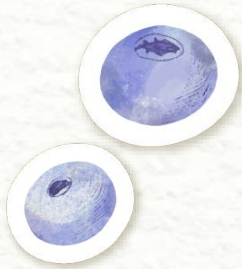


Freshness Finder

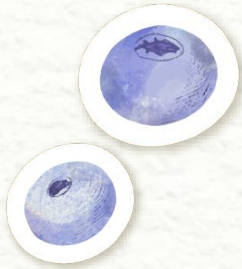
By: Francesco Marrocco, Ann Phan, and
Heath Sainio



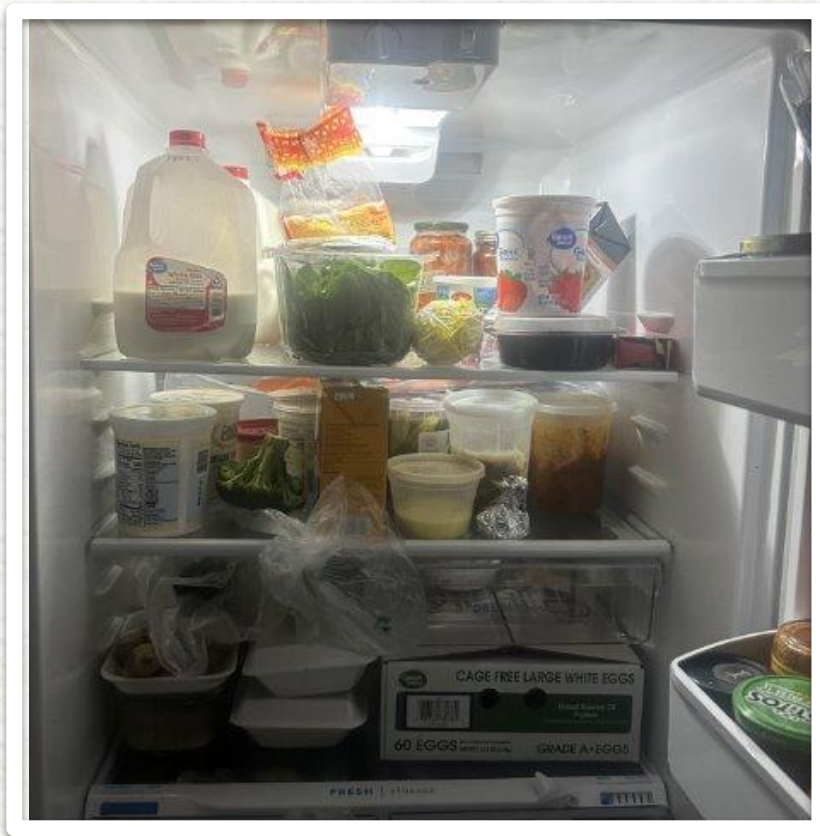


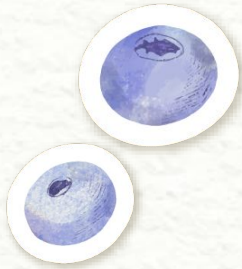
Does your
fridge look
like this?





