Division of
Integrative Systems and Design

香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

ACADEMY OF 跨學科學院
INTERDISCIPLINARY STUDIES

Integrative Systems and Design

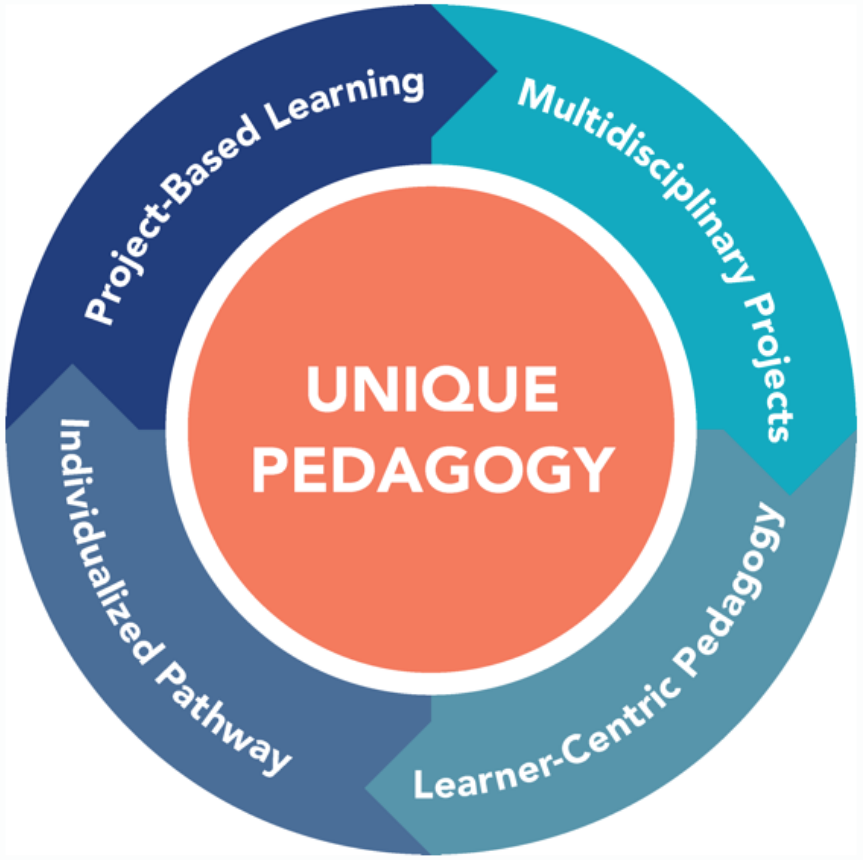
A UG Program for Nurturing Innovators and Technologists

Prepared for
Major Selection Year 1 Students
9 Apr 2025

New mode of education to nurture innovators for future industry

1st Experiential Learning degree program in Hong Kong

- Launched in Fall 2018
- Low faculty-to-student ratio
- Interdisciplinary knowledge with human-centered mindset



Core Mindsets

- Global Vision
- Entrepreneurial Spirit
- Design Thinking
- Technical Competency
- Hands-on Prototyping Skills
- Teamwork

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INTERDISCIPLINARY STUDIES

ISD Graduate Pathways – **Innovators and Technologists**

Since launch of program in 2018, we have 3 batches of graduates.
With **diverse skillsets and competencies**, our graduates are welcomed by many industries ...

Trusted employers


呂鏡慧 Josephine Lui
助理工程師 Associate Engineer
香港國際主題樂園有限公司
Hong Kong Disneyland
Mashiat Lamisa
高級產品經理
Senior Product Manager
LALAMOVE Hong Kong
魏雪來 Martin Wei
米蘭理工大學設計與工程碩士生
MSc Design & Engineering at
Politecnico di Milano
青年創業家 Entrepreneur
趙政 Gordon Chiu
技術顧問
Technical Consultant
國際商業機器 IBM

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INTERDISCIPLINARY STUDIES

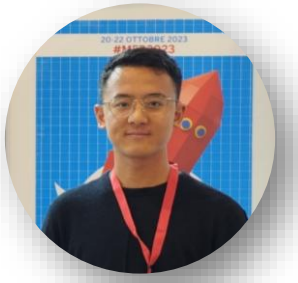
ISD Graduate Pathways – **Postgraduate Studies**

