FreshSense

Eat smarter, waste less.

[Refrigerator smart sensors and food monitoring app]

Theo Aronson | July 2023 | Stanford CEE 276G

Food Waste & Disease Facts

U.S. Department of Agriculture reports:

- U.S. food waste is estimated between 30-40% of the food supply*
- 17% of total global food production is wasted***
- 14% of food produced is lost between harvest and retail***
- Best approach to reducing food loss and waste is not to create it in the first place*

CDC estimates:

- 48 million people get sick from food borne diseases each year in the U.S.**
- 128,000 people are hospitalized…**
- 3,000 people die!**

Sources: *https://www.usda.gov/foodwaste/faqs
**https://www.cdc.gov/foodborneburden
***https://www.un.org/en/observances/end-food-waste-day

Human-Centered Design Concept

Leverage existing mobile infrastructure to reduce food waste.

Help reduce global food waste:

- Food Tracking: notifications alert user when food is approaching end of use (or has spoiled)
- Real-time temperature and humidity tracking to optimize food temps and save energy
- Ethylene gas filtration

Improve Your Health & Save Money:

- Encourages users to get more value out of groceries and leftovers
- Save money by discouraging delivery and takeout orders; grocery shopping insights
- Consumption and nutrition tracking provides health data insights

Smart Sensor Technology

Hardware

* All products function individually or can be combined for additional features and functionality.

FreshSense Coin Tags

- SmartApp notifies user of climate and food status
- Compact disc sensor also fits in individual food bags and containers
- Temperature, humidity, and bacteria tracking

FreshSense Hub

- SmartHub with integrated ethylene gas filter/sensor
- Constant monitoring of temperature, humidity, and bacterial mold
- Collects data from tags via BLE > connects to app via WiFi



Air Quality Sensor Disc



FreshHUB

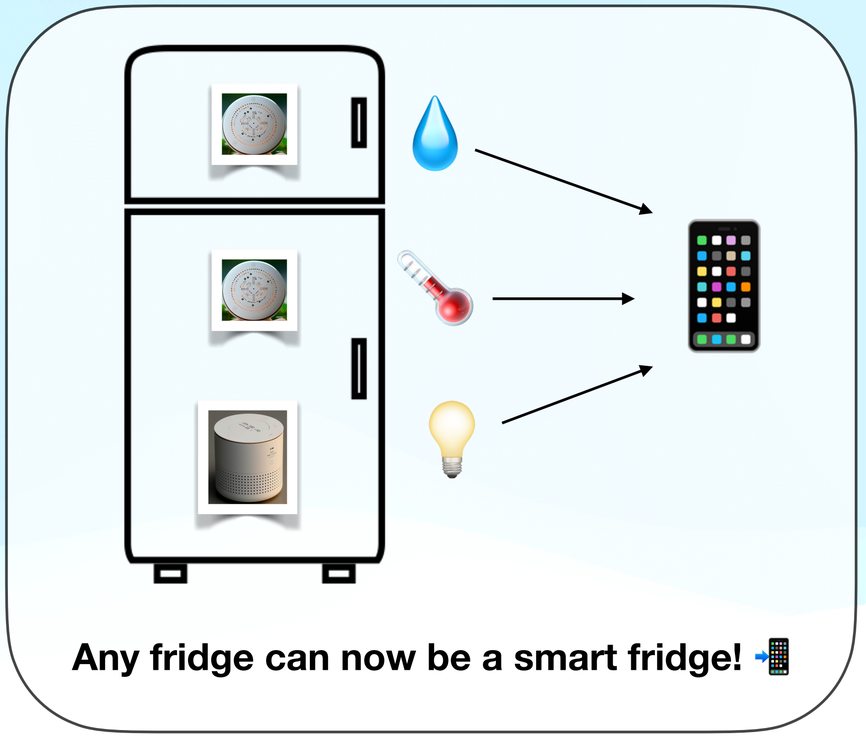
Smart Sensor Technology

Software

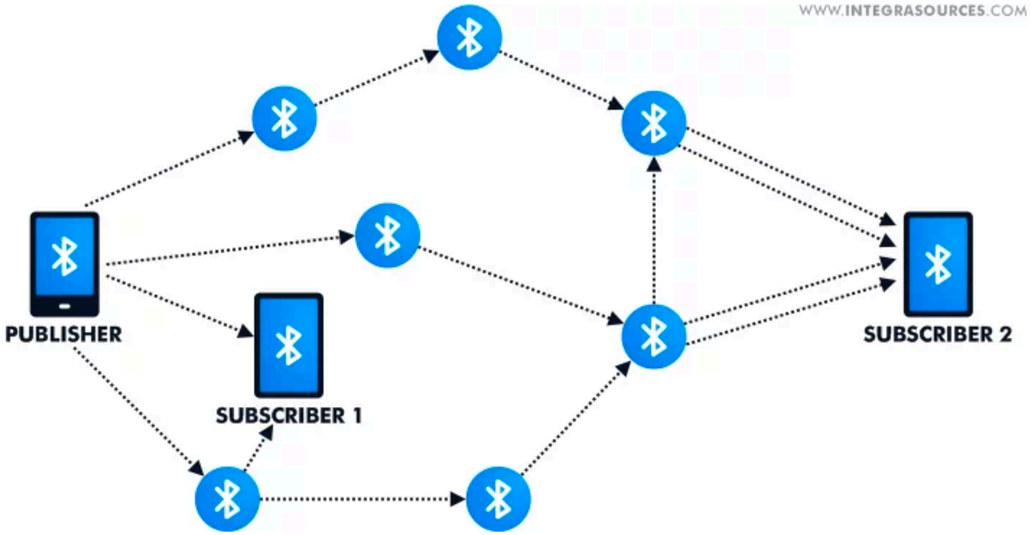
- Monitors air quality information
- Devices communicate via Bluetooth Mesh Network
- Climate and food condition data pushed to app