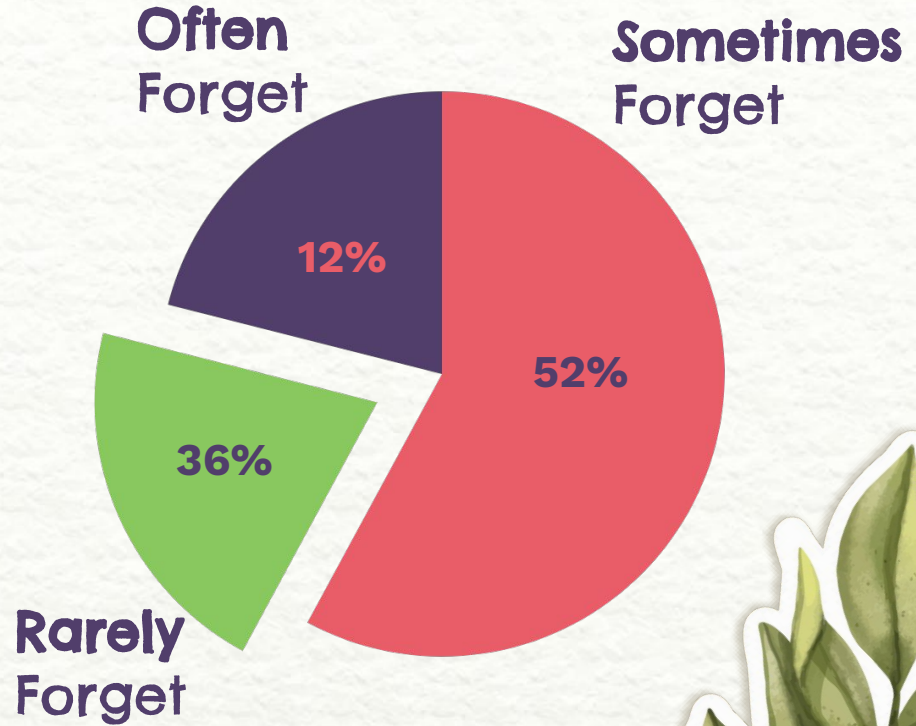
Or like this?





YOU'RE NOT ALONE!

64% of people waste food to some degree **because they forget**¹



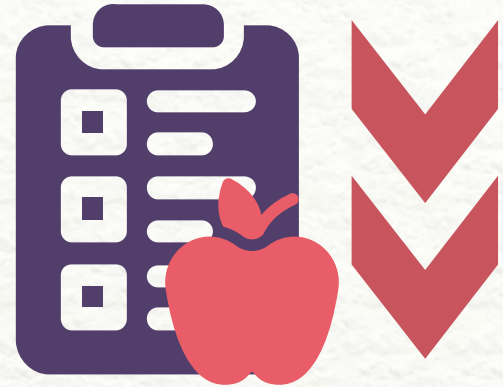
THIS CAN BE A SERIOUS PROBLEM!



Harmful Bacteria/mold
growth



Contributes to
food waste



Nutritional value
decreases

LOSS OF SENSES



People Have Tried Monitoring Fruit Before...



ECOTEST 6

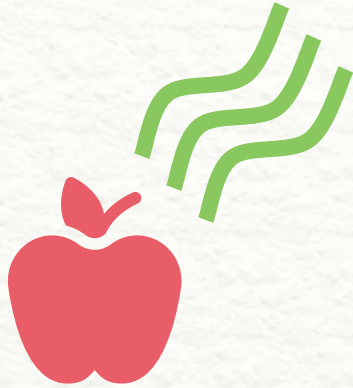
Can detect **nitrate** and **radiation levels**, and **water quality**.



STRELLA BIOTECH

Can detect the level of **ethylene** produced from large quantities of fruit for **commercial use**.

BUT NEVER LIKE US!!



METHANE DETECTION

Instead of tracking nitrate or ethylene, we detect **METHANE**.



HOUSEHOLD USE

Our device is designed for the **average household** fridge.



INCLUSIVE DESIGN

We kept our **wide range of customers** in mind through the design process.



Our Solution





How does it work?



Freshness Finder will
turn on after
recognizing light

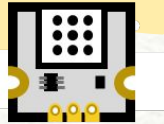
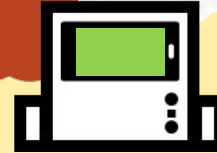


Turns on



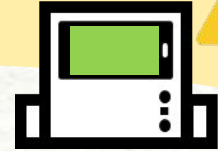
Add new fruit by
using the the screen
and buttons