... also welcomed by world-renowned institutions. Here are some examples:

Star Chen
University of Pennsylvania
PhD Electrical Engineering

Jason Wang
The Hong Kong University of Science and Technology (CWB)
PhD in Integrative Systems and Design

Alice Guan
The Hong Kong University of Science and Technology (GZ)
MPhil in Computational Media and Arts



Xuelai Wei
Politecnico di Milano
MPhil in Design & Engineering

Kelly Lai
University of Pennsylvania
MSE Electrical Engineering

Katie Chong
University of Michigan
Master of Public Health

Tom Yu
Carnegie Mellon University
MSc in Robotics

Cecil Fu
ETH Zurich
MSc in Robotics, Systems and Control

ISD Journey to become Future Talent

Year 1 | **Year 2** | **Year 3** | **Year 4**

Division of
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INTERDISCIPLINARY STUDIES

ISD Journey to become Future Talent

Year 1 **Year 2** **Year 3** **Year 4**

TECHNOLOGY

Fundamentals
Mathematics, Physics, Basic Programming

Intermediate
IoT, Smart Mechatronics, Materials, Shape and Design

DESIGN

Fundamentals
Design Thinking, Systems Thinking Sketching

Intermediate
Graphics Communication, Digital Design, Physical Prototyping

INDIVIDUALIZED PROJECT ELECTIVES

Advanced Technical Courses
Supported by Engineering, Science, Business, Humanities and Social Science

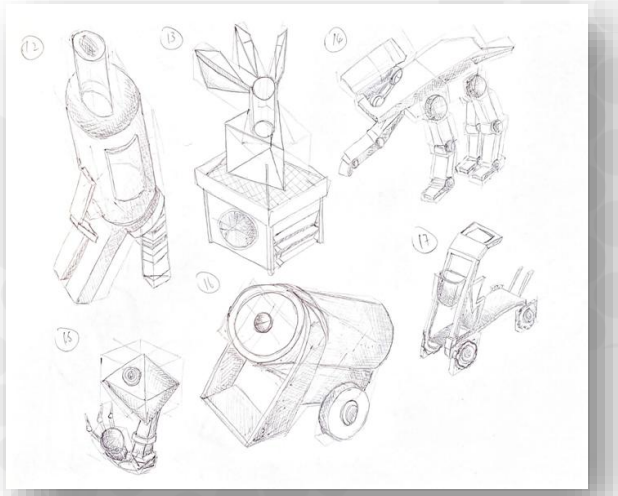
ENTREPRENEURSHIP

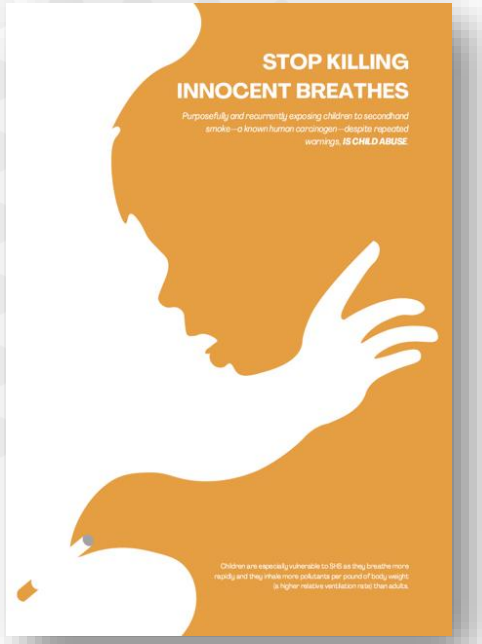
Global Product Management, Product Innovations, Operation and Marketing Management

