Thingdom

A role-playing intelligent toy for second language learning

Thingdom is a role-play—based intelligent educational toy that transforms children into "Little Diplomats," enabling natural second language acquisition through everyday exploration.
The system includes a non-intrusive headset and a smart interactive unit with an integrated microphone and camera. Through immersive, scenario-based interactions using a playful toy stethoscope, children engage in real-life conversations that encourage confident and spontaneous language expression.
By turning abstract language learning into contextual and experiential practice, Thingdom helps children actively use and internalize a second language in daily life.

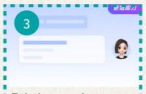
Preliminary Research

As globalization accelerates, more than **43%** of the global population is bilingual or multilingual.

User Pain Points

A disconnect between **oral expression** and written learning among Chinese children

The **preschool years**, a critical period for shaping language intuition, are often overlooked.



Existing market solutions lack intuitive interaction tailored to **children's cognitive patterns**.

Persona

Lack of **conservation awareness**

Limited understanding of **hierarchical categorization**

Animistic thinking

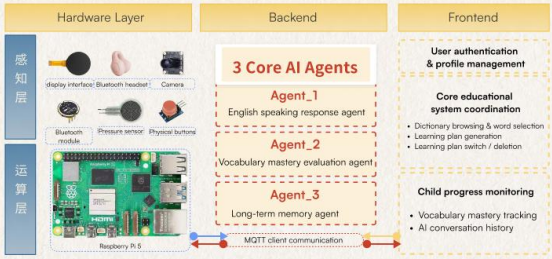
Egocentrism

Age:4-7 **Anthropomorphic Interaction**

Design Direction

a **playful**, **interactive**, and **life-integrated** smart toy that builds a natural and immersive **second language environment** for **preschool** children.

Technical Architecture



Product Introduction

Background

There exists a parallel "Thingdom"to the real world. Children take on the role of "Little Diplomats," using magical language tools to hear the objects' thoughts and build bridges of communication.

Level Design

Fruit Plain

Background

Children help the fruit spirits and plant inhabitants awaken the Fountain of Life.

Beast Forest

Background

Children assist animal tribes in restoring the Friendship Totem, reconnecting the forest paths.

Food Cliff

Background

Children use magical recipes to create the Feast of Heart, linking the cliffside suspension bridges.

Travel Sea

Background

Children help vehicle companions repair the Clock of Order, ensuring smooth navigation.

School Sky

Background

Children light up the Beacon of Language, rebuilding human bridges and connecting the sky bridges to the ground.

Base Design

The product packaging doubles as both a base and a storage container.
Upon first use, children place the badges for different levels onto the base to initialize the system. The base provides real-time progress feedback through lights.


开机按钮设计

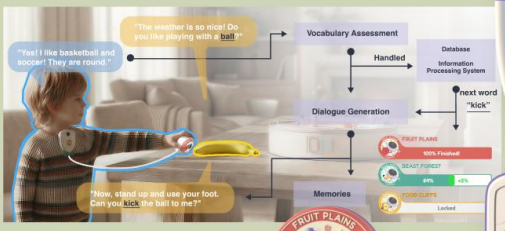

进度引导灯光

感应充电底座

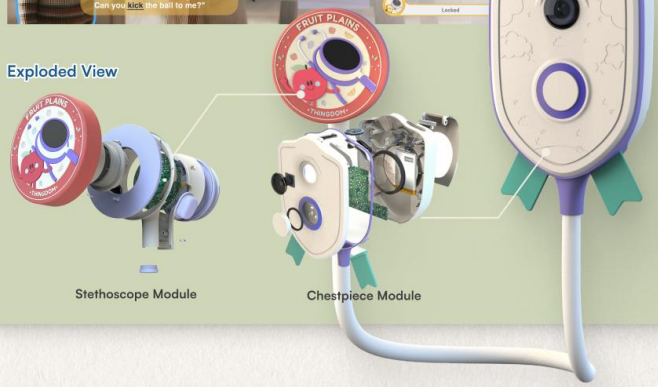
Core Product

Interaction

During gameplay, children touch real-world objects with the stethoscope. A YOLO-based system recognizes each object, while a custom AI agent assigns playful personalities. Guided by parent-selected vocabulary, the AI enables natural dialogue, tracks progress, and lets children unlock themed islands, build "diplomatic relationships," and improve English speaking skills through interactive play.



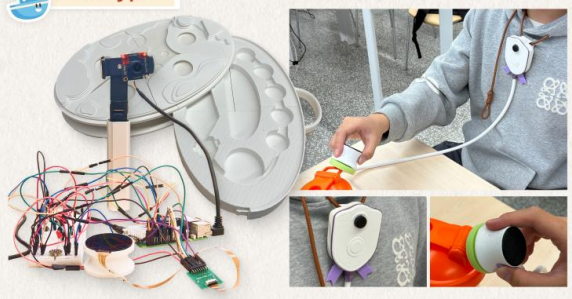
Exploded View



Stethoscope Module

Chestpiece Module

Prototype



UI

Product Interface

Object anthropomorphism with expressive reactions

Parent App

Monitor learning progress & Customize vocabulary notebook

Research suggests that **Young children have a uniquely strong capacity for second-language learning,** especially around ages 4—7, when they already have a solid L1 base and more free time to explore language through play.

But this advantage rarely turns into confident speaking—because daily L2 "turns" are missing.

Input is everywhere; speaking turns aren't.

Most learning happens in fragmented, tool-bound sessions: kids receive input, but get too few low-pressure opportunities to speak, get feedback, and repeat inside real routines.

Storybooks & picture books

- ✅ Rich, contextual input
- ✅ Supports comprehension and imagination.
- ❌ Mostly one-way
- ❌ Children rarely get sustained speaking turns or corrective feedback.

