

FRUIT FRESHNESS

MONITORING

Fruit

- Yidan Gao

How many days fresh fruit can be stored under the current conditions and the freshness of a specific fruit

M K R 1 3 1 0

× L O R A

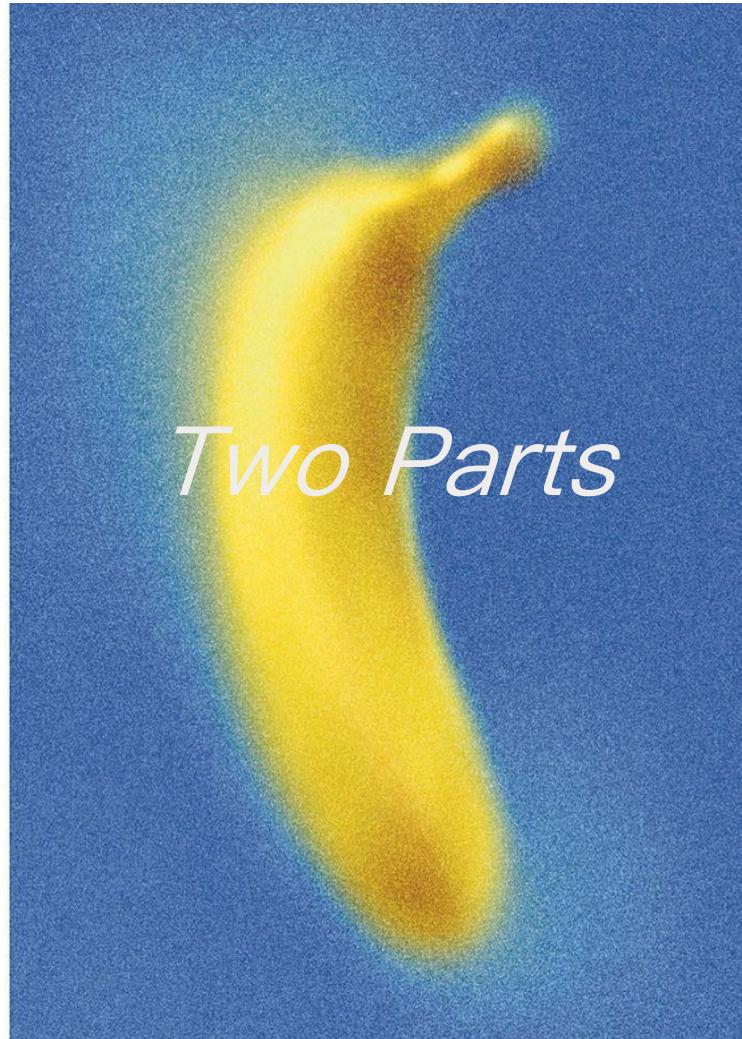
Github : https://github.com/gydgzh/ucl_casa0016_yidan