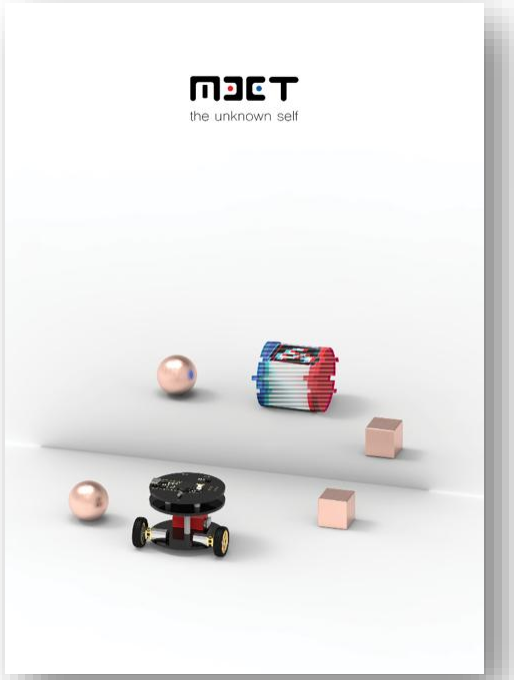
Fundamental Design Courses

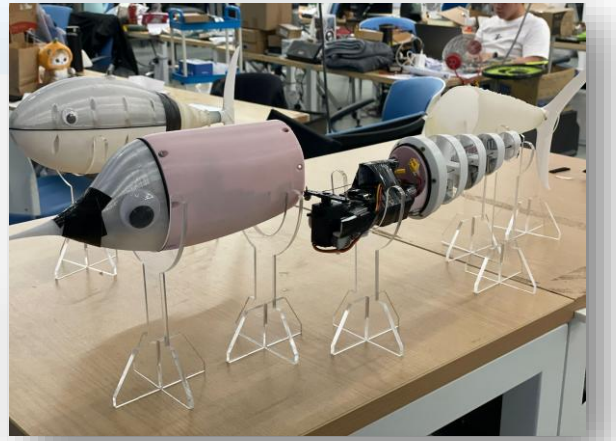
Example:

- Sketching
- Graphics Communication
- Digital Design
- Physical Prototyping





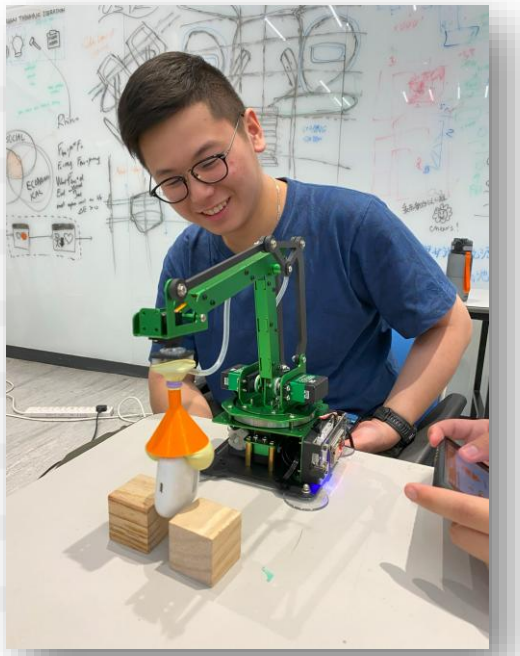




Fundamental Technical Courses

Example:

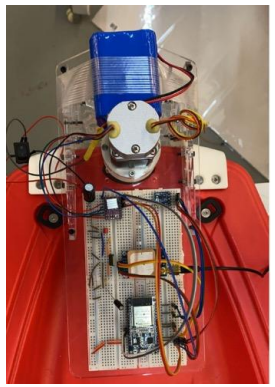
- Internet of Things
- Smart Mechatronics
- Materials, Shape and Design



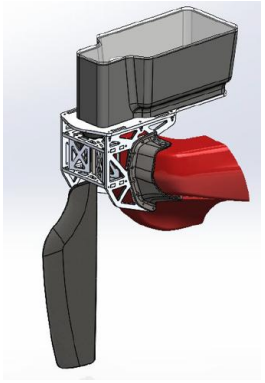
Technical and entrepreneurship electives

Collaborating with other Schools, ISD students can choose courses to meet their project needs

- MATH – Mathematic courses
- MECH – Mechanical Engineering courses
- COMP – Computer Science courses
- ELEC – Electronics Engineering courses
- BIEN – Biomedical Engineering courses
- ENTR – Entrepreneurship courses
- ISOM – Information Systems courses
- MGMT – Management courses
- .....