Flashcards & drills

- ✅ Efficient for quick recall and repetition.
- ❌ Decontextualized
- ❌ Knowledge often stays "testable" but doesn't transfer to spontaneous conversation.

Screen-based learning apps

- ✅ Engaging, adaptive, and always available.
- ❌ Screen-bound interactions
- ❌ Limited embodied use and weak carryover to real-world dialogue.

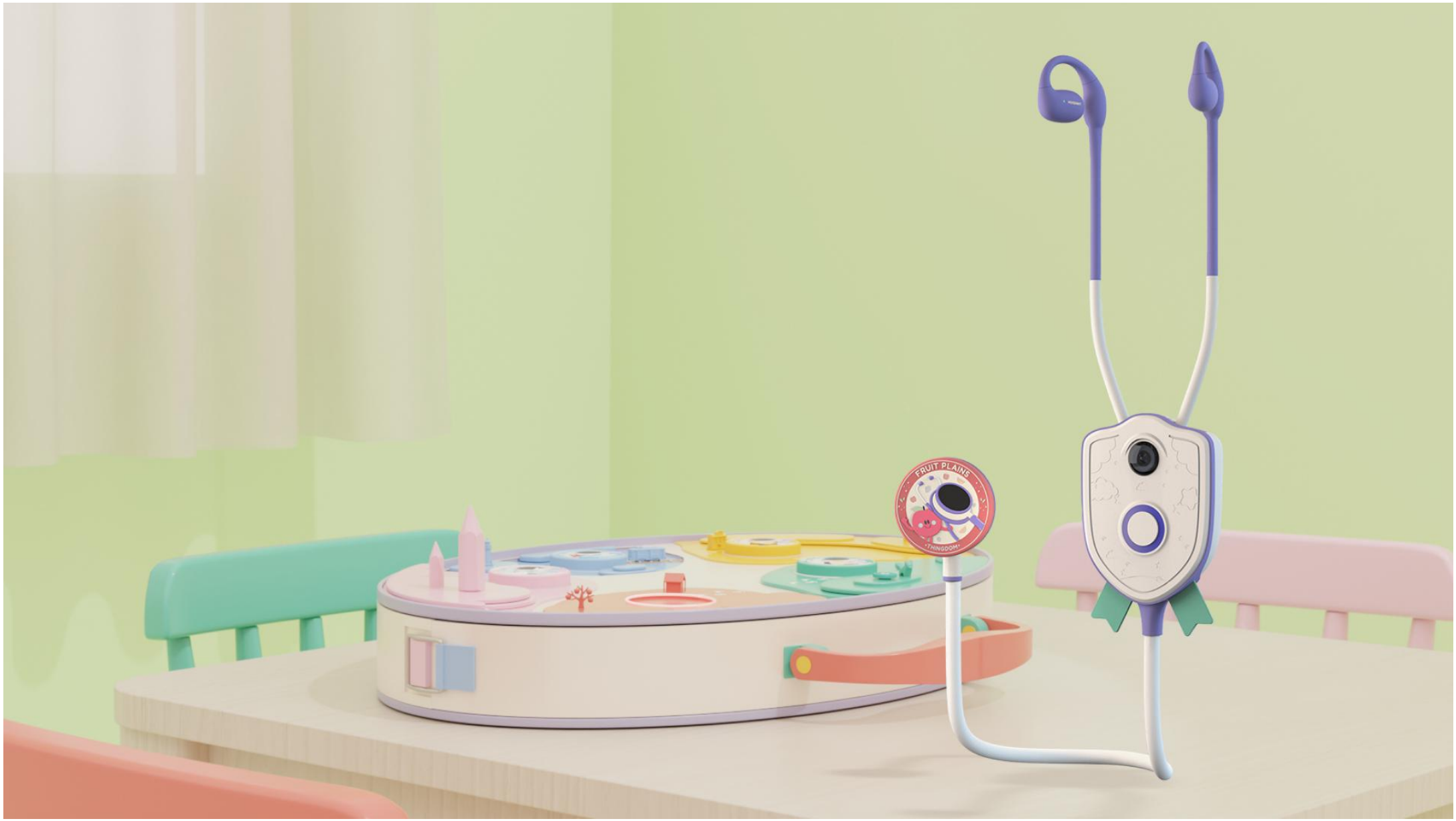
Tutor-led / after-school classes

- ✅ Live turn-taking with guidance and correction.
- ❌ Time-boxed and hard to sustain daily
- ❌ Immersion ends when class ends.

As a result, many 4—7 L2 programs provide input and exercises—but not a continuous, low-friction speaking environment embedded in everyday life.

Inspired by Piaget's view of **children as active learners—learning through action and symbolic pretend play**

We reimagined "listening like a doctor": a stethoscope-like tool that lets kids **"hear" everyday objects and start playful conversations with them.**


FRUIT PLAINS
TTHINGDOM

Open the Home Station drawer and take out the Stetho module.

Clip it onto the collar—spring clip for hands-free wear.

Pick a “Charm” from the Home Station and attach it to the tip.

Tap the chest-badge button to power on.

