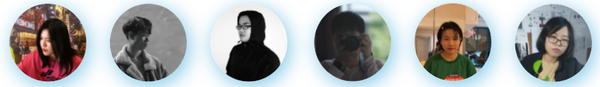
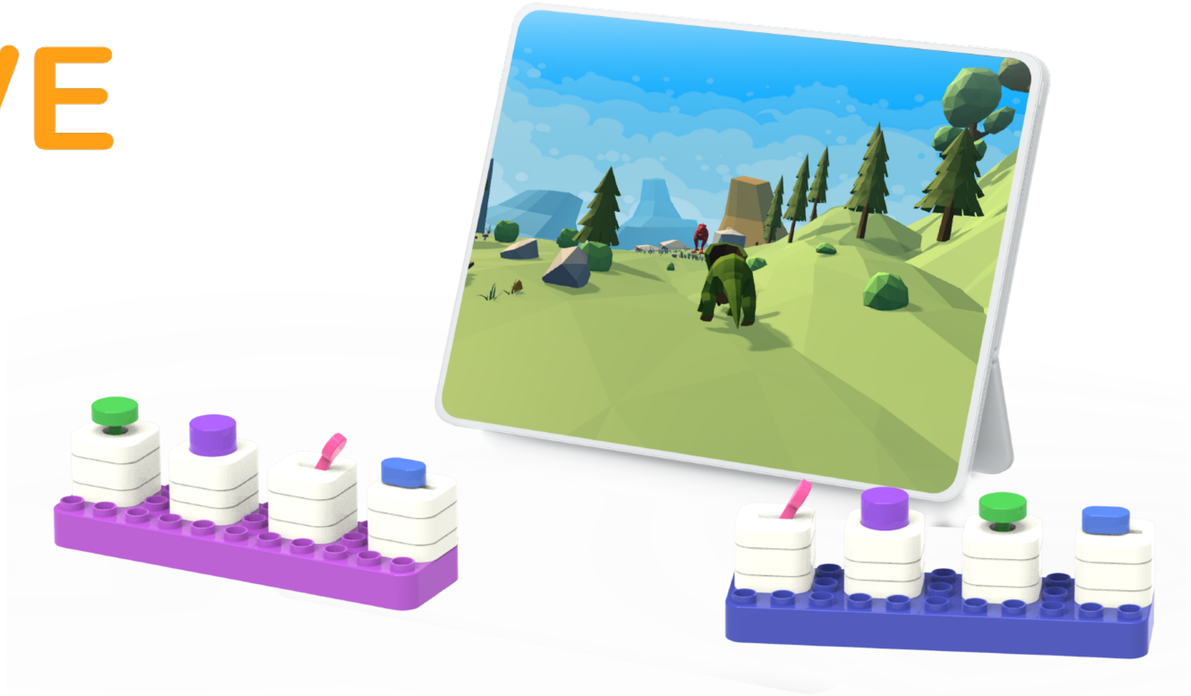
BLOCK ALIVE

When Blocks Break the 3D Space

Product Design / Group Work

Responsible for research, inspiration, brainstorming, designing of the contol, video shooting and clipping.
A set of design for Botzees to combine ipad and toy blocks, to make blocks have more playability and possibility.





Scan this code to watch the whole processing video!!!!!

Background

This is a commercial project from Pai Technology. Pai technology is the only technology company that partners with parents to enhance their children's education and development through fun, imaginative STEAM-based play. Products in Pai Technology are called Botzees, which is a science-backed block set designed specially for early childhood.
We were required to ***combine the block sets in Botzees with simple information technology***, in order to add more possibilities and enjoyment in traditional blocks.

BOTZEES
CREATE, PROGRAM & PLAY!

Primary Research

Nowadays, the combination between virtual world and real world has been more and more popular. The concept of *reality-virtuality continuum* was introduced, and VR, AR has been an integral part of our society.