Electronics hardware



3D modelling

Prototype/simulation

App development

System integration

Year 3 project example – AutoNav: Automatic Kayak Rudder Control
Students integrating multi-disciplinary knowledge

Learning to innovate: from zero to one

Students learn to find the right problems to solve

ISD Journey to become Future Talent

Year 1 | **Year 2** | **Year 3** | **Year 4**

Year 2 Project → **Year 3 Project** → **Year 4 Project**

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ENTREPRENEURSHIP

Global Product Management, Product Innovations, Operation and Marketing Management

ISD Signature: Year-Long Projects

ISD curriculum embeds 3 Year-Long Projects.
Students apply their learning to solve **real-world problems.**

Year 2 project example – GreenHub SustainableTech

Year 2

Work as a **Team**
Apply technologies through **Hands-on** experience

Year 3 project example – SURFIVE MarineTech

Year 3

Create **New Designs** & applications
Refine **Prototyping** skills

Year 4 project example – FIRS
NEC 2024 Champion
ASMPT 2024 Bronze award

Year 4

Connect with industry & research partners
Develop **Global Vision**

FIRS

Facade Installation Robotic System

Modernizing Working At Heights

F.I.R.S is a smart construction robot that can handle the most high-risk procedures of mounting panels at heights with Computer Vision-powered automation and IoT connectivity, while giving construction workers control to monitor and intervene safely from the ground, empowering them to install BIPV safely and effectively.

Fixation Module

The robotic fixation module can carry panels up to 35 kg to high places and mount them in place, and all the while provide real-time video feedback to monitor installation conditions, and use Computer Vision to enable automated installation.

Hook Optimization

Our panel hooks are redesigned for self-aligning, striking a balance between robot-friendliness in installation, human-friendliness in securing, with cost and manufacturability in mind.

Worker Controller

The worker controller gives worker full transparency over the robot's operations, such that they can inspect and ensure safety and quality of the installation in real-time. The controller also enables a hybrid operation between automated and remote-control workflows.

Project by:

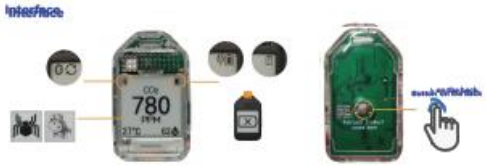
WANG, Shijie (Jason)
YU, Muku (Tom Notch)
TSE, Yiu Kai (Ricky)
LIK, Wang Lok (Renault)
SONG, Chen (Alan)

UAIR

YOUR PERSONAL CO2 MONITOR

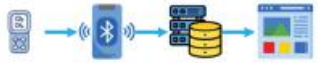
THE LEVELS OF CO2 IN THE AIR AND POTENTIAL HEALTH PROBLEMS ARE:

- 400 ppm: average outdoor air level.
- 400-1,000 ppm: typical level found in occupied spaces with good air exchange.
- 1,000-2,000 ppm: level associated with complaints of drowsiness and poor air.
- 2,000-5,000 ppm: level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.



App & System Flow

- Real-time data monitoring
- Data synchronization from sensor
- Data logging and transmission to server
- User login and personalized suggestions/ alerts for users



Contributors

Wong Tat Hang, Alex
Wei Xuelai, Martin
Zheng Jiakun, Jack

Supervisors

Prof. CHI Ying TSUI
Prof. CHI MingCHAN

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY
The Division of Integrative Systems and Design (ISD)

SALT

Hi, We're SALT.

A Phase Difference of Arrival (PDOA)-based System for Enhancing Construction Safety

SALT Anchor
Serves as fixed reference points to receive UWB signals from tags to locate the workers and machineries with broad coverage.

SALT Tag
Makes use of UWB, IMU and BLE technology for precise location tracking. It's water-resistant and easily attaches to workers' helmets.

SALT In-Cabin Display
Provides a high-resolution and intuitive interface for real-time safety information, customizable to site needs and user preferences.

SITUATIONAL AWARENESS LOCATION TRANSPONDER

Shock Resistant · Water Resistant · Increase Safety Awareness · Wireless Charging · High Scalability

Discover SALT

Scan the QR code to get a glimpse of how SALT can revolutionize worker safety in construction sites.

香港科技大學 THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY — ISD
Division of Integrative Systems & Design
Final Year Design Project

AILISTEN

Background

Public infrastructures, such as transport announcements, often rely on audio cues to convey information. As such, deaf individuals may miss out on important information.