Banana
Orange

Catbus Fruit Detector

- DHT22 (temperature and humidity)
- MQ135
- TFT display
- Button * 2
- MKR 1310

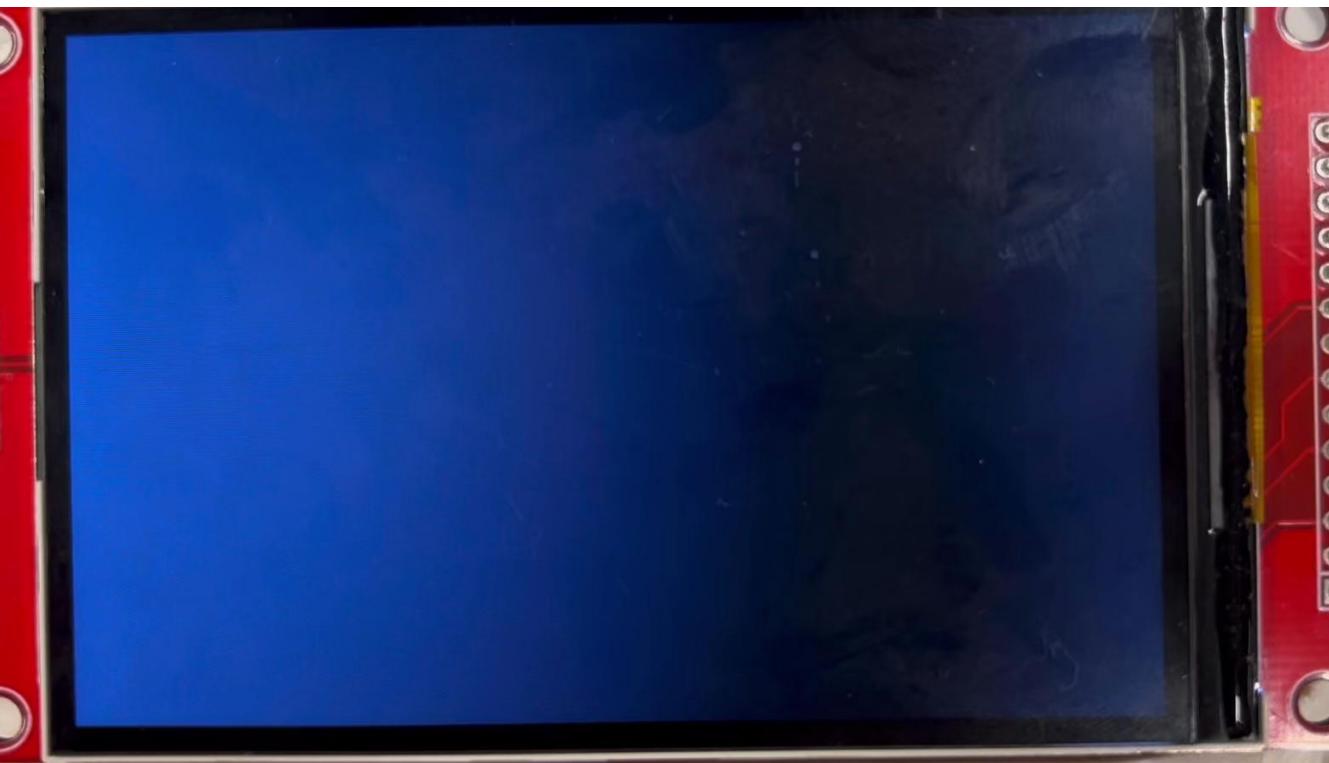
Banana



Web Monitoring System (Data flow)

- Arduino → TTN
- TTN Storage (latest 100)
- Web page → TTN API
- Web page display

— *Required before set up:*

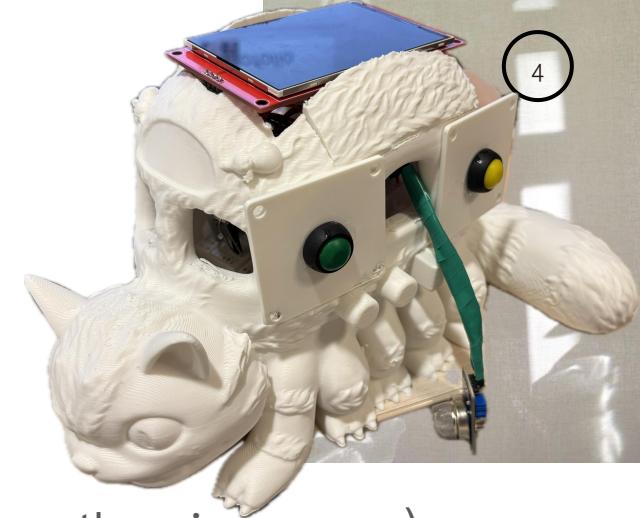


Automatically :

- a. Calibrate the gas sensor (10 seconds)
- b. Join the LoRaWAN network
- c. Show the main screen