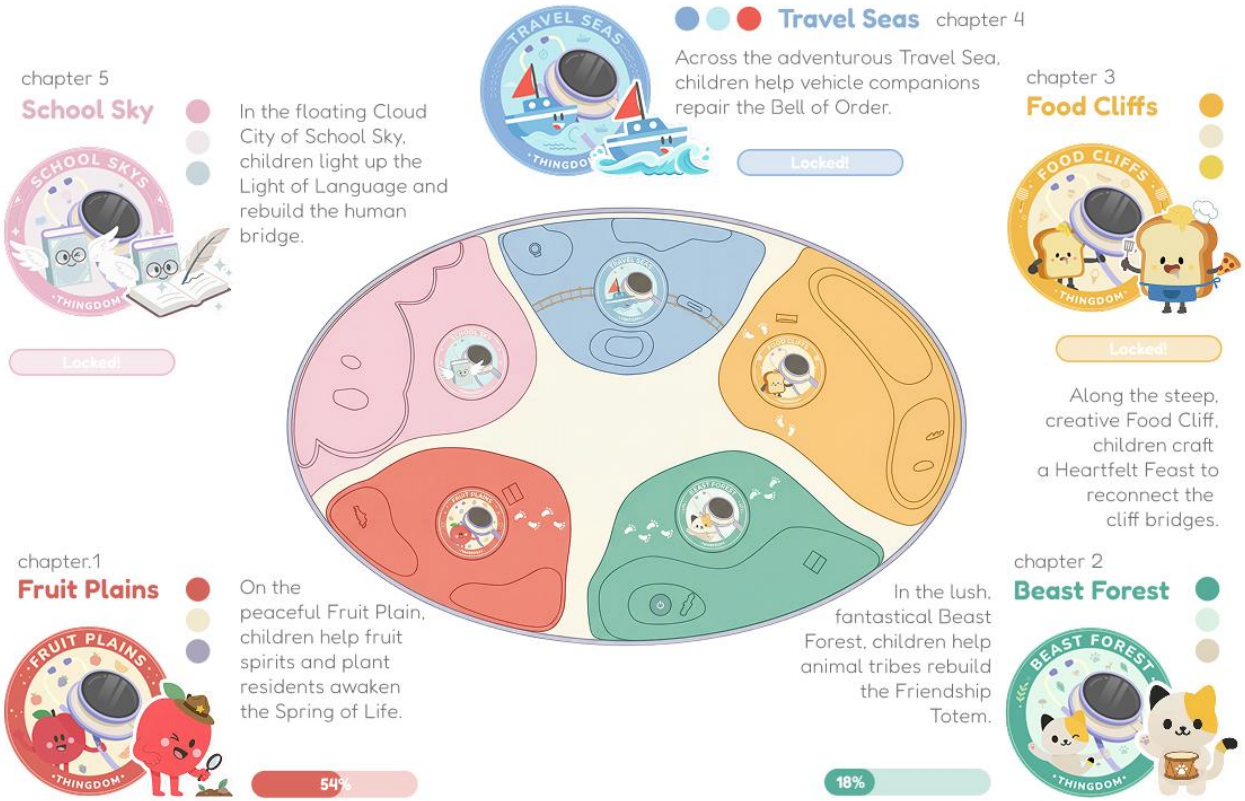
Touch the tip to real-world objects to “listen” and start a dialogue (audio via earphones).

Press the tip button to record and reply.

The LCD guides the flow—listening / thinking, object “expressions,” and key words for this turn.

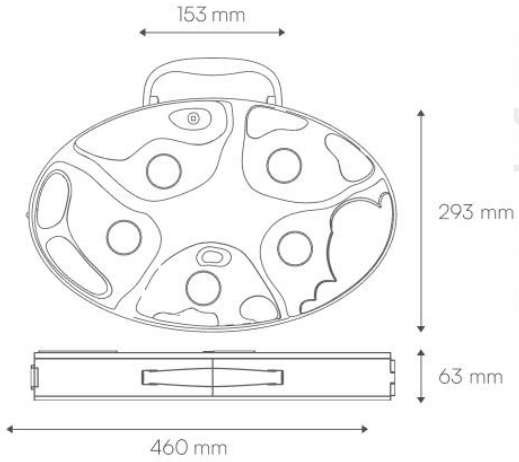
We built ‘Thingdom’ to make L2 speaking feel like role-play—playful, low-pressure, and easy to repeat in daily life, and “Thingdom” is divided into five regions, each mapped to one product chap-ter and its characters.

With the matching chapter badge on, children speak with real-world objects; the system analyzes their in-context dialogue and updates progress.



Chapter progress visualizes the restoration of the Language Bridge in each region.

Children speak with real-world objects, the system then analyzes their in-context dialogue and updates progress.

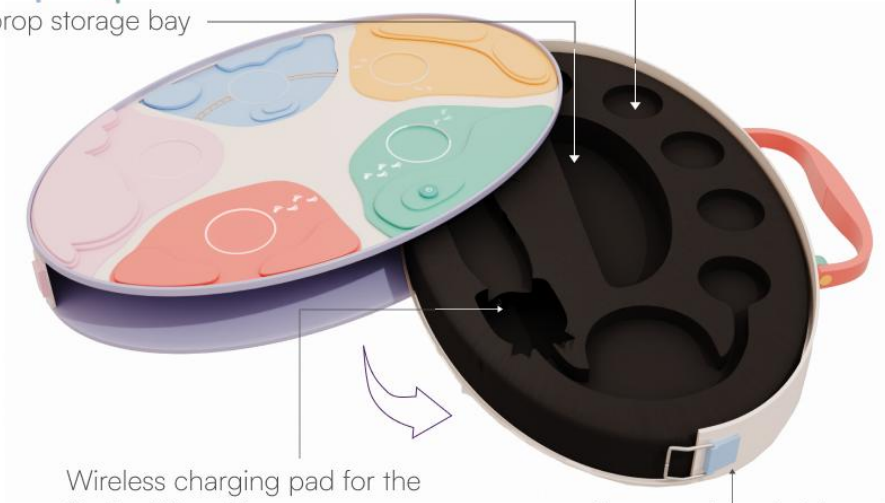


Dimensioned orthographic view

Mini-prop storage bay

Insert them into the holes on the dock surface to enhance hands-on play.

Chapter badge storage bay



Wireless charging pad for the Stetho Wearable

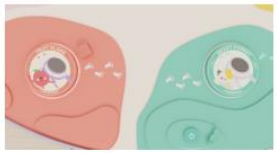
Drawer release latch

Carry handle

Master power button

Chapter trail LEDs (footprint lights)

The footprint trail illuminates from the start point to the current chapter (updated via MQTT).