Deaf individuals may face safety risks while navigating their surroundings, as they are unable to hear warning sounds like alarms, sirens, or the sound of approaching vehicles.

Being unable to hear makes it difficult for deaf individuals to identify the direction and distance of a sound source, such as knowing if there is a vehicle behind them.

These challenges limit deaf people's ability to live independently and safely

Limitations of Existing Products

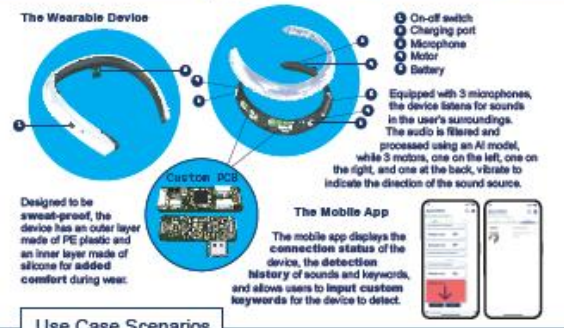
1. **Cost and medical eligibility** limit access to current technology such as cochlear implants and hearing aids
2. Cochlear implants provide **limited sound quality** and **cannot fully restore one's hearing**, especially for those with bilateral hearing loss. Similarly, hearing aids amplify sound but cannot help those with profound hearing loss in both ears.
3. Alarms that use visual or haptic feedback have **limited functionality** and are designed for **indoor use only**.

Our Solution

To address the gaps of existing solutions, we designed a system that can:

- **Analyze the semantics of ambient sound**
- **Identify notable sounds or sounds that indicate potential danger**
- **Identify the incoming direction of sounds**

The Wearable Device



Equipped with 3 microphones, the device listens for sounds in the user's surroundings. The audio is filtered and processed using an AI model, while 5 motors, one on the left, one on the right, and one at the back, vibrate to indicate the direction of the sound source.

Designed to be **sweat-proof**, the device has an outer layer made of PE plastic and an inner layer made of silicone for **added comfort** during wear.

The Mobile App

The mobile app displays the **connection status** of the device, the **detection history** of sounds and keywords, and allows users to **input custom keywords** for the device to detect.

Use Case Scenarios

Notify the user when their name is called (e.g. at a public hospital)

Notify the user of sirens or alarms (e.g. when an ambulance is approaching from a distance)

Notify the user of someone trying to communicate with them (e.g. someone saying "excuse me" from behind)

Monitor the user's environment for things falling or breaking (e.g. when a pet breaks a vase)

Team Members: FU Zhengyu, HU Ruyu, LUI Josephine, LUO Yuchong, SHI Jingshu, Xu Yinzhe

Special thanks to the local deaf community and 語橋社資 for assisting us during the development of this project.

Zero Carbon
Architecture & Future City

Project highlights:

- Entered **HKSTP Ideation** Program
- One member continued project after FYP for his **PhD research topic**
- Further incubation in Shenzhen, company name "KingJune Robotics"
- ASMPT **Bronze** Award in 2024
- Engineering Innovation Challenge (Singapore) **Champion** 2024

About the project:

Designing an integrative systems for a semi-automated control system to install PV panels onto building façade to reduce the safety hazards, cost, and efficiency of workers working at heights.

擎隽机器人科技有限公司
KingJune Robotics Co., Ltd.

PV system installation process

Place panel

↓

Smart CV recognition, auto-positioning

↓

Auto-lifting and installation

Project highlights:

- First entrepreneurship project in ISD UG
- Successfully spin off a startup from final-year project
- One member brought the idea and productized in Europe

About the project:

The team designs a device that raises awareness of high indoor CO2 concentration and its negative effects.

Project highlights:

- Entered **HKSTP Ideation** Program
- Worked with a construction company as **industrial partner**, co-developed with on-site safety managers and workers
- ASMPT **Gold** Award in 2023

About the project:

Using Ultra-Wideband (UWB) positioning system to enhance construction-site safety. Namely Situational Awareness Location Transponder