Input



Sensing

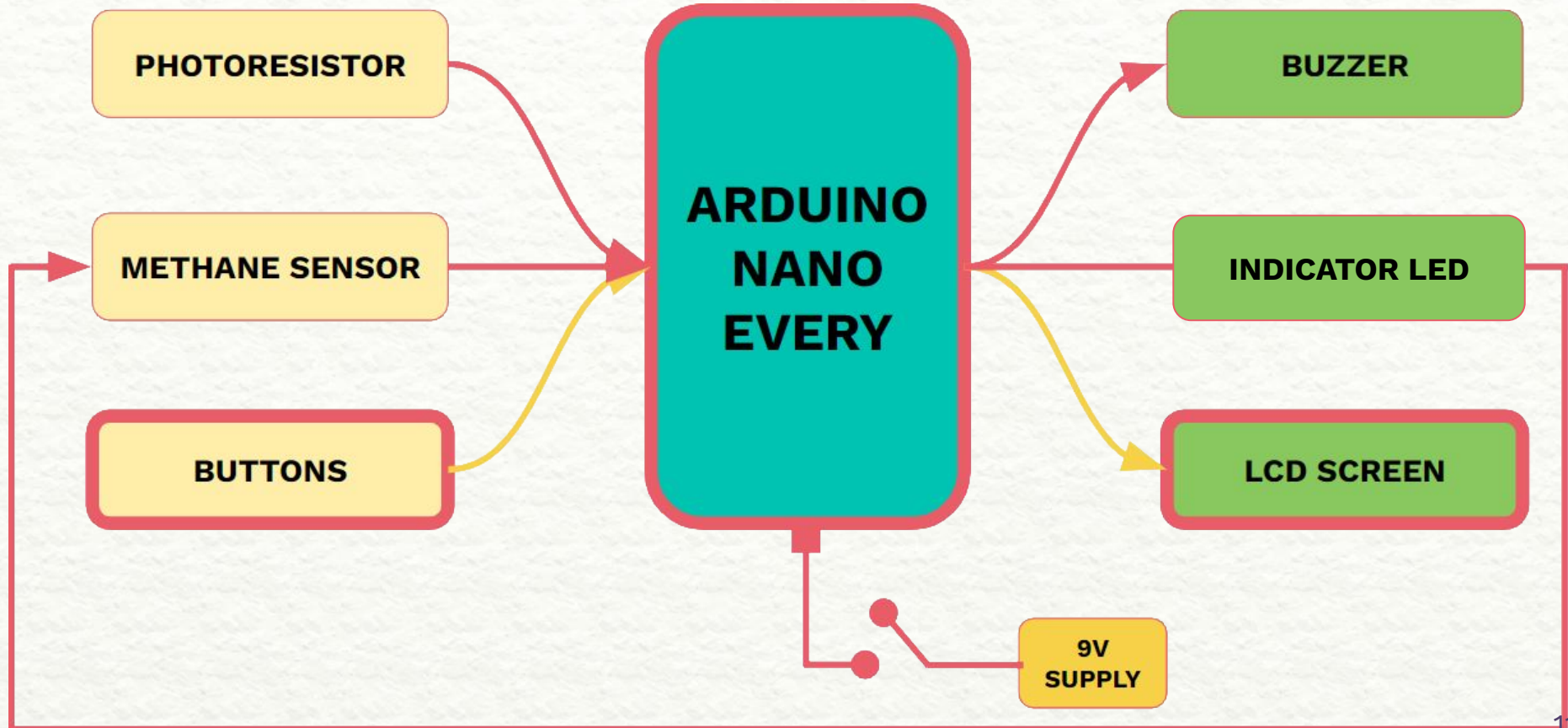
The LED will start
blinking-the methane
sensor is on!



