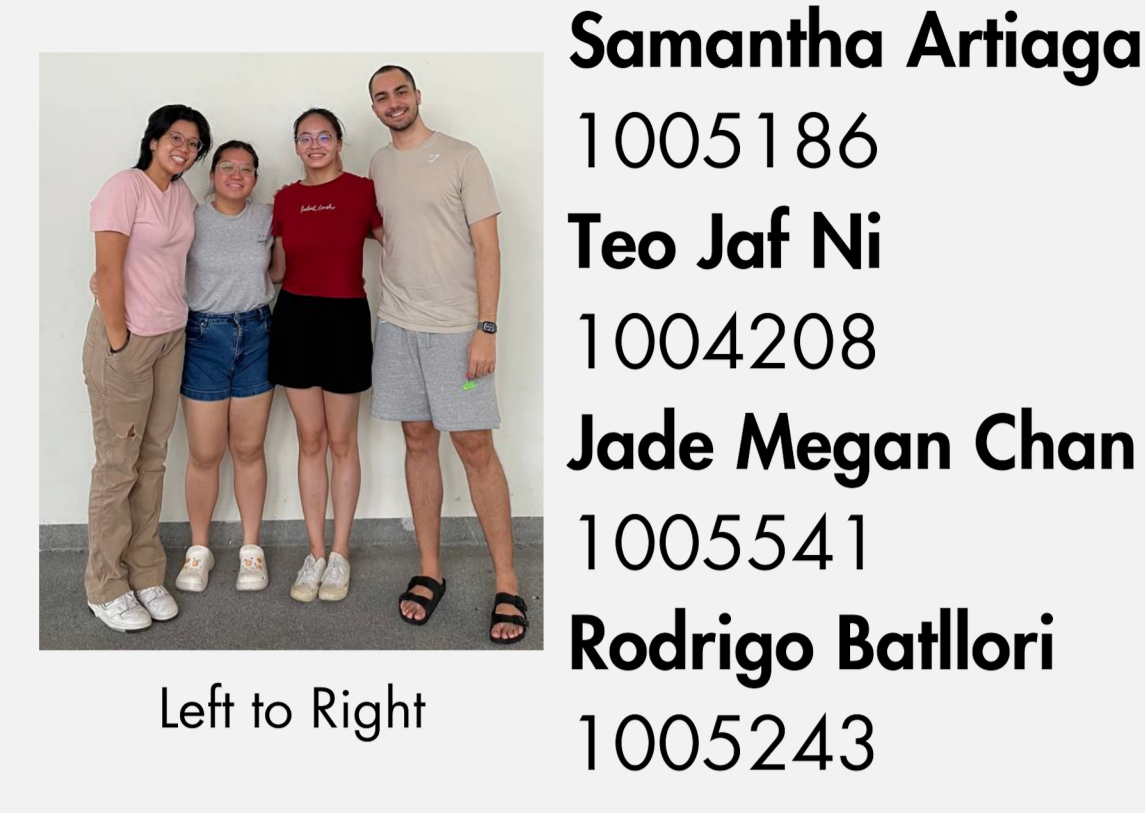




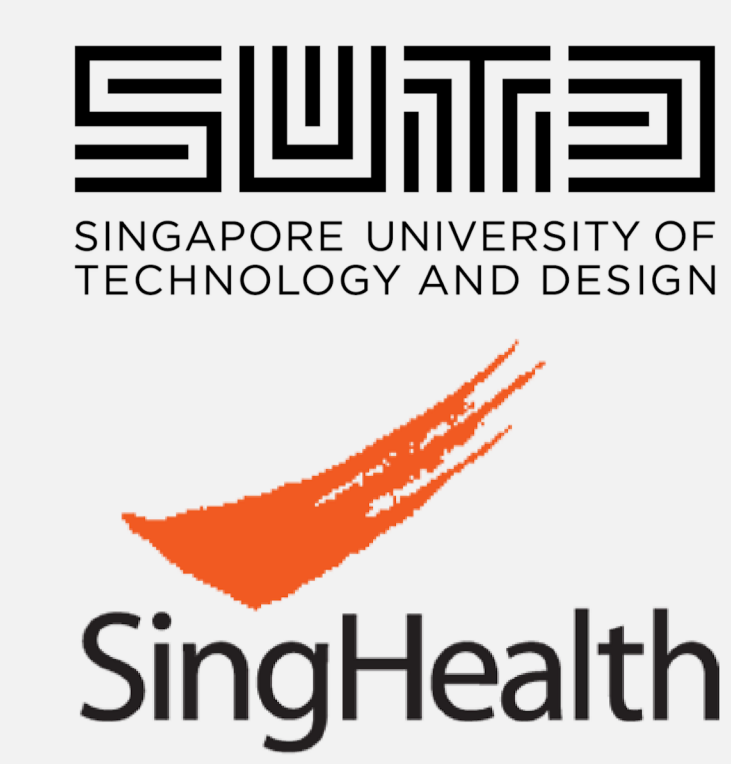
Convenient
Automated
Request
Enabler

Product Description
A semi-intuitive, low-cost and self-resetting drink-ordering device tailored for hospital wards of tomorrow, equipped with ambient intelligence

Student Team



Course Mentors



01.101: Technologies for Sustainable Global Health
AY 2023 Term 7
Instructor: Dr. Khoo Xiaojuan and Dr. Zhu Yajuan
Client: Dr. Daniel Leong, Smart System Planning Eastern General Hospital

