKEN OFF.
  valueTemp2 = 1; // WE RESET THE MODE TO 1.
  analogWrite(redLed, 0); // WE TURN OFF ALL LEDS.
  analogWrite(greenLed, 0);
  analogWrite(blueLed, 0);
  noTone(speakerPin);
}</pre>
```

}

## **Torro in Action**

To watch the Torro in action (overview): https://youtu.be/6REMuynoraM



In-depth demonstration of Torro: https://youtu.be/eLpKme-xRJE



## **Future Directions**

Torro indicates when tea begins to cool down, but what if it maintained the teas temperature? Torro could be used as a heating pad that not only keeps tea hot, but other beverages, and food as well. It would keep reminding the user that there is tea on the coaster, if it hasn't sensed that the user has taken a sip for awhile.

This could also be useful for drinking water, Torro could sense when a waterbottle is placed on the coaster, and remind the user to drink water if a certain amount of time has passed. Although, this direction begins to part paths from the original concept.