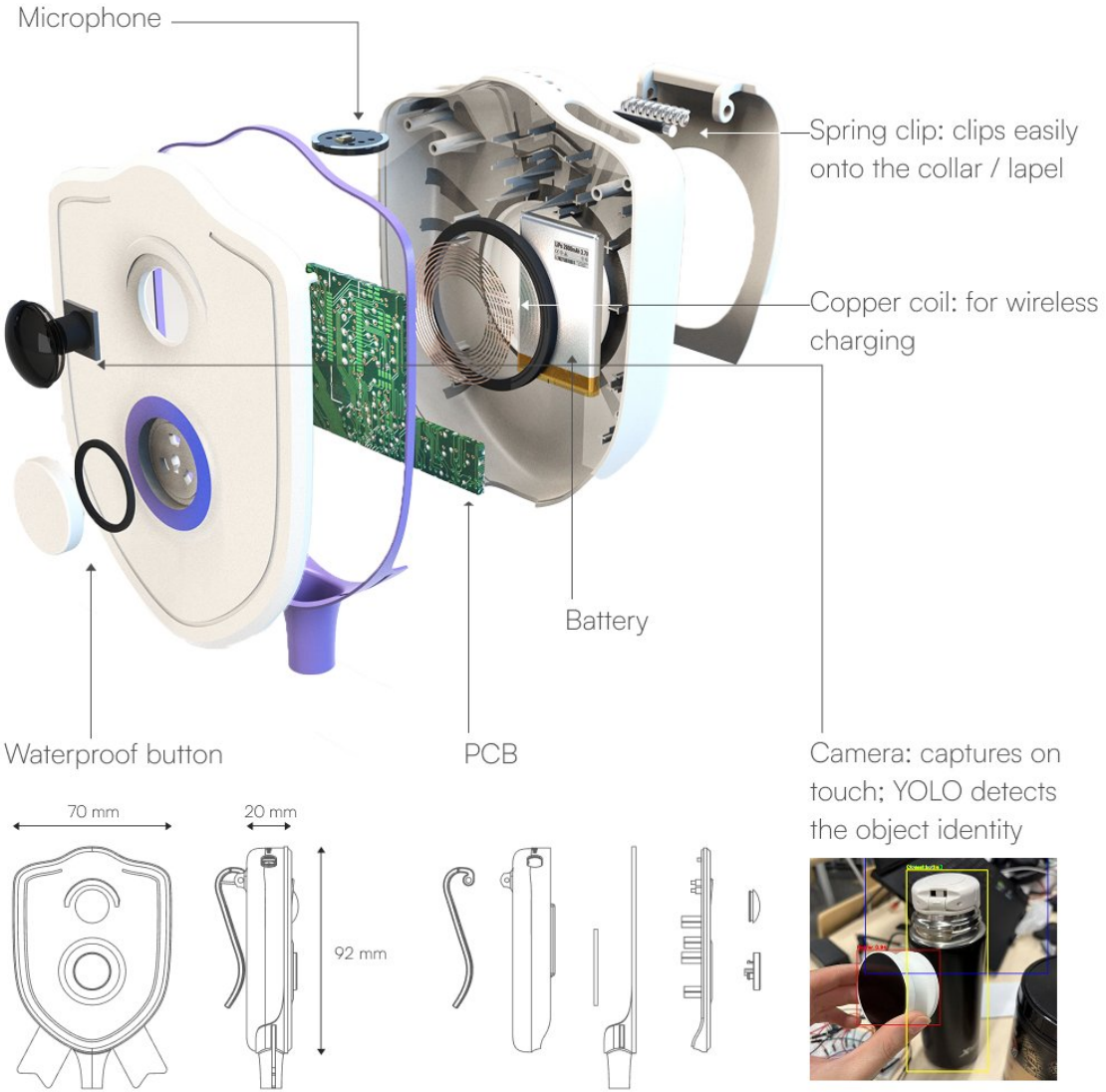


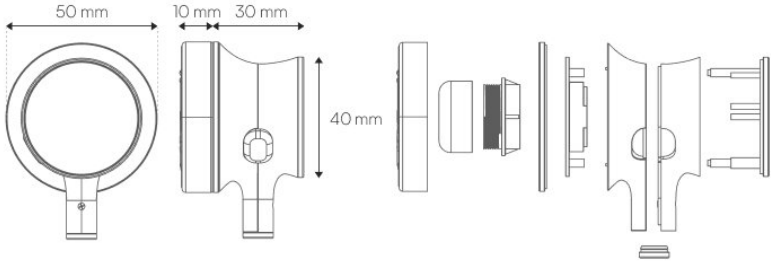
Chapter progress ring LED

The progress ring stays in sync with cloud progression (via MQTT).

USB-C charging port & battery status indicator

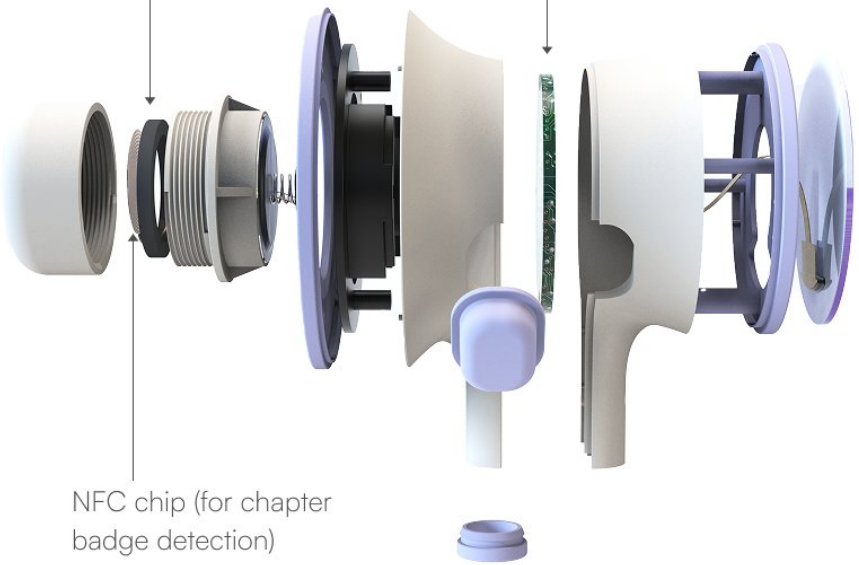
when in chapter "Beast Forest"





PCB: with tact switch, connector terminals, pressure sensor, etc.

