GlowFresh

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Product Pitch

Did you know that the average person wastes **103 pounds** of food in a year due to expiration? Every year, millions of dollars are lost to food waste in households and restaurants due to forgotten perishables. Busy lifestyles make it easy to lose track of what's fresh — and often, it's too late by the time you notice.

Our solution is **GlowFresh** – a smart silicone pad that detects food placement and *glows* to indicate freshness, paired with a mobile app for smarter inventory management and grocery recommendations.

Our **sleek and compact** product detects an item placed on the pad and displays **expiration color** on both the physical pad and digital twin software. Users also receive **notifications** for warnings and when food expires.

System Description



System Architecture







- Hardware Interface
- → <u>NFC Scanner</u> registers food items via NFC tags
- → Pressure Sensor detects item placement on the pad
- → Level Shifter converts signal voltage (3.3V to 5V) for LEDs
- → <u>LEDs</u> show freshness status with color changes
- → <u>LiPo Battery</u> powers the pad for portable use.

System Evaluation



Software architecture

Food \rightarrow NFC Scan \rightarrow ESP32 \rightarrow Pad detection \rightarrow App + LEDs

Conclusions & Additional Information

GlowFresh successfully tracks food expiration status through visual indicators on the mat and real-time notifications via the mobile app. Our system meets performance targets, achieving high accuracy and low latency in item detection, expiration tracking, and inventory updates. Future works include implementing a model that gives predictions on food expiration based on temperature and humidity, real-time environmental sensing to adjust freshness alerts dynamically, as well as expanded grocery management features.







Use-Case Results

Feature	Target	Result	Notes
Expiration -> LED update	< 10s	< 10s	FastAPI sends periodic updates to ESP32, we set time to 10s to reduce overhead as items usually expire on a daily basis
Item location detection	99% accuracy	100%, < 10s update time	ESP32 sends sensor data updates every 10s
Manual add inventory update	<= 3s	2s average, no missed items	
Scan add inventory update	<= 5s	4s average, no missed detections	Phone scanner takes < 2s, board scanner takes longer ~5s
ltem removal update	<= 3s	<2s	
Expiring item notification	99% accuracy	100% correct notifications	Sends notifs on change in expiration status

Design Trade-offs

Original Plan	Changes	Trade-off
Thin, polished PCB	Breadboard for modular prototyping	Bulkier (~150% thicker), but saved ~1 week for iteration and improved reliability
ully molded silicone casing	Modular silicone encasing	Less polished look, but allowed easy hardware swaps