Environment Monitoring Mode

- a. Reads temperature, humidity and air quality
- b. Estimates **how many days** a fresh fruit can stay good
- c. Gives a **score** for the current storage place (Score in a fridge is usually higher than in a room)



STAGE_VERY_FRESH (80-100) →	
STAGE_GOOD (60-79) →	
STAGE_EAT_TODAY (40-59) →	
STAGE_SPOILED (<40) →	

Yellow button:

switch fruit type (banana ↔ orange)

Data:

- a. Refreshes every 2 seconds
- b. Uploads data to TTN every 5 minutes

Fruit Testing Mode

Green button:

Check freshness of one piece of fruit (Works for the current fruit type)

Shows green when:

- no fruit is near
- or the fruit is healthy

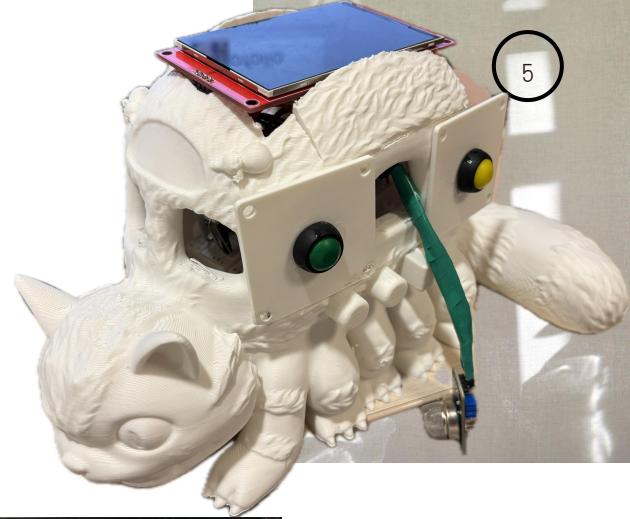


Shows red when:

- a bad banana close
(checks gas change and warns if the banana is not fresh)



Catbus Fruit Detector



Fruit Testing Mode

Press yellow button again → back to Environment Monitoring Mode

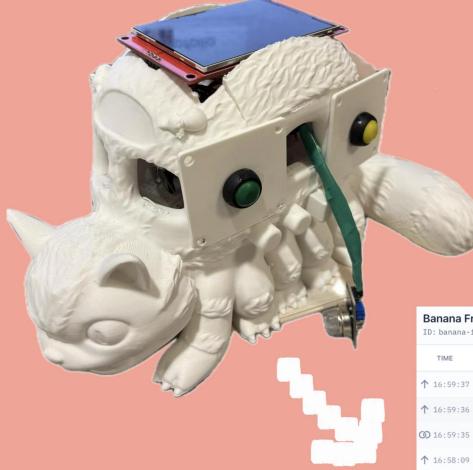
The screen will say that the gas sensor needs some time to calibrate.



Catbus Fruit Detector

Banana

- Arduino → TTN (5 min)



Banana Freshness Monitor + Add label
ID: banana-freshness-monitor

TIME	ENTITY ID	TYPE
↑ 16:59:37	banana2	Forward join-accept message
↑ 16:59:36	banana2	Successfully processed join-request
↓ 16:59:35	banana2	Accept join-request
↑ 16:58:09	banana2	Forward join-accept message
↑ 16:58:08	banana2	Successfully processed join-request
↓ 16:58:08	banana2	Accept join-request
↑ 16:56:08	banana2	Forward join-accept message