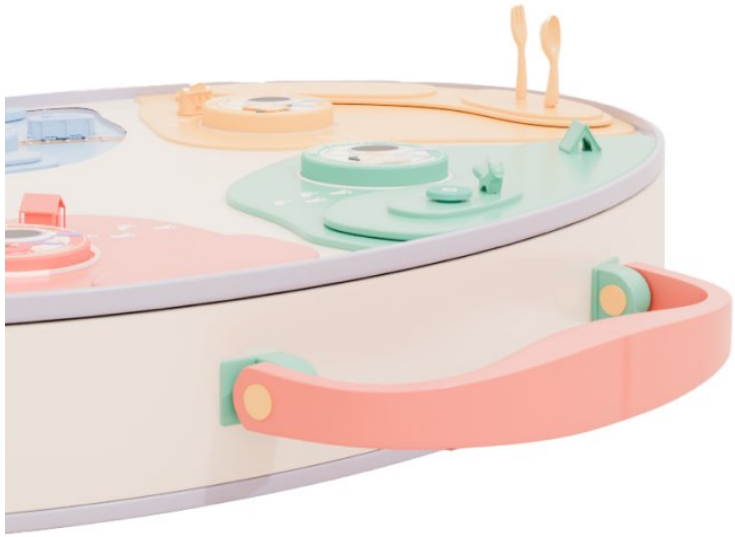
Ring magnet: snap-on mounting for the chapter badge

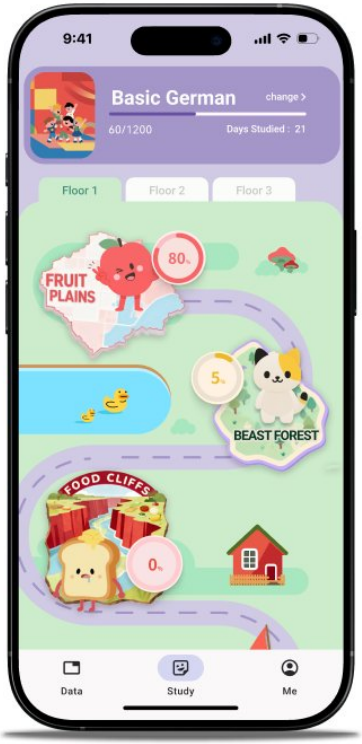


NFC chip (for chapter badge detection)

Parent App

We created a simple and intuitive Parent App that allows parents to easily track their child's daily progress in learning a second language through Thingdom.





Level Progress

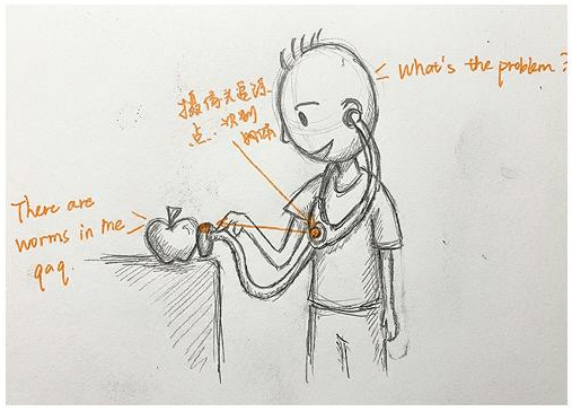
Parents can track their child's level progression through a map-based progress bar interface.

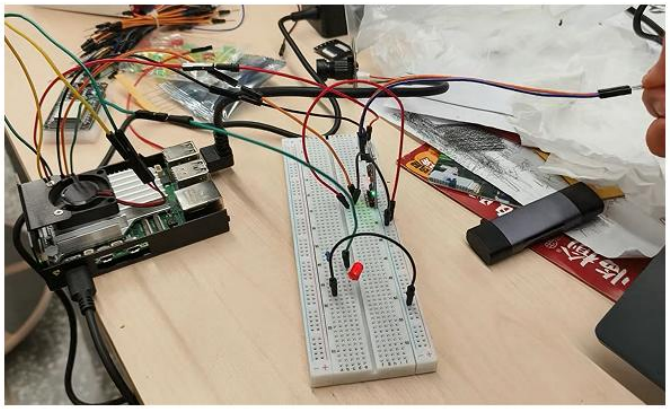
Training Data

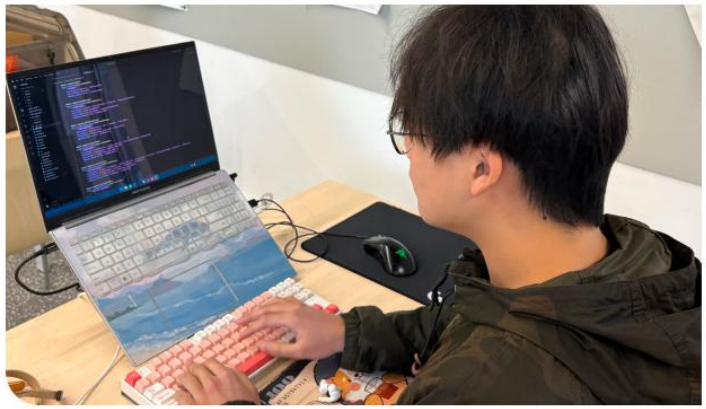
Daily training duration is visualized through intuitive data charts, allowing clear and immediate insight into usage patterns.

