



# Fridge or Foe

by  
[✓friends - 1]



## Problem Space

Shared fridges in universities bring up issues such as:

- Food theft
- Confusion over ownership
- Lack of accountability
- Individualistic behaviour

**Design challenge:** How can we use technology to foster trust and social connection in shared physical environments?

**Focus:** Intersection of social and mobile computing through gesture-based interactions and identity linkage.

**Aim:** Make food storage and sharing more interpersonal and playful (rather than anonymous and conflict inducing)

**Outcome:** Fridge or Foe utilises gesture-based interactions and local connectivity to make the experience of storing food within a more social and collaborative for the purpose of improving accountability within a shared university space context.

## Academic & Field Research

Research findings for our project may be split into two parts: contextual user research, and academic research.

(Background research)

We firstly wanted to familiarise ourselves with the domain and location for the project, being shared fridges across the UQ campus. The first week consisted of surveying usage habits of these fridges, namely which ones saw the most use, what times were the most full, and other general observations.

### Academic Research

We reviewed literature on tangible and embodied interaction, trust, and communal design.

Key findings:

- **"Embodied interaction"** (Dourish, 2001) – encourages intuitive, physical engagement with technology.
- **Design for trust** (Söderberg, 2021) – emphasises transparency and visible cues to promote shared responsibility.
- **Communal fridges and sharing systems research** suggests that success depends on social signalling and mutual respect rather than strict access control.

### Contextual User Research

We explored how people currently interact with communal food spaces and what behaviours shape sharing and trust – prototype testing was conducted on campus, generally at the communal kitchen in central library.

- **Trust and boundaries:** Users are hesitant to share food in public spaces due to fear of misuse or theft. Furthermore, although the fridge was generally consistently filled up, most people interviewed around the library had never actually used the fridge/
- **Social value of food:** Food exchange can create moments of connection and generosity between strangers → most people found that they are likely to bond over food.
- **Gestures as access:** Users were intrigued by gestures as a playful, personal form of interaction, though some expressed uncertainty about reliability and privacy.

## Prototyping

Prototyping itself has been done in 3 iterations, each cycle continuously being that of a higher fidelity, allowing for refined user testing.

### Iteration 1 – Roleplay/Mock-Up

Our first prototype was an acted scenario using a real fridge in UQ's Central Library. Participants were invited to imagine performing gestures to unlock it. This low-tech approach encouraged creative interpretation and helped us explore how people conceptualise gesture-based access without technical constraints.

- Suggestion 1: chained gestures
- Suggestion 2: the "gesture inventory"
- Questions and concerns about privacy/stealing of gestures raised

### Iteration 2 – Cardboard Low Fidelity Prototype

Building on these insights/suggestions, we created a simple physical prototype out of cardboard. This version allowed participants to test form, placement, and interaction flow. We refined our questioning to probe trust, body language, and accessibility in more detail.

- Participants valued clear visual feedback, suggesting light or sound indicators to confirm successful gestures. → front facing camera suggestion
- Gesture complexity affected confidence; users preferred short, expressive movements over subtle/intricate ones.

### Iteration 3 – Functional Prototype

Our final prototype is our current and most advanced iteration. It features a realistic full-scale build with an integrated screen, locking mechanism, and a Raspberry Pi-based gesture recognition system using machine learning. This version enabled functional testing of the complete gesture-to-unlock interaction, simulating the intended user experience.



## Ethics & Privacy

This prototype encourages social connection through gesture-based fridge access.

### Testing insights:

- Participants were uneasy about gesture visibility and potential imitation.
- Concerns emerged around names/photos being displayed with stored items.

### Ethical principles applied:

- Transparency on data collection and purpose.
- Participant control over visibility and identity.

### Privacy adjustments made:

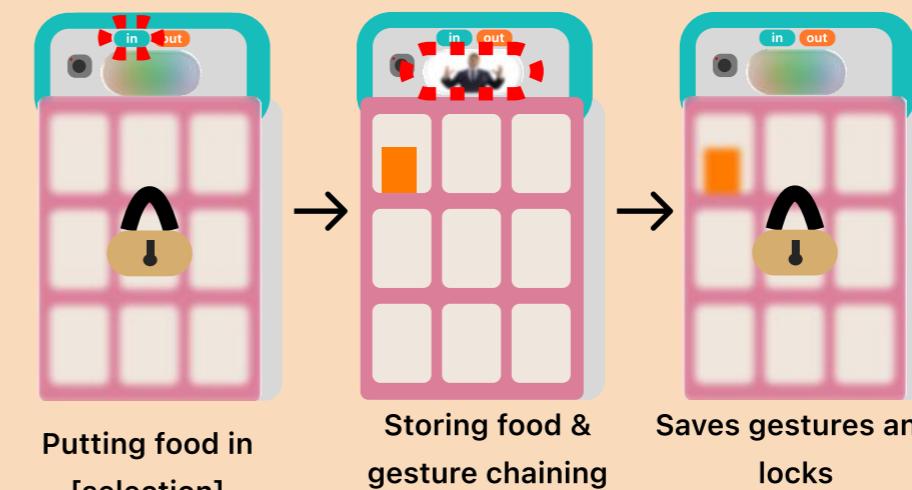
- Introduced chained gestures (three gestures to unlock for greater security).
- No collection of extra personal data (names, IDs, etc.) beyond what is necessary.
- Automatic deletion of item photos once food is removed.