Last 12 hours

END DEVICE ID	RECEIVED	FRONT FINE	SEEN BY GATEWAYS	DECODED PAYLOAD
banana2	Dec 9, 2025 13:50:25	2	3	{ fruitType: 0, gasDelta: -1, gasPms: 102, humidity: 47.4, temperature: 25.1 }
banana2	Dec 9, 2025 13:51:01	2	3	{ fruitType: 0, gasDelta: 17, gasPms: 119, humidity: 43.4, temperature: 25.1 }
banana2	Dec 9, 2025 14:26:36	2	3	{ fruitType: 0, gasDelta: 1, gasPms: 99, humidity: 44.7, temperature: 25.1 }
banana2	Dec 9, 2025 14:31:37	2	1	{ fruitType: 0, gasDelta: 0, gasPms: 99, humidity: 44.9, temperature: 25.1 }
banana2	Dec 9, 2025 14:40:43	2	2	{ fruitType: 0, gasDelta: 0, gasPms: 100, humidity: 45.1, temperature: 25.1 }
banana2	Dec 9, 2025 14:53:43	2	1	{ fruitType: 0, gasDelta: 0, gasPms: 100, humidity: 45.3, temperature: 25.1 }

- TTN Storage (latest 100)



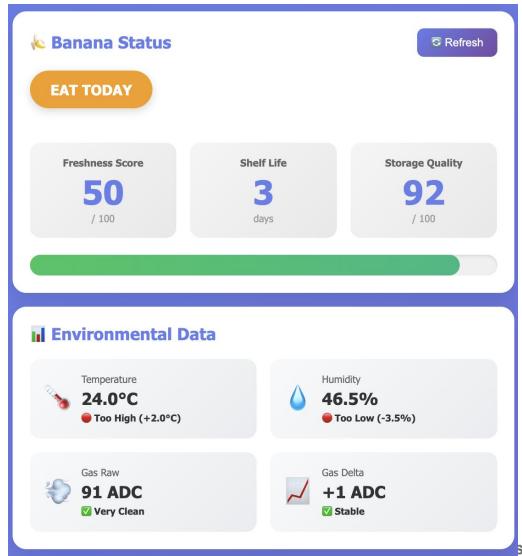
- Web page → TTN API
- Web page display

Data

Web Monitoring System—

- Many gases change when fruit goes bad (NH_3 , NO_x , alcohol, benzene, CO_2 , smoke)
- The system needs to store data over time to see how the fruit changes

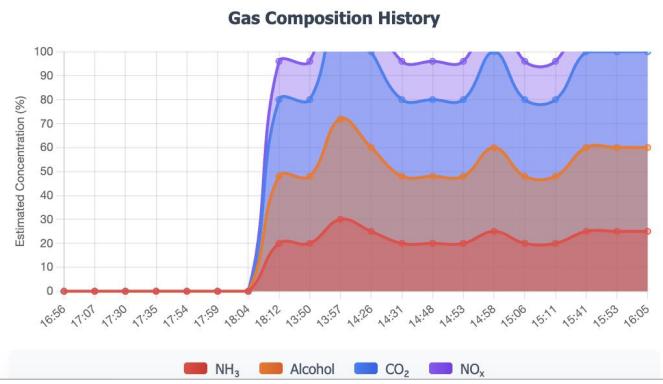
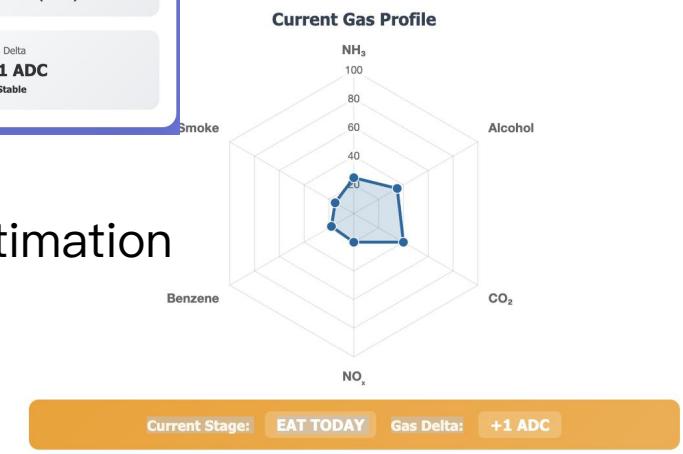
Fruit



Freshness Score



Gas Composition Estimation



Banana



Historical Data Line Chart

Web Monitoring System

Fruit

*Thanks for Your
Listening*

BY
Yidan Gao