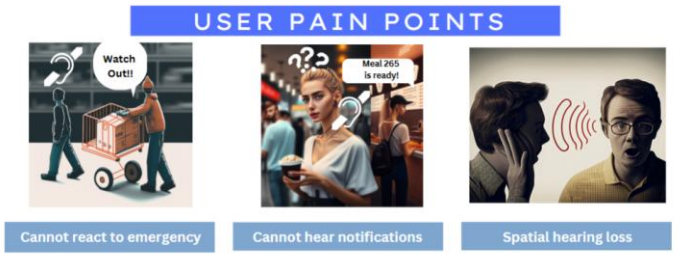
S.A.L.T. - Situational Awareness Location Transponder

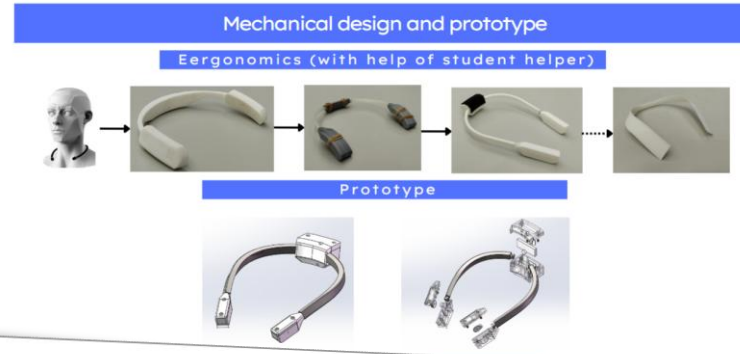
Project highlights:

- Entered HKSTP Ideation Program
- A social entrepreneurship project for people with disabilities

About the project:

Designing an inclusive wearable device for hearing impaired to navigate daily life with visual and haptic senses.





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ACADEMY OF 跨學科學院
INTERDISCIPLINARY STUDIES

ISD Journey to become Future Talent

Year 1

Year 2

Teamwork

Year 2 Project

Year 3

Hands-on Prototyping Skills

Year 3 Project

Year 4

Global Vision

Year 4 Project

Technical Competency

TECHNOLOGY

Fundamentals
Mathematics, Physics, Basic Programming

Intermediate
IoT, Smart Mechatronics, Materials, Shape and Design

Design Thinking

DESIGN

Fundamentals
Design Thinking, Systems Thinking Sketching

Intermediate
Graphics Communication, Digital Design, Physical Prototyping

INDIVIDUALIZED PROJECT ELECTIVES

Advanced Technical Courses
Supported by Engineering, Science, Business, Humanities and Social Science

Entrepreneurial Spirit

ENTREPRENEURSHIP

Global Product Management, Product Innovations, Operation and Marketing Management

RESEARCHER (PG)
TECHNOLOGIST
DESIGNER
ENTREPRENEUR

ISD Study Path

Year 1

Fall (16)

ISD SCIENCE FOUNDATION
- PHYS (3)
- COMP (3)
- MATH I (3)

DESIGN THINKING
- ISDN1001 Introduction to ISD (3)
- ISDN1007 Design Thinking (3)
- ISDN1004 Sketching (1)

COMMON CORE
- LANG1402 Chinese (3)
- CC SA (3)
- HMAW1905E (1)

ISDN1010 (0)

Spring (18)

ISD SCIENCE FOUNDATION
- COMP (3)
- MATH II (3)

COMMON CORE
- LANG1407 English (3)
- CC Arts (3)
- HMAW1905E (2)

Year 2

Fall (13)

Year 2 Project
- ISDN2001 (1)

ISD TECHNICAL FOUNDATION
- ISDN2300 3D Design (3)
- ISDN2601 Smart Mechatronic (3)
- ISDN2602 Internet of Things (3)

COMMON CORE
- LANG206X Chinese (3)

ISDN2010 (0)

Spring (15)

Year 2 Project
- ISDN2002 (3)

PROJECT-RELATED ELECTIVES
- Elective I (3)

ISD TECHNICAL FOUNDATION
- ISDN2400 Physical Prototyping (3)
- ISDN2603 Materials & Shape (3)

COMMON CORE
- CC Science (3)

Year 3

Fall (17)

Year 3 Project
- ISDN3001 (3)

PROJECT-RELATED ELECTIVES
- Elective II (3)
- Elective III (3)
- Elective IV (3)

SYSTEMS & DESIGN COMMUNICATION
- ISDN3200 Graphics Communication (2)

COMMON CORE
- CC Humanities (3)

ISDN3010 (0)

Spring (15)