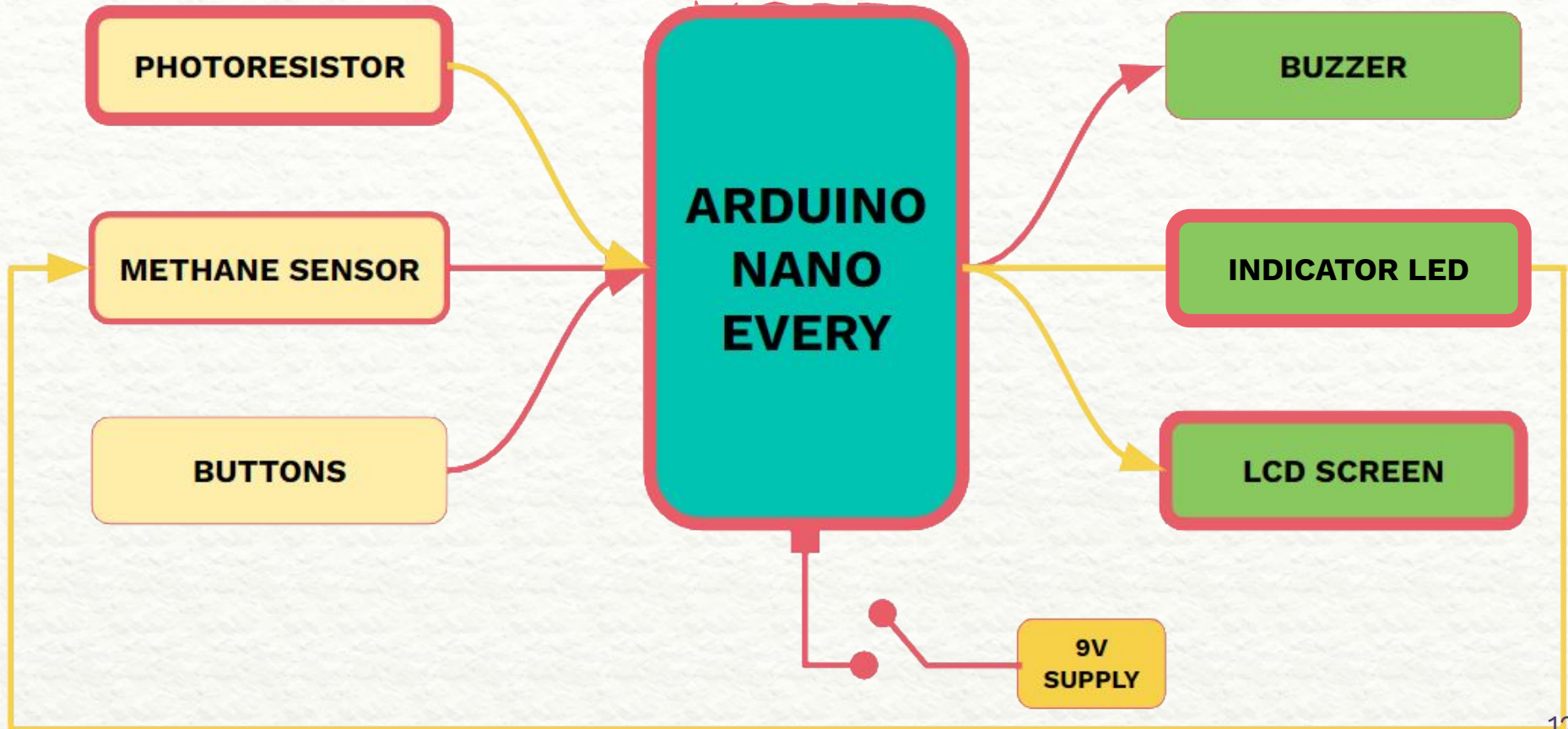
Alerts

Freshness Finder
will beep when
your fruit is close
to spoiling

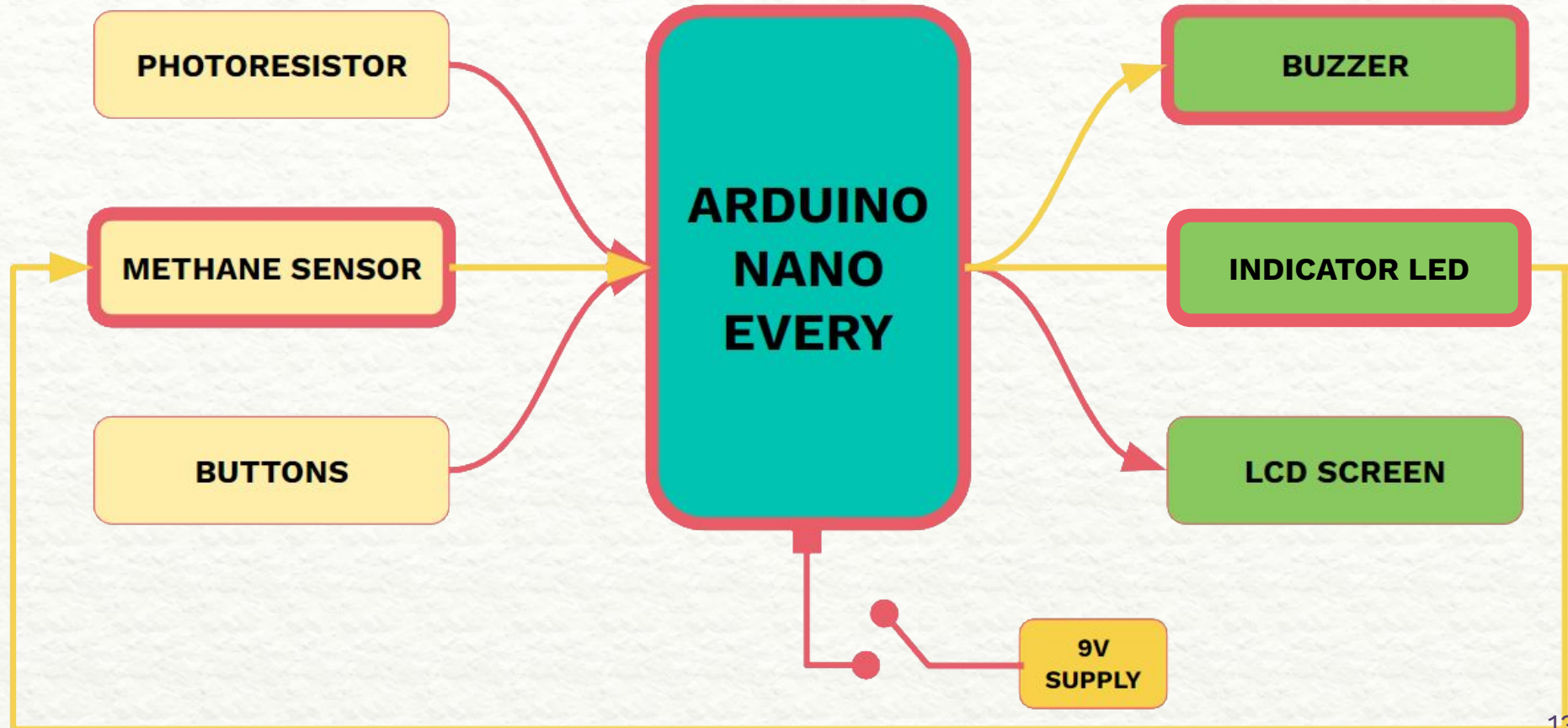
DESIGN APPROACH: USER INPUT



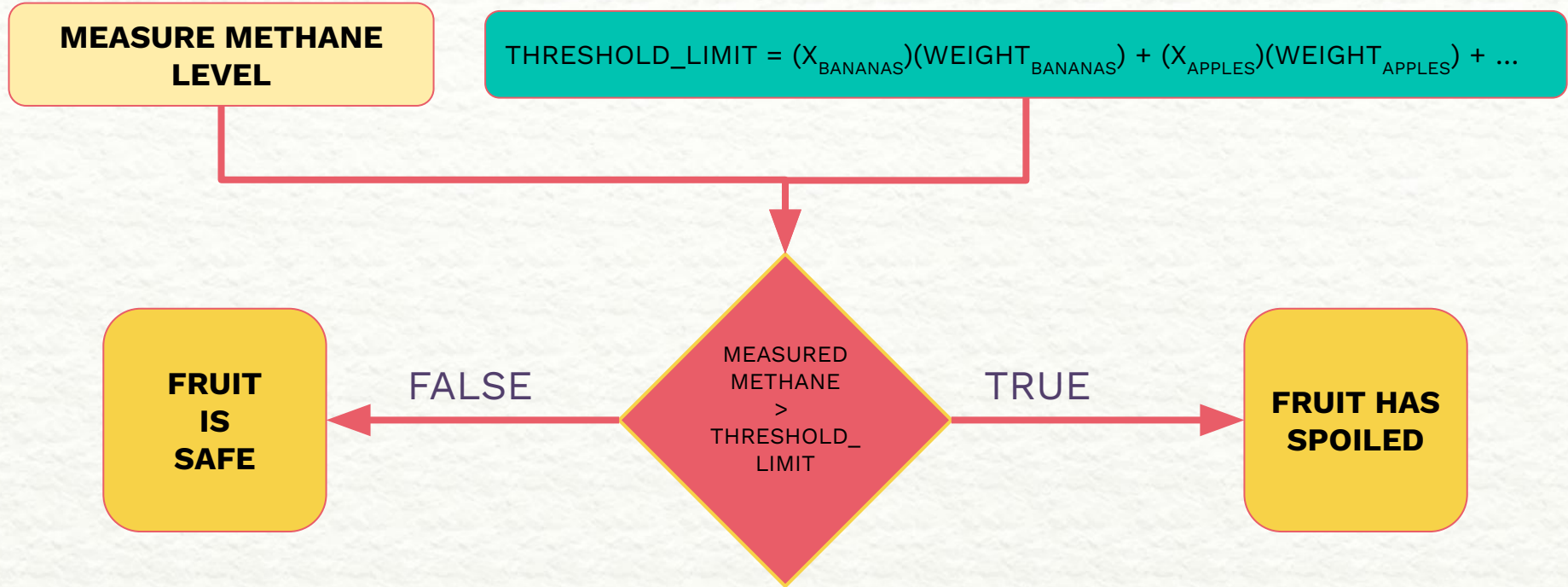
DESIGN APPROACH: LOW POWER

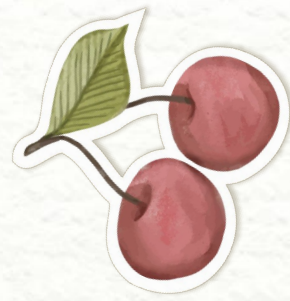


DESIGN APPROACH: ALERT ALGORITHM



DESIGN APPROACH





Casing

Compact Interface for fridge drawers.

Food-Safe PLA Casing.