Virtual Reality (VR) Market to Reach by 2028

USD 84.09 Billion

Data from Fortune Business Insights

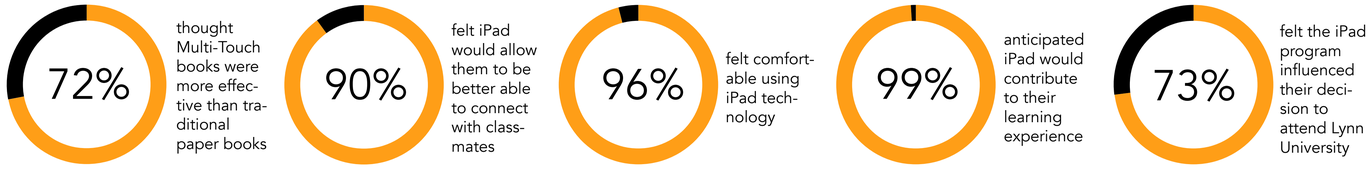
The Value of AR in ***Education*** by 2023 Will Be

USD 5.3 Billion

Data from ABI Research

From preschool to college, reports from institutions overwhelmingly indicate that students using iPad find that *it increases their engagement in learning* and makes them *feel more motivated to learn*.

Students' Data in Lynn University

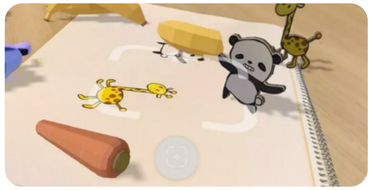


Content & Data From Apple

Gamification

Children prefer gamified products and toys, because playing these products make them have more fun and a sense of achievement.

Inspiration

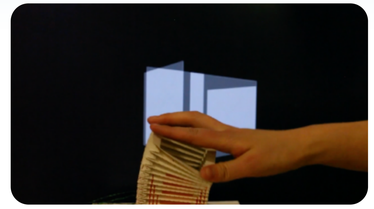


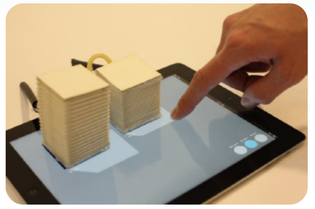
RakugakiAR

RakugakiAR is an app bring users' doodle to "life". Just draw in a notebook, on a whiteboard, or on any other kind of surface, then scan your drawing with the app to bring it to life, and you can walk through a virtual space with your smartphone. Once your drawings are alive, you can try feeding them, poking them, or even teasing them a little.

PneUI

This is a project of Tangible media group in MIT Media Lab. This project presents PneUI, an enabling technology to build shape-changing interfaces through pneumatically-actuated soft composite materials. In the two pictures on the right, the researchers controls the changes on the screen by the deformation of the 3D object. They can also manipulate the 2D changes to make changes of the 3D objects.





Rebuild the World

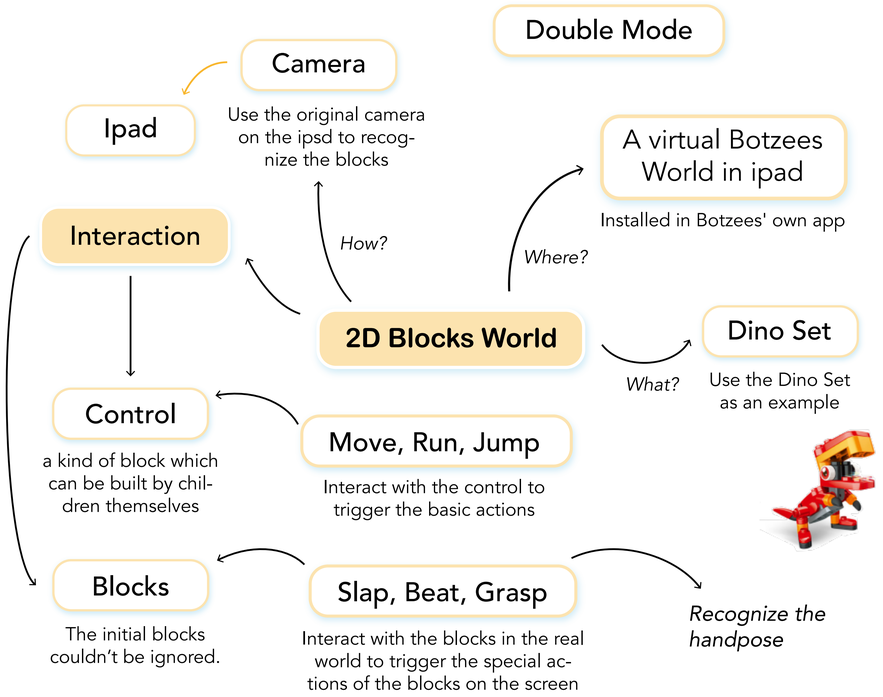
LEGO released a video called *Rebuild the World* in 2019. In this video, the real world is the reflection of one lego world, and everything became childlike and imaginative.