Year 3 Project
- ISDN3002 (3)

PROJECT-RELATED ELECTIVES
- Elective V (3)
- Elective VI (3)

SYSTEMS & DESIGN COMMUNICATION
- ISDN2200 System Thinking (3)

COMMON CORE
- CC Elective (3)

Year 4

Fall (13)

Year 4 Project
- ISDN4001 (4)

PROJECT-RELATED ELECTIVES
- Elective VII (3)

ENTREPRENEURSHIP
- ENTR Elective I (3)

COMMON CORE
- LANG4036 Advanced English (3)

ISDN4010 (0)

Spring (13)

Year 4 Project
- ISDN4002 (4)

ENTREPRENEURSHIP
- ENTR Elective II (3)

COMMON CORE
- Free elective (3)
- CC Elective (3)

Students are required to take ISDN1011 Industrial Training (0 credit) in Year 1 winter term

Total no. of credits: 120

YLP Pathways with Exchange

Regular (without exchange)

ISDN2001		ISDN2002		ISDN3001		ISDN3002	
Year 2 Fall	Year 2 Winter	Year 2 Spring	Year 2 Summer	Year 3 Fall	Year 3 Winter	Year 3 Spring	Year 3 Summer

Exchange in Y3 Fall

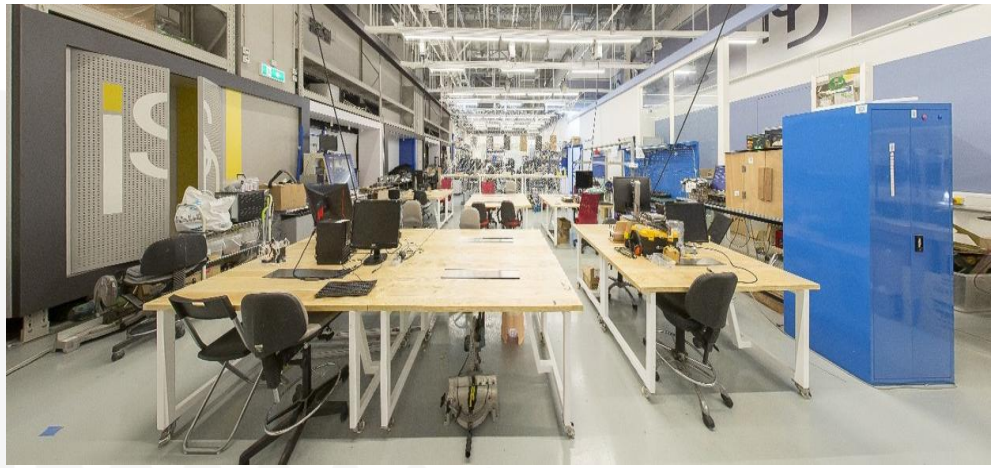
ISDN2001		ISDN2002	ISDN3001	Exchange		ISDN3002	
Year 2 Fall	Year 2 Winter	Year 2 Spring	Year 2 Summer	Year 3 Fall	Year 3 Winter	Year 3 Spring	Year 3 Summer

Exchange in Y3 Spring

ISDN2001		ISDN2002		ISDN3001		Exchange	ISDN3002
Year 2 Fall	Year 2 Winter	Year 2 Spring	Year 2 Summer	Year 3 Fall	Year 3 Winter	Year 3 Spring	Year 3 Summer

Design Studio + ISDWorks! Makerspace

Two 24/7 reconfigurable collaborative spaces for student projects



ISD Faculty

Multi-disciplinary faculty

Design and Engineering faculty

- EE – Embedded System, Signal Processing, Robotics
- MECH – mechanics, material, kinematics
- CSE – AI, Computer Vision, UX/UI
- Ergonomic Design
- Design Methodology and System Design
- Industrial Design
- Green Building Design
- Material
- Health technologies
- Graphic and Brand Design
- Sustainability
- Entrepreneurship

ISD student success

Welcome to join ISD!