IDENTIFICATION

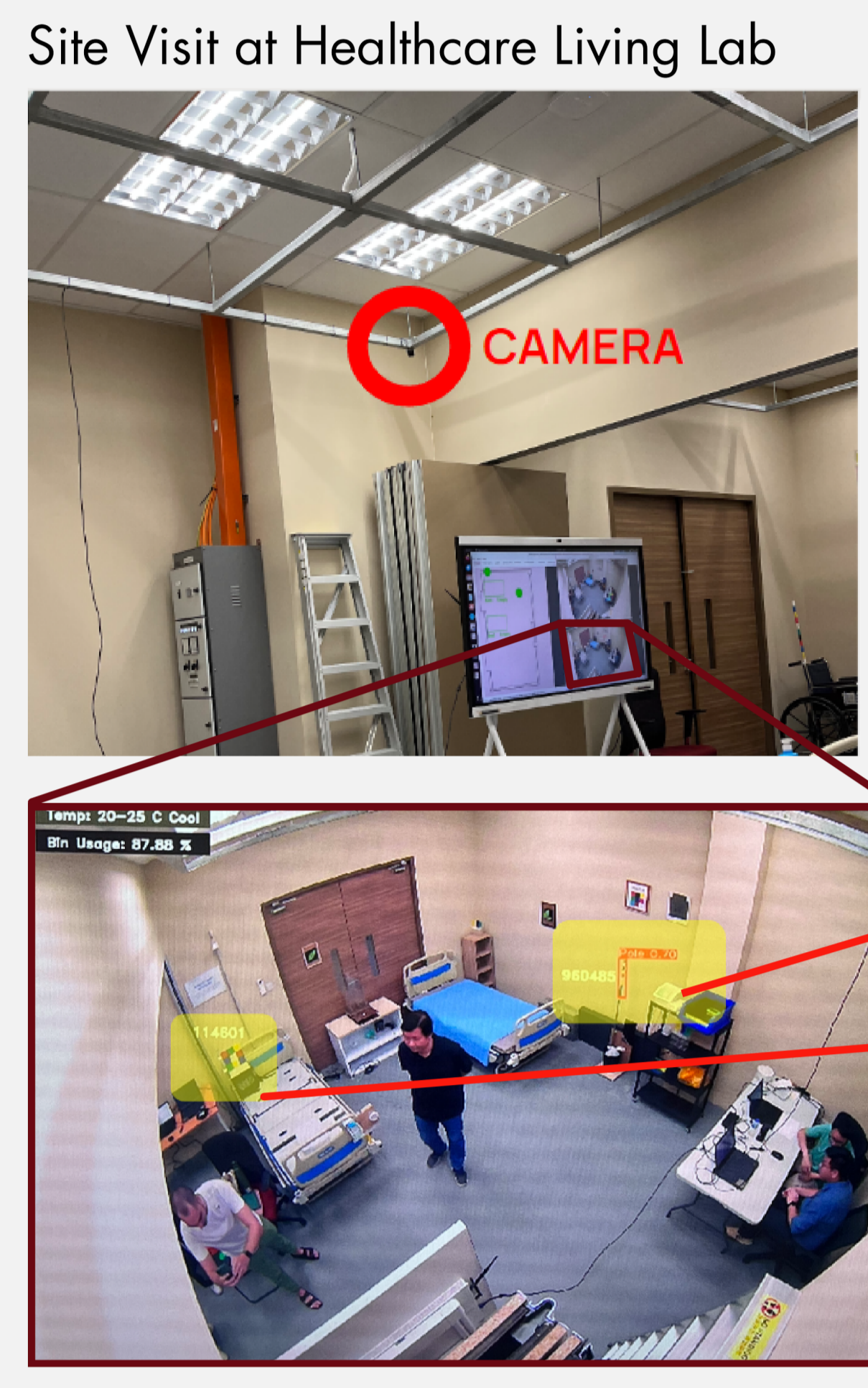
Solution Landscape

In Singapore hospital wards, patients get drinks between meals, with orders being taken and delivered by nurses. However, this system puts pressure on our **understaffed healthcare system**. An ageing population exacerbates this problem and puts more strain on the Singapore healthcare system. The new Eastern General Hospital aims to solve this and similar issues by automation through **ambient intelligence** supported by **mechanical and electricity-free devices**. This approach reduces the overwhelming digital barrier of other solutions while maximizing its potential, making it **accessible** to a wide range of patients and visitors.

Alternatives



Ambient Intelligence (AmbI)



A type of **subtle AI system** that detects and reacts to **changes in the environment**

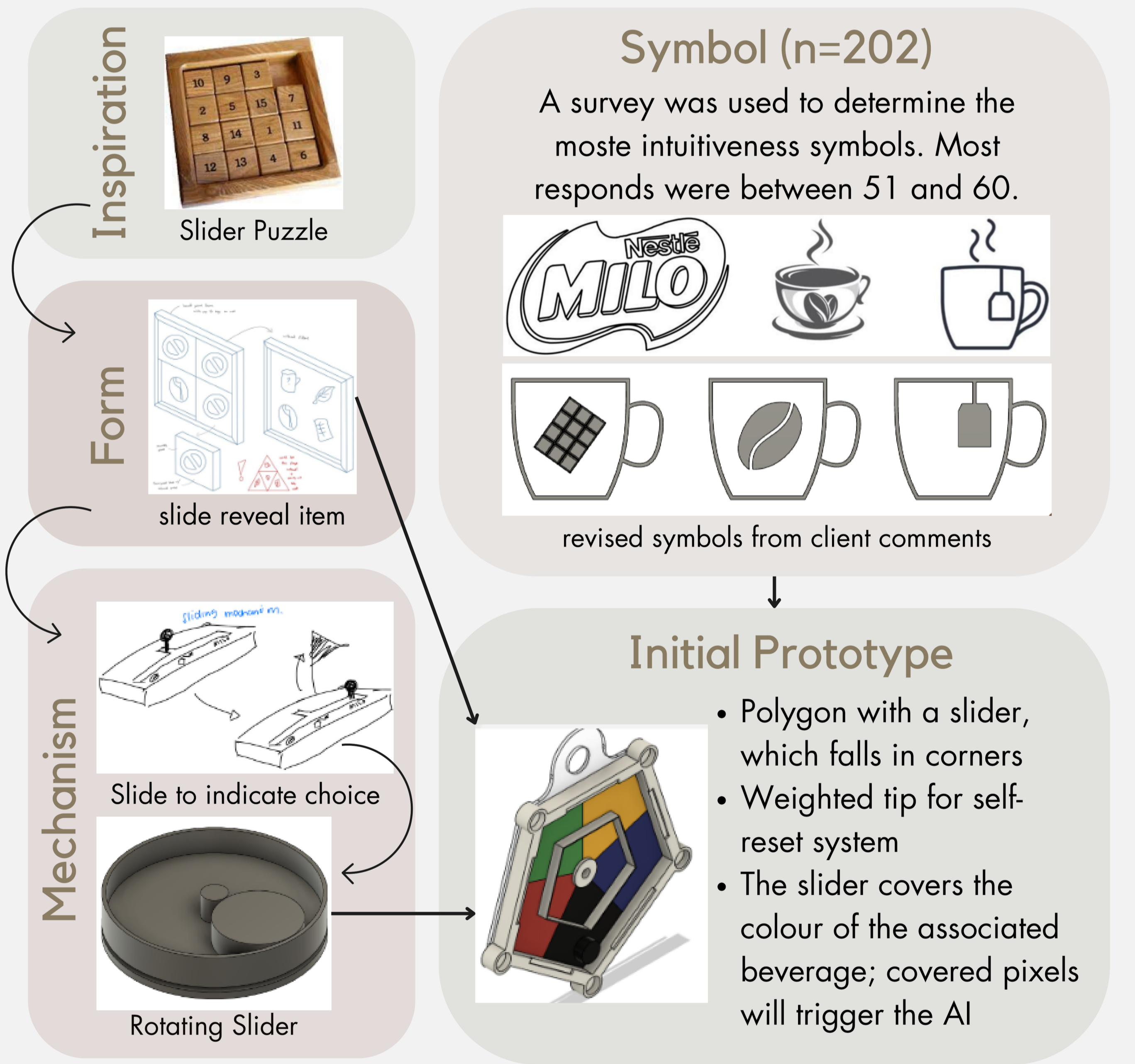
- Embedded into the environment
- Recognizes people and situational context
- Responds to changes through indicators