Opportunity

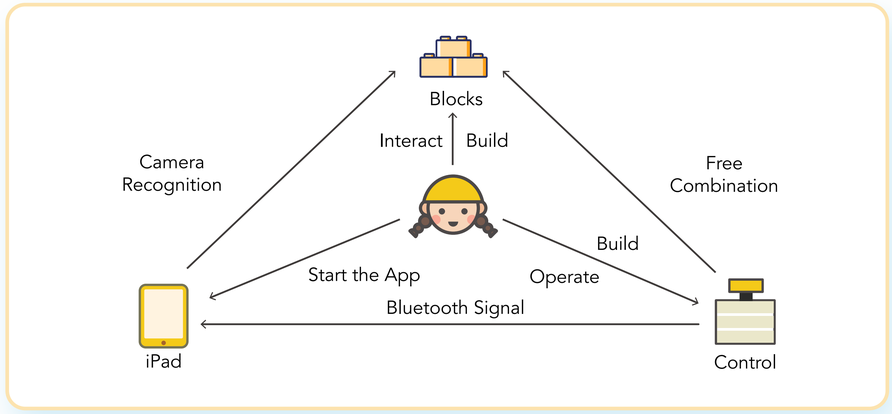
The interactions between 2-dimensional world and 3-dimensional world is exciting and awesome. *Why don't we project the 3D children's blocks into 2D space? Like ipad screens?*

If blocks are generated in the virtual world, children will *gain more play methods and more fun*. The magical interaction between the physical world and the virtual world can also *stimulate and cultivate children's hands-on ability and imagination*.

Ideation



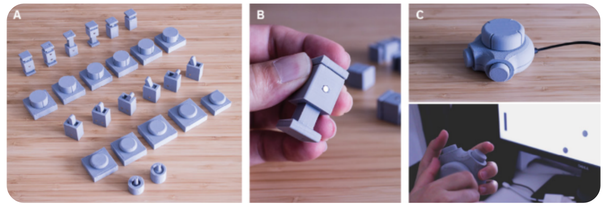
Concept Statement / Interaction Mode



Further Research

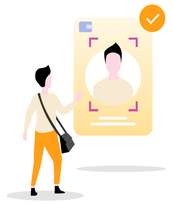
What technology should we use in this project?

CONTROL



MachaMagnets from the University of Colorado
The damping of the magnet allows the player to feel comfortable and obvious interactive feedback, and the change in the electric field generated by the movement of the magnet can be captured by the Hall effect sensor.

RECOGNITION OF BLOCKS

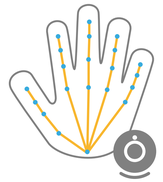


Use the machine vision recognition technology to recognize the blocks

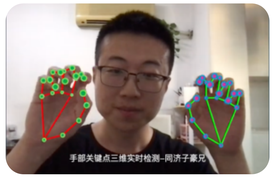
Use Baidu Intelligence Cloud Platform to train the recognition model.

Machine Recognition

RECOGNITION OF HANDPOSE



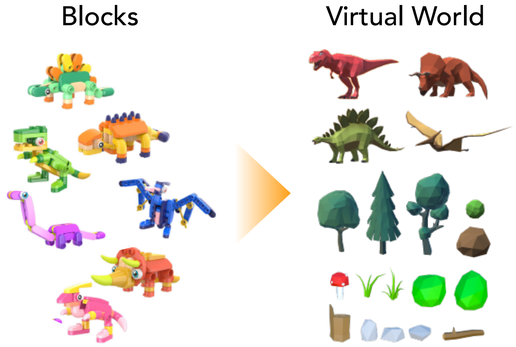
MediaPipe Handpose



Use the open source code of one blogger to recognize the handpose

What are the essential elements in this product?