Overall, our project balances accountability with privacy protection to maintain social trust.

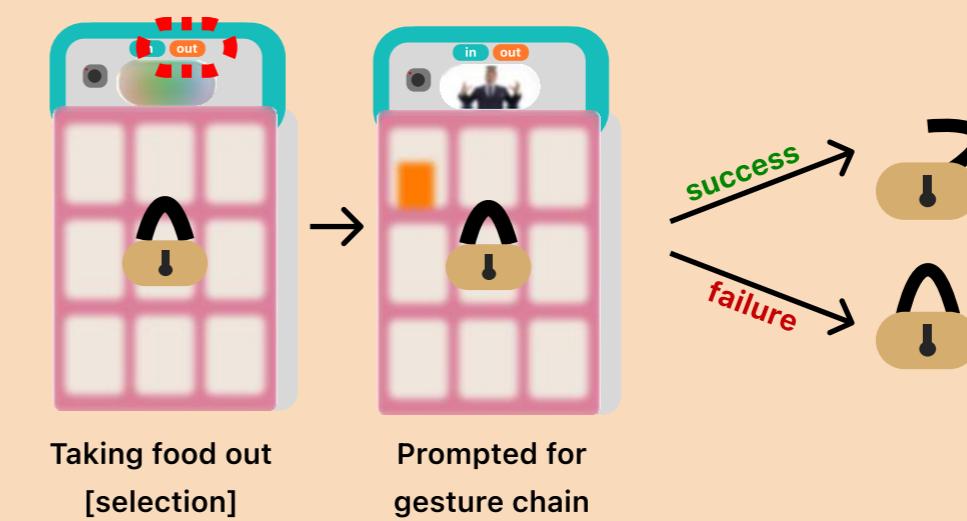
## Design Concept

**Our design** utilises a fridge equipped with a 3x3 array of food storage locations. The fridge is secured with a simple **locking mechanism**, that protects its contents. A camera and a display situated above the fridge allows users to **record a chain of gestures** to store and access their food from a section of the 3x3 fridge grid. Utilising **machine learning and vision models**, the fridge only allows those who perform the right sequence of gestures to access contents inside.

### Usage - Storage



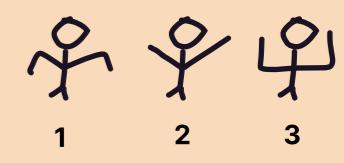
### Usage - Retrieval



### Unseen Interaction - Gesture sharing / Social Interaction

A: Hey! I've put some food in the Central Library fridge!

B: Cool! Could I have a bite the next time I come round?  
A: Sure! He's the gesture code ;)



B: Haha! That's awesome, thanks for sharing your food! I'll bust these moves out at the fridge.

This all comes together as...

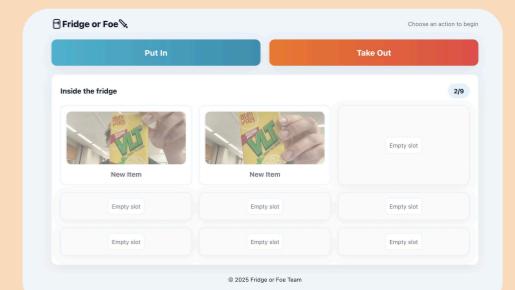


## Evaluation

Insights from both academic research and user testing directly shaped the evolution of our design.

### Key Changes & Insights:

- Chained gestures introduced to improve security and reduce the chance of gesture "theft," inspired by feedback on privacy and trust concerns.
- Front facing screen added to provide clear feedback and transparency, addressing visibility and accountability (aligning with Design for Trust principles.)
- Physical scale and presence refined based on embodied interaction theories (Dourish, 2001), enhancing the performative nature of gesture input.
- Sound and light cues implemented to create a more responsive, human-like interaction loop, supporting user confidence during testing.



## Adaptability & Mobility

Though originally targeted at university libraries, our design is adaptable to a variety of **shared public spaces**. Other places where a solution like ours would **thrive** are shared office break rooms, group accommodation kitchens and other locations where a fridge is shared by a community.

With that being said, we do acknowledge potential **pitfalls** our solution could face in certain environments where **mutual trust is low**, such as prison systems, or openly accessible public sites.

All in all, we are proud as a team to have proposed a design solution that supports various environments, communities and locations.

## Future Work

Future work on *Fridge or Foe* could go in a variety of directions. Some features we would like to see implemented based on our testing and discussions as a team are:

- The ability to adapt traditional fridges for our system
- Better accessibility options for users who may struggle with performing physical gestures