Need Criterias

Type	Structural	AmbI System	User
Must-Have	Resilient to misuse	Detectable from 5 to 6m away	Intuitive (No manuals)
	No power and electronic	Identifiers should be 5cm x 5cm	Universal symbols (No trademark)
Good to Have	Easy production	Have a reset system	Simple operation (three steps or less)
	Low-cost	Distinctive identifier colours	Accessible while lying down
Good to Have	Cost target of \$30	Minimal maintenance	Single-step operation
	UV resistant material	Controlled state system	Automatic reset system (Minimal intervention)

IDEATION

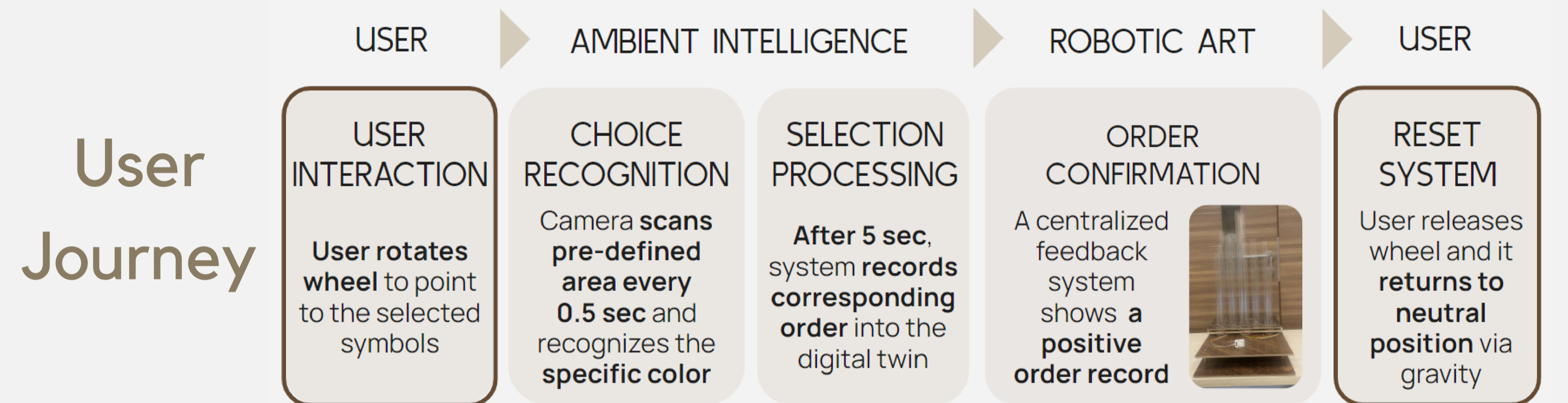
We started with children's toys as they are **intuitive** to use. We extracted the form due to user **intuitiveness** and the mechanism for its **interactiveness**. Sliders were chosen for **simplicity and low-maintenance**. The symbols used for each drink were determined using a survey and client feedback to ensure it met stakeholder needs.