CHARACTERISTICS OF THE VIRTUAL WORLD



CHARACTERISTICS OF BOTZEES

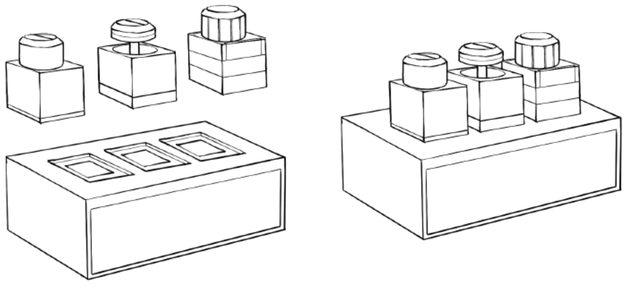
Bigger block

Rounded corner

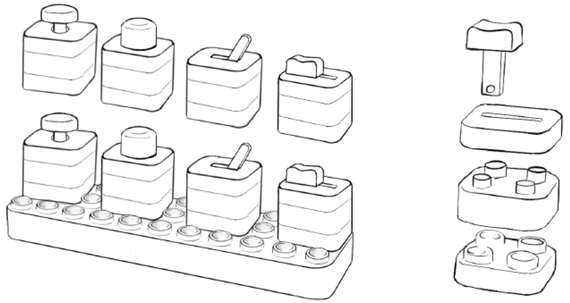
Multi-di-mensional building

Soft silicon blocks

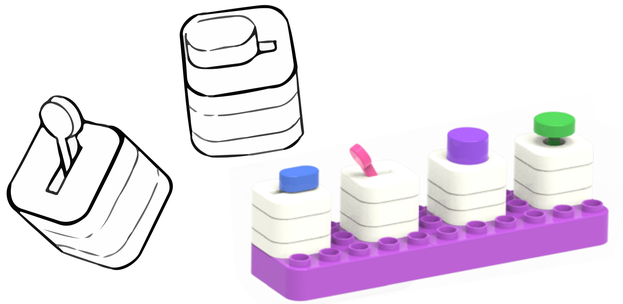
Sketch & Iteration



The initial version of control, which is similar as the one of the University of Colorado. This consists of right-angled edges and monotonus appearance.



The second version shapes like blocks, referring to the characteristics of Botzees' block sets, which are rounded and bigger. The joints are also made into Botzees' general style.

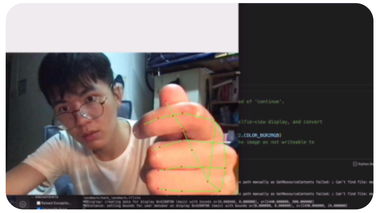


The final version adds the colors, and chages the two sections of the control to make them be more rounded and cute.

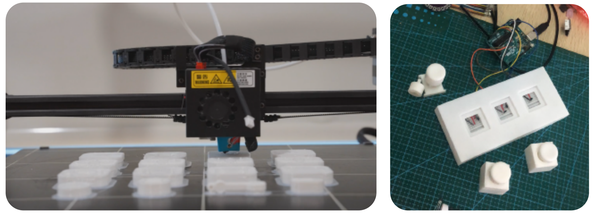
Making Process

We took dozens of photos with different angles and environment for each block model

We trained a model based on convolutional neural network using cloud platform to recognize the blocks.



We used a machine learning model Media Pipe Handpose to detect the interaction between children and toy block sets.



We used 3D printing to shape the control. Then we put magnets and Hall-effect sensors into the controls, and connect them to arduino to test the feasibility.

User Text

We invited 2 children aged under 7 to experience this product. The elder child easily understood the gaming method. The younger child could't understand the way of playing but she was eager to build the control blocks and play them. After our guidance, she also knew the functions of each stuff.

Both of them enjoy playing it.

Final Concept

build blocks and controls → start the app → choose the game scene → use the camera to scan the block → operate the control → change handpose to interact

Control

Move | Jump | Match with Game Characters | Run

Handpose Interaction

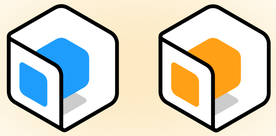
the Triceratops Lie Down

Stroke the Triceratops

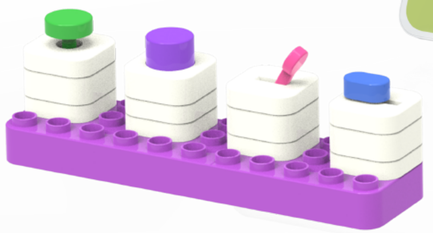
the Tyrannosaurus roar

Pat the Tyrannosaurus

Icon



Indicates the meaning of projecting a 3D object into a 2D space



Final Scene