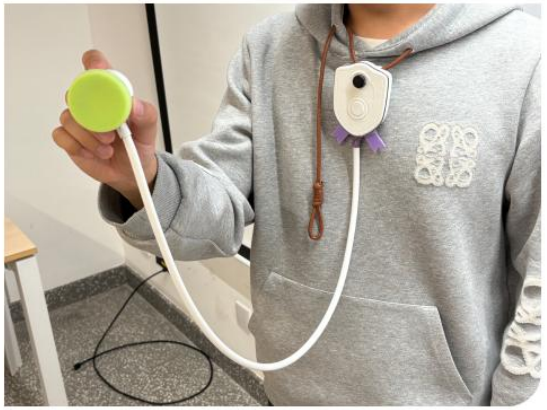
Word Bank

Parents can track which new words their child has learned, supporting targeted practice in daily life.





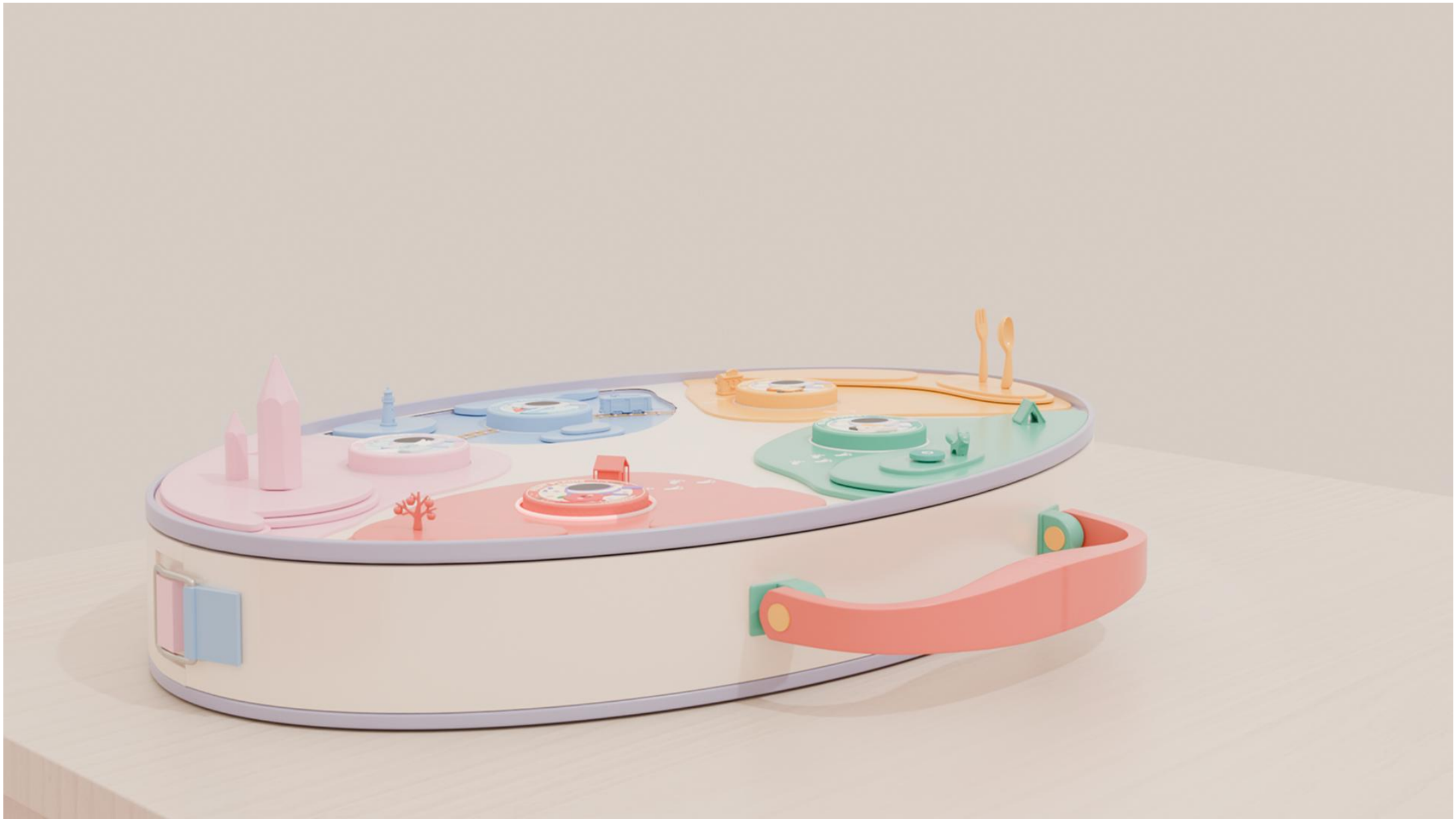


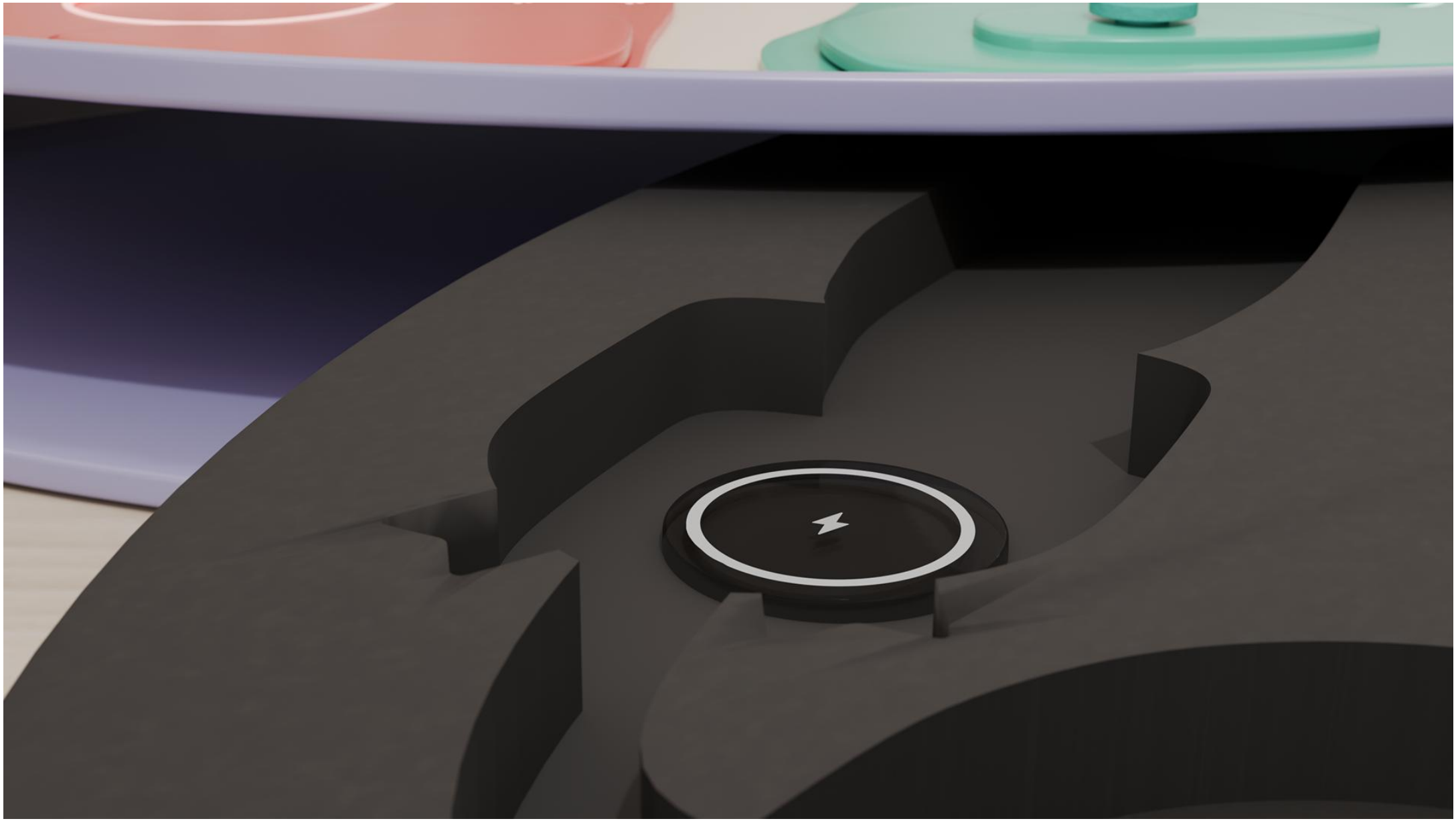


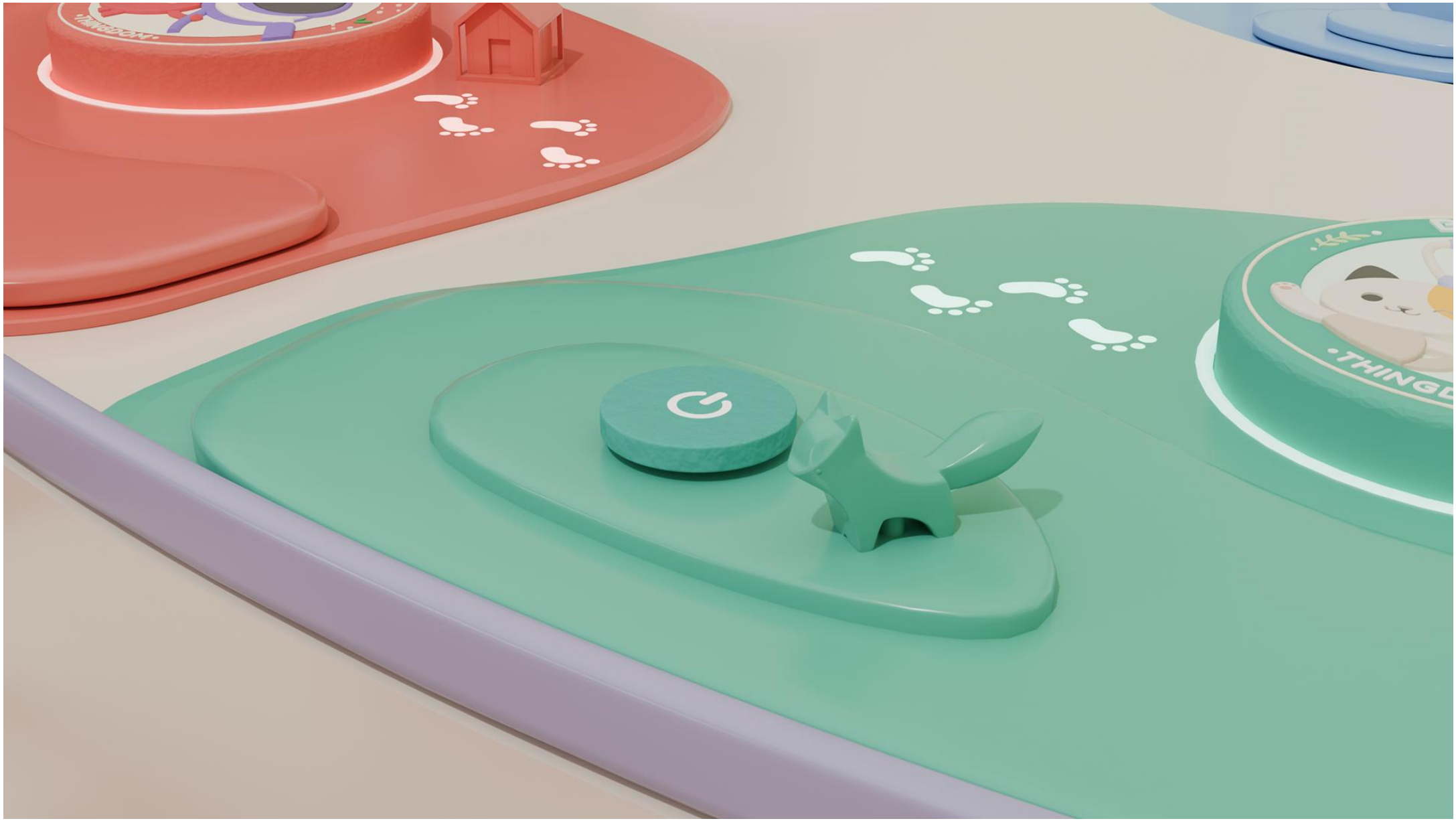