Generative AI Notifications:

- “Chicken breasts will expire tomorrow, July 18th. Cook tonight. Here’s a recipe idea: 📖”
- “Eggplant is actually a fruit not a veggie and should be stored with your fruits to last longer”
- “Did you know tomatoes are happier and taste better stored on your counter than in the fridge?”



Any fridge can now be a smart fridge! 📲



Product Roadmap

Smart App (iOS & Android):

- Hyper-local food and air quality monitoring
  - Tracking data for your fridge temp/humidity
  - Temp/humidity/mold sensing within containers
  - Basic food shelf life timers
- Linked to Whole Foods app so all store purchases are automatically added
- Image and receipt scanning technology to easily add groceries
- App learns food habits and suggests/discourages purchases based on buying and usage history.

Partnerships (Editorial):

- Epicurious
- Food Network
- NYTimes Cooking

Partnerships (Products & Brands):

- Sway (seaweed packaging)
- Ello (packaging & containers)

Feasibility

Challenges:

- Physical product design and current sensor technology
- Creating proprietary bacterial recognition process
- Competing with Amazon and other patent holders exploring the space
- Keeping product price point low (<$99 for hub and <$49 for pack of 5 sensor tags)

Solutions:

- Build initial product with existing tech (e.g. particle.io)
- Leverage existing food image libraries and generative AI to make app more user-friendly
- Develop MVP and pitch Amazon on partnering/investing!

The Opportunity / Impact

- 2022 global refrigerator market was estimated at USD $68 billion
- Empower individual users around the world to reduce food waste (start with micro changes to make a macro difference!)
- Sensor technology could easily be expanded beyond refrigerators and food monitoring. Other industries include medicine, industrial machinery, manufacturing, and farming.

Join us to:

- Reduce global food waste; Save yourself money; and Improve your health!

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PRODUCT

- Temperature; Humidity; Bacteria sensors
- Ethylene gas filtration
- Food monitoring app

BENEFITS

- Reduce Waste
- Improve Health
- Save Money

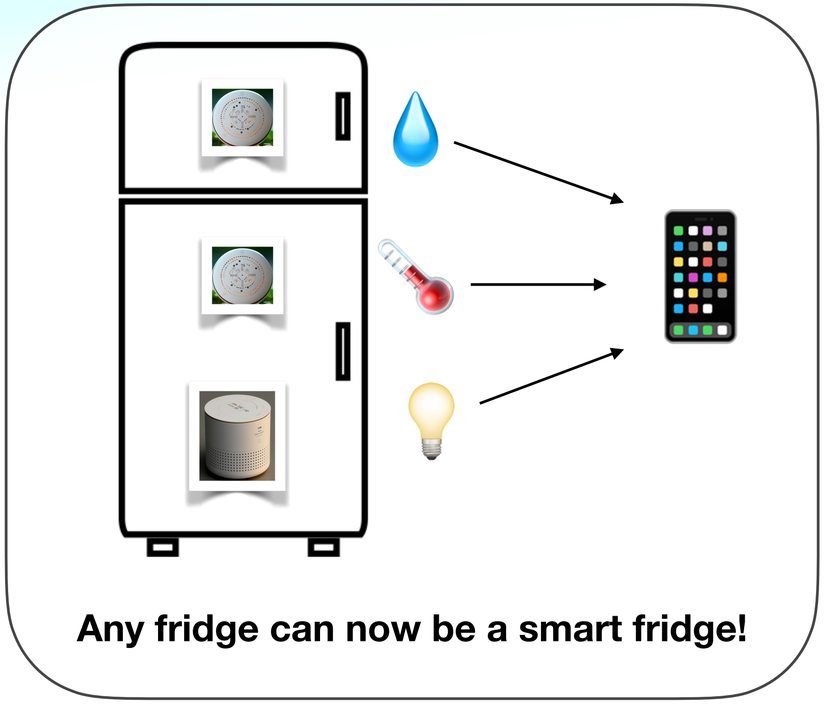
DESIGN PROCESS

- Food Sustainability & Waste
- Preserving < ≠ Monitoring Food = Behavioral Changes
- “Constant Empathy” (user feedback)



FreshSense Coin Tag (Disc Sensor)





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FreshSense SmartHub