

Convienient Automated Request Enabler

Product Description

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

Student Team



Left to Right

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Course Mentors



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Eastern General Hospital

IDENTIFICATION

Solution Lanscape

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)

Site Visit at Healthcare Living Lab



Tempt 20-25 C Cool Bin Usage: 87.88 %

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

| Туре | Structural | Ambl 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) |
| | Easy | Have a reset system | Simple operation (three steps or less) |
| | production Low-cost | Distinctive identifier colours | Acessible 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) |



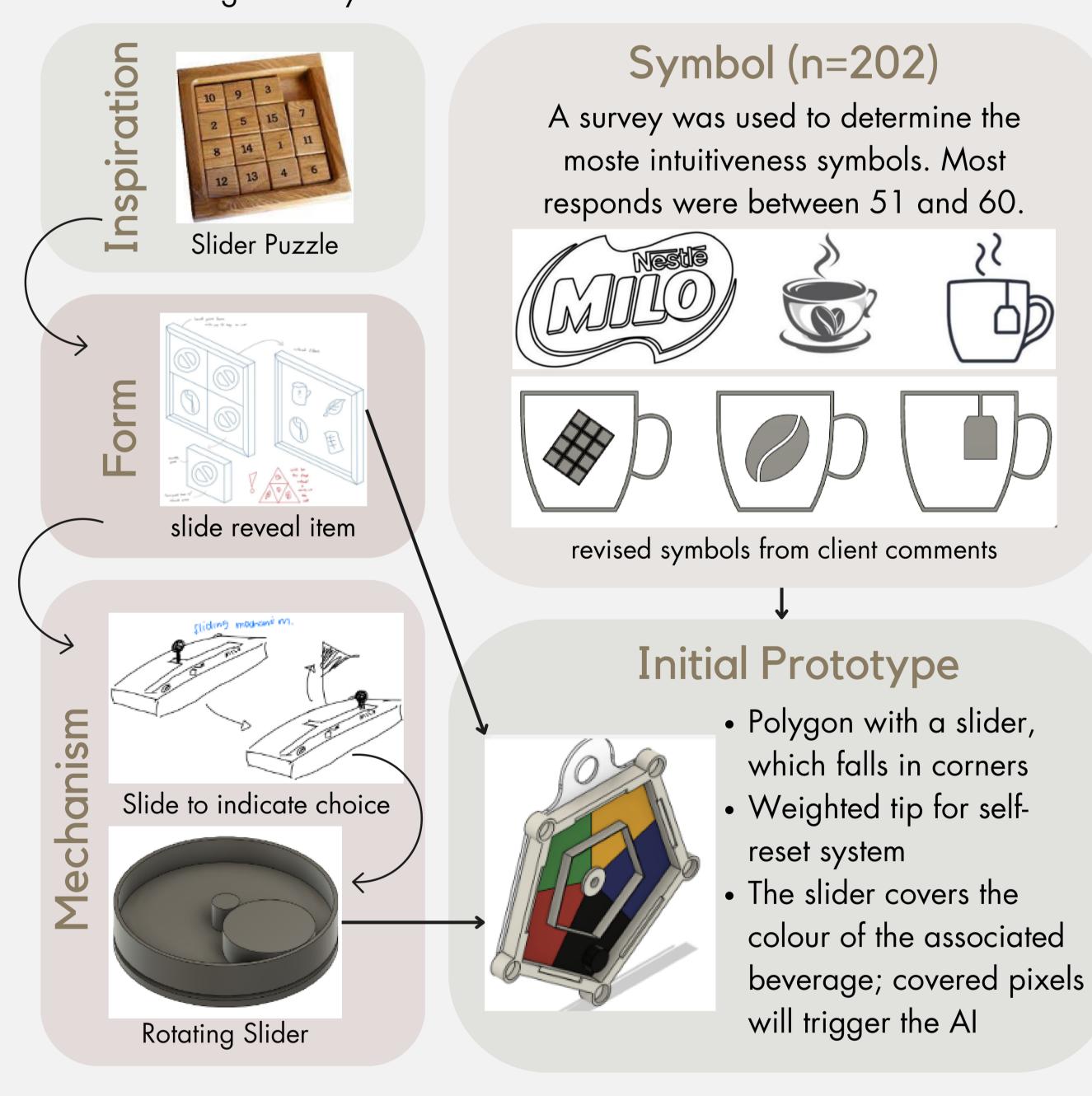






IDEATION

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 choosen for simplicity and low-maintence. 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?

User

USER INTERACTION User rotates wheel to point to the selected

symbols

USER

recognizes the

CHOICE **RECOGNITION** Camera scans pre-defined area every 0.5 sec and

specific color

AMBIENT INTELLIGENCE

SELECTION PROCESSING After 5 sec,

system records corresponding order into the digital twin

ORDER CONFIRMATION

ROBOTIC ART

A centralized feedback system shows a positive order record

RESET SYSTEM User releases wheel and it returns to neutral **position** via gravity

USER

Design Features

Distinct Colours Easy detection by Ambient Intelligence Holes For easy turning\ like a rotary phone Intuitive Instruction Words and arrows to Order! indicate use Table Top Stand Movable when a new

patient arrives

Reset System

- The bottom gears are aligned to the black neutral piece and move up when the system turns.
- Due to its weight, it returns to neutral via gravity
- Movement is guided by the largest gear's, aligned to the middle, teeth.

Standardized Symbols Tested and vetted symbols

Reduce Human Intervention

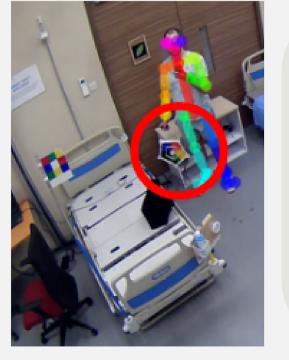
Triangle Base

Stable base for stability and support

CONCLUSION

Functionality Test Results

Camera Functionality at HLL



Identifiable by Camera

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

Reset Functionality at SUTD



Reset by Weight

- Automatic drop upon release
- X 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

280mm

Minimal Standardization No. of Choices Colour Range Minimal Mobility Required Weight-dependent Reset Challenges Success Identifying mechanism Self-resetting Simple Low-cost that best fits the needs of both Ambl and user Colour-based Identifiers Accessible **Designing minimalist Ambient Intelligent Compatable** and non-trademarked symbols that are still identifiable