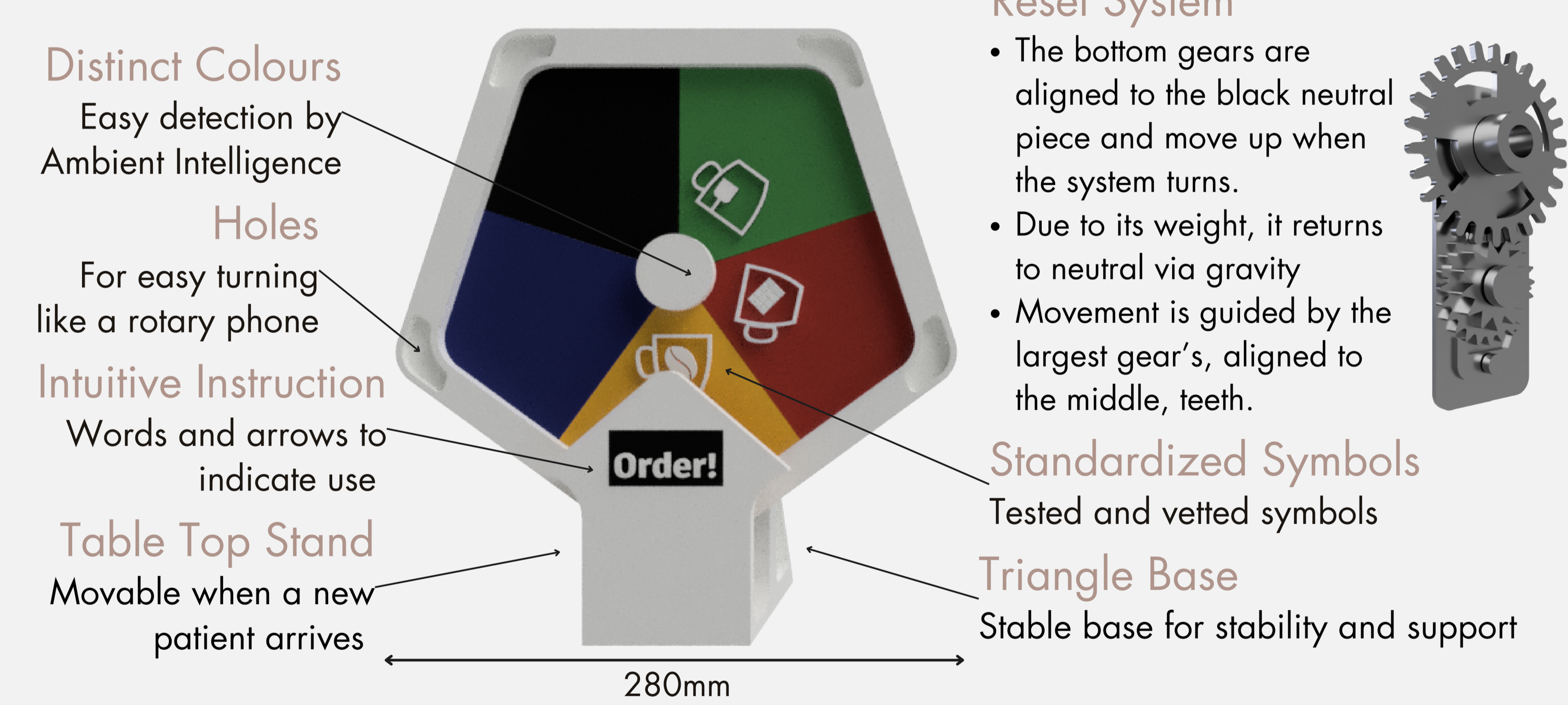
OUR PROTOTYPE

Final Need Statement

How might we develop a **low-cost, power-free, intuitive drink-ordering device** compatible with **ambient intelligence** to facilitate independent orders and alleviate the workload of hospital staff, particularly nurses?



Design Features



CONCLUSION

Functionality Test Results

Camera Functionality at HLL

Identifiable by Camera

- ✓ Colours range (Pixel detection)
- ✗ Disc for selections (No contrast)
- ✗ Individual colours (Yellow and Green are too close)

Reset Functionality at SUTD

Reset by Weight

- ✓ Automatic drop upon release
- ✗ Very quick drop speed (high chance of user error)

Usability Testing Results

Healthcare Living Lab (n=4, Qualitative)

Usability Rating: 2.25/5
Based on the initial prototype with the disc slider

Suggestions:

1. Reduce force to turn the wheel
2. Provide indicators for usage
3. Explain purpose of colours for concerns about temperature-base drink customization.

Mentor Feedback (n=3, Qualitative)

- Support for darker settings using luminous material or placed in strategic areas with dim lighting
- Have feedback through sound for movement between options
- Have system to control the reset speed for good recognition

Product Limitations

- Colour Range
- Minimal Standardization
- No. of Choices
- Weight-dependent Reset
- Minimal Mobility Required

Challenges

Identifying mechanism that best fits the needs of both AmbI and user

Designing minimalist and non-trademarked symbols that are still identifiable

Success

- Low-cost
- Self-resetting
- Simple
- Colour-based Identifiers
- Accessible
- Ambient Intelligent Compatible
- Reduce Human Intervention