Braille Authority of North America
(BANA) compliant **Braille**.



Ass Bambu X1E 3D printer arun
Anand

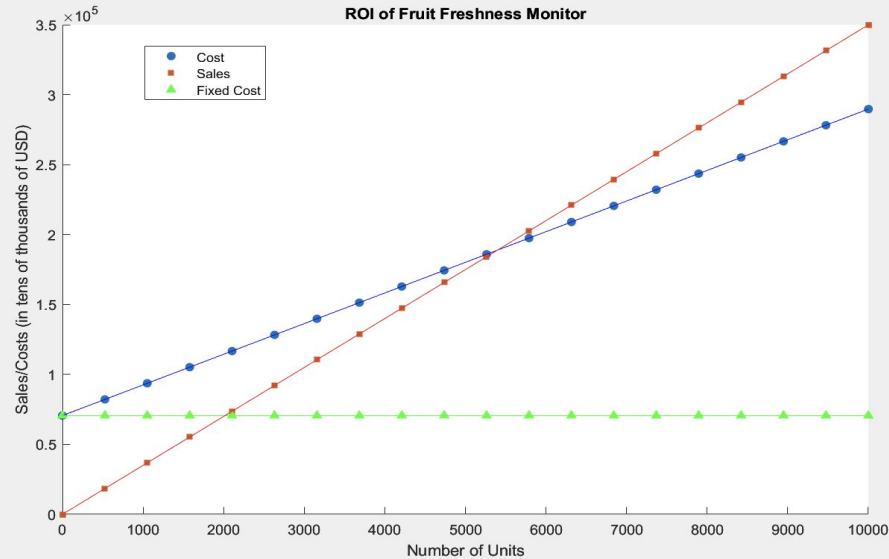


Cost Analysis

FIXED COSTS				
Cost Type	Cost	Quantity	Time (hrs)	Total:
Engineers	\$55.00	2	260	\$28,600.00
Technician	\$50.00	1	200	\$10,000.00
Rent	\$1,500.00	4	1	\$6,000.00
Equipment	\$3,000.00	1	1	\$3,000.00
Marketing	\$3,000.00	1	1	\$3,000.00
Compliance	\$20,000.00	1	1	\$20,000.00
Total:				\$70,600.00

UNIT COSTS		
Cost Type	Quantity	Cost
Buzzer	1	\$1.84
LCD	1	\$2.80
button	3	\$1.01
Plastic	1	\$0.60
on/off switch	1	\$0.36
Photoresistor	1	\$0.77
Microcontroller	1	\$1.33
Methane Sensor	1	\$4.38
Battery	1	\$3.30
PCB	1	\$0.70
Total:		\$17.09
Shipping to Amazon		\$0.25
Amazon Fee		\$3.42
Packaging		\$0.50
Assembly		\$0.66
Total:		\$4.83
TOTAL UNIT COST:		\$21.92