Design Processes

We moved from research and brainstorming to sketches and storyboards, exploring multiple interaction directions before committing to one.Rapid 3D prints and coded prototypes helped us refine form, ergonomics, and the “listen → reply” flow through quick tests.


BEAST FOREST
FRUIT FLAIRS
SCHOOL SKY
FOOD CLIFFS
TRAVEL SEAS

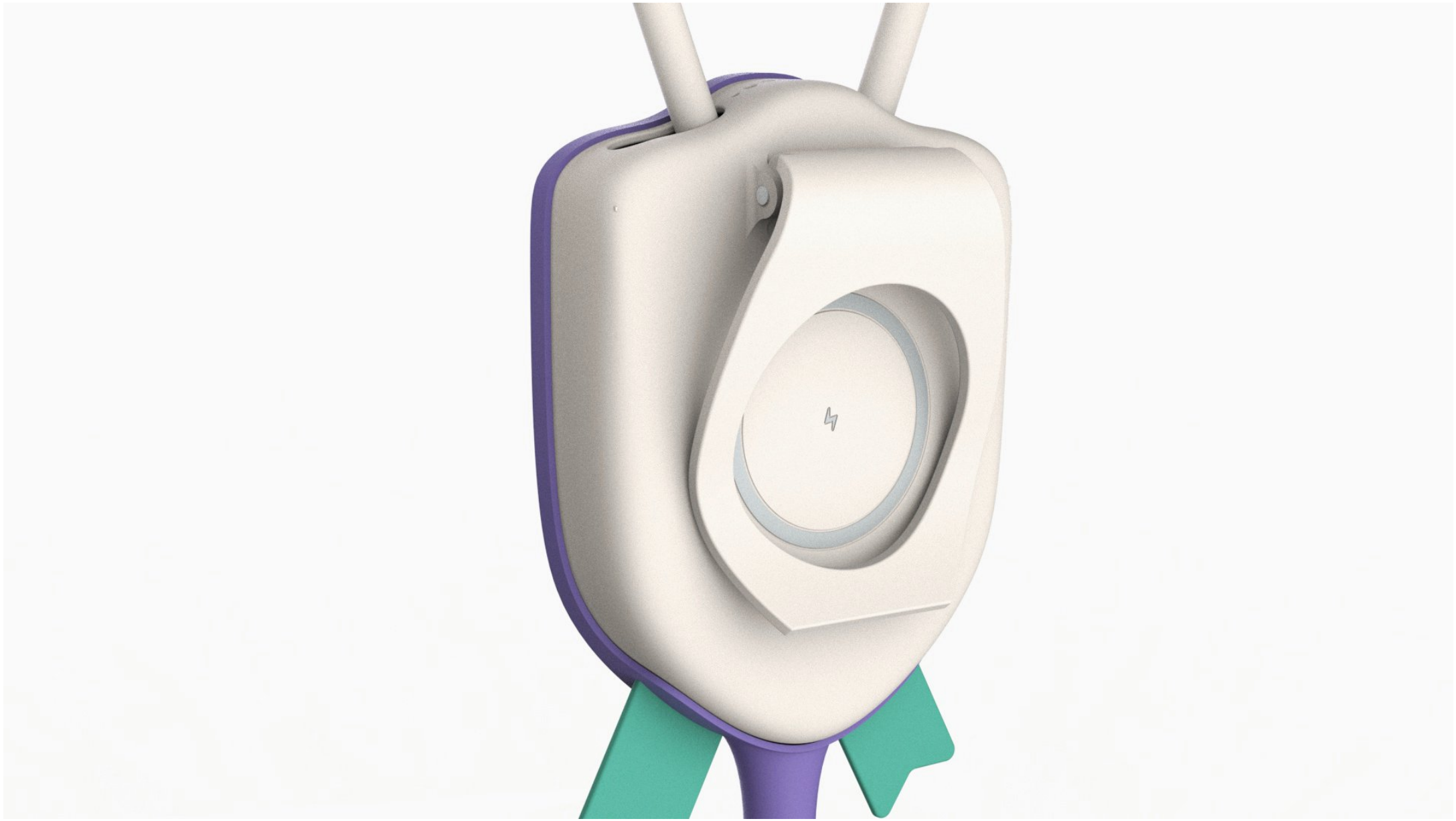







FRUIT PLAINS
•THINGDOM•


Object located!




THINGDOM


FOOD CLIFFS
•THINGDOM•
BEAST FOREST
•THINGDOM•
FRUIT PLAINS
•THINGDOM•
SCHOOL SKY
•THINGDOM•
TRAVEL SEAS
•THINGDOM•


FRUIT PLAINS
•THINGDOM•