Cost Analysis

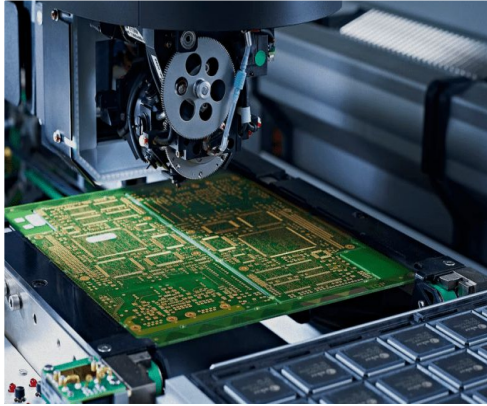


ROI ANALYSIS	
Cost Type	Money
Fixed Costs	\$70,600.00
Total Unit Cost	\$21.91
Total Revenue	\$349,900.00
Selling Prices	\$34.99
#units	10000
Total Costs	\$289,697.20
ROI	0.21
Break-even point	5398 units



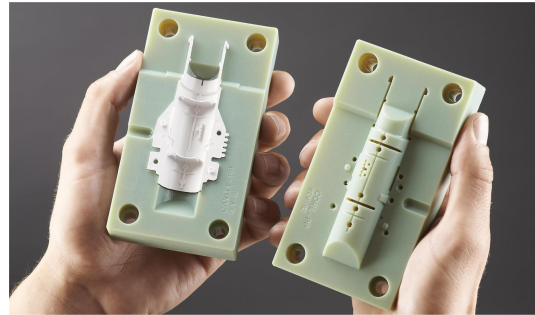
**LIVE
DEMO**

What Comes Next?



Custom PCB

Cut costs by printing our own PCBs.



Injection Molding

Ensure that there are no crevices for bacteria and mold.

```
1 #include "ArduinoLowPower.h"
2
3 void setup() {
4   pinMode(LED_BUILTIN, OUTPUT);
5 }
6
7 void loop() {
8   digitalWrite(LED_BUILTIN, HIGH);
9   delay(1000);
10  digitalWrite(LED_BUILTIN, LOW);
11  delay(1000);
12  LowPower.sleep(5000);
13 }
```

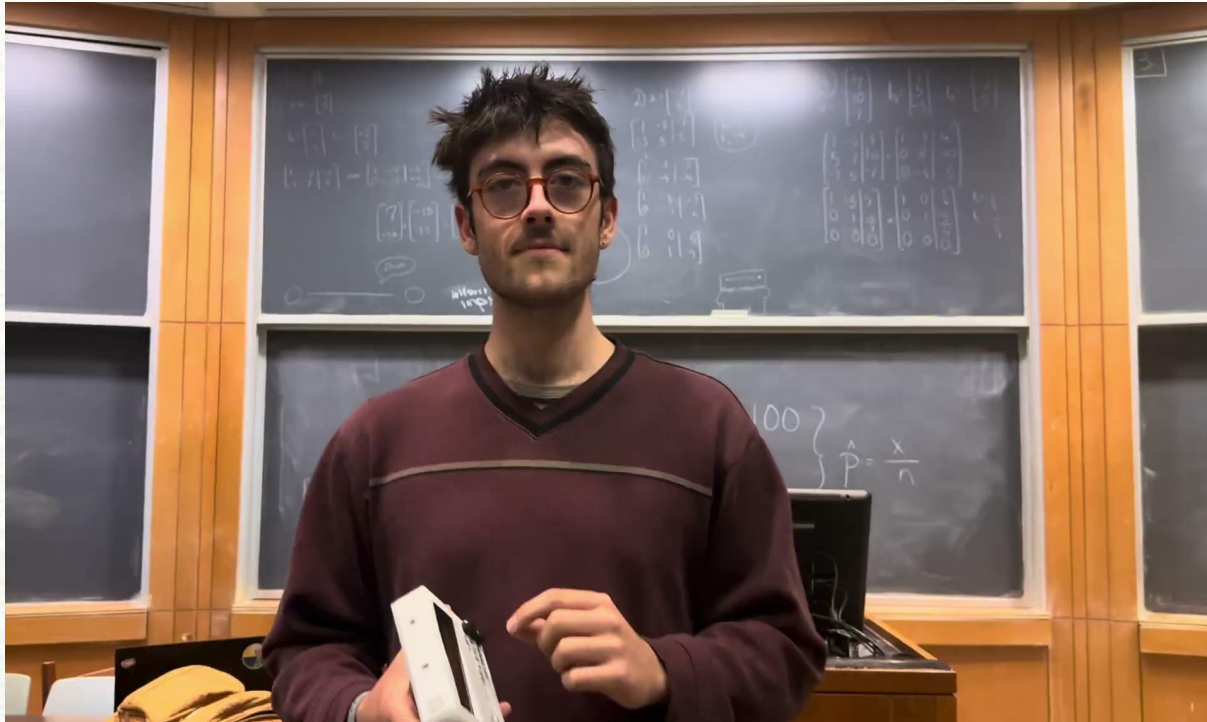
Software

Refine software to cover all cases and circumstances.

Thanks!

Do you have any
Questions?





Waterproofing

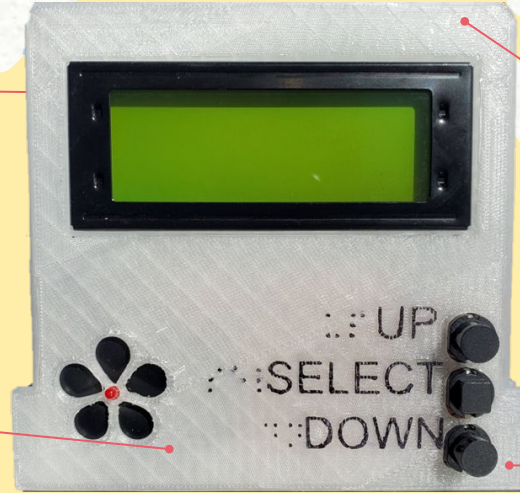


Rubber gaskets

Gaskets can provide sealing around edges for parts that need to be removable

Conformal Casing

A well-fit case can prevent unwanted liquids from seeping in



Breather Vents

Vents with foam filters keep dust and liquids away from PCBs

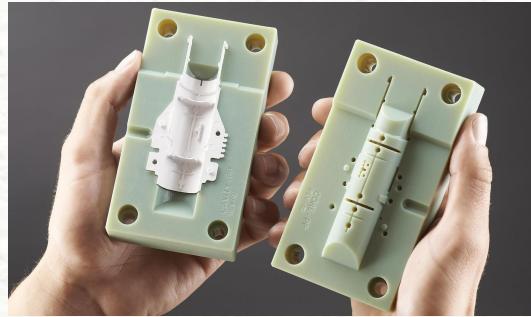
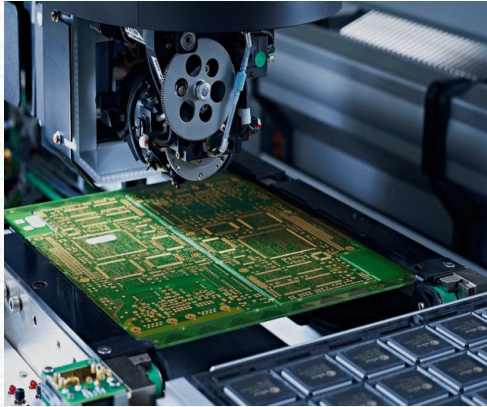
Resin

Coating certain components in resin can prevent damage

Sources

1. <https://www.montana.edu/research/publications/article.html?id=6443>
2. <https://www.tandfonline.com/doi/full/10.1080/17482970701284510>
3. <https://www.linkedin.com/pulse/cost-hiring-marketing-team-in-house-blueburstmediacom>
4. <https://masseyeandear.org/news/press-releases/2023/06/millions-of-patients-do-not-have-full-recovery-of-smell-or-taste-senses-after-covid>

What Comes Next?



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```