- Self-motivated and inquisitive 喜愛探索
- An active learner and a maker 主動學習
- Passionate about technology & development 熱衷科技發展
- Eager to be a future technology leader & innovator 渴望成為未來創科專才

Source: Graduate Photo taken 3 Dec 2023

Major Selection Assessment Methods

Pre-requisites:

- MATH 1012/MATH 1013/MATH 1014/MATH 1020/MATH 1023/MATH 1024

Assessment Components:

- Academic Performance
- Design and Technology Project Portfolio (DTP) - *(Submission link)*
- Interview *(Shortlisted students will be invited for an interview in June)*

For details, please refer to: https://isd.hkust.edu.hk/academics/bsc-in-integrative-systems-and-design-isd

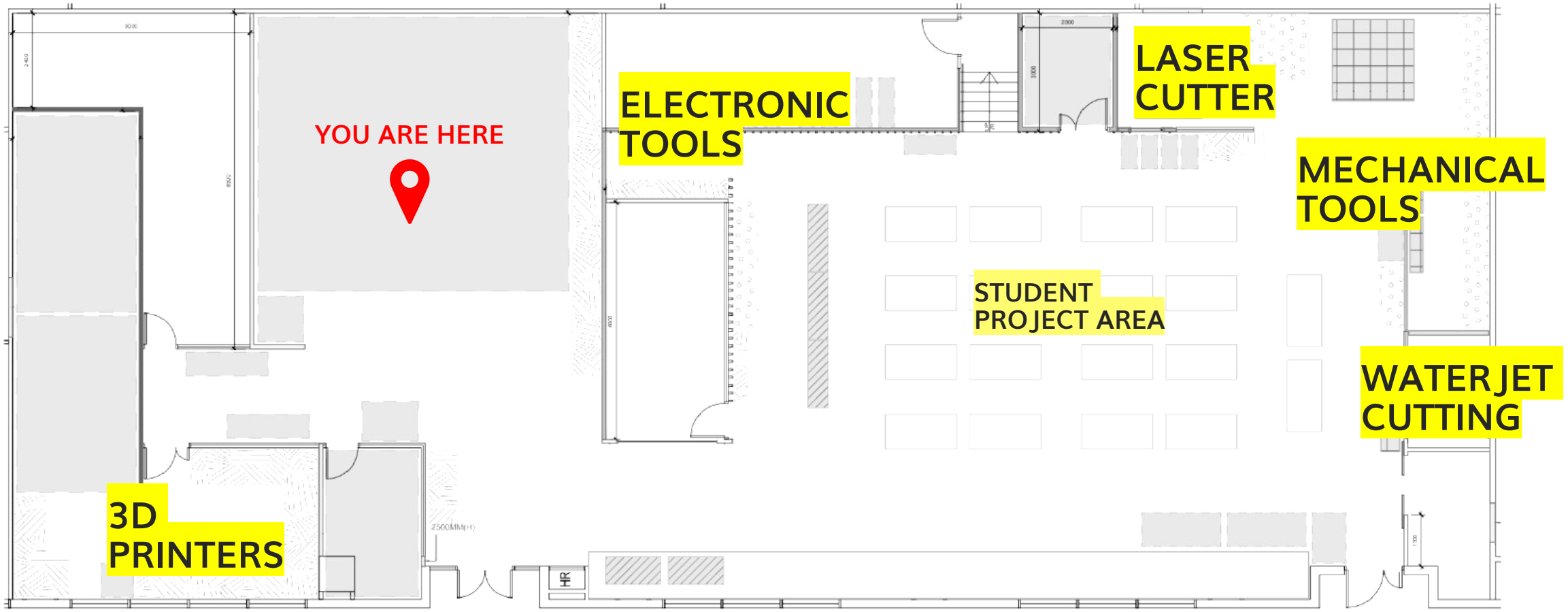
Application Period

School	Application Period	Application Procedure
SSCI	1 March - 25 April	Students should submit the application online via SSCI by 25 April 2025
SENG	26 March - 30 April	Students should submit the application online via SENG by 30 April 2025

Tips for your interview

1. Prepare a “tailored” self-introduction
   準備一個"度身訂做"的自我介紹
2. Be familiar with your portfolio / transcript
   熟悉你的成績單
3. Talk about the process, show your passion, not ONLY the result
   談談你學習的過程，對學習的熱誠，不要只談成績
4. Prepare a question(s) that shows your interest to the program
   準備一個能表達您對該課程感興趣的問題
5. Always smile!
   帶你的微笑！

In-house State-of-the-art Facilities to Realize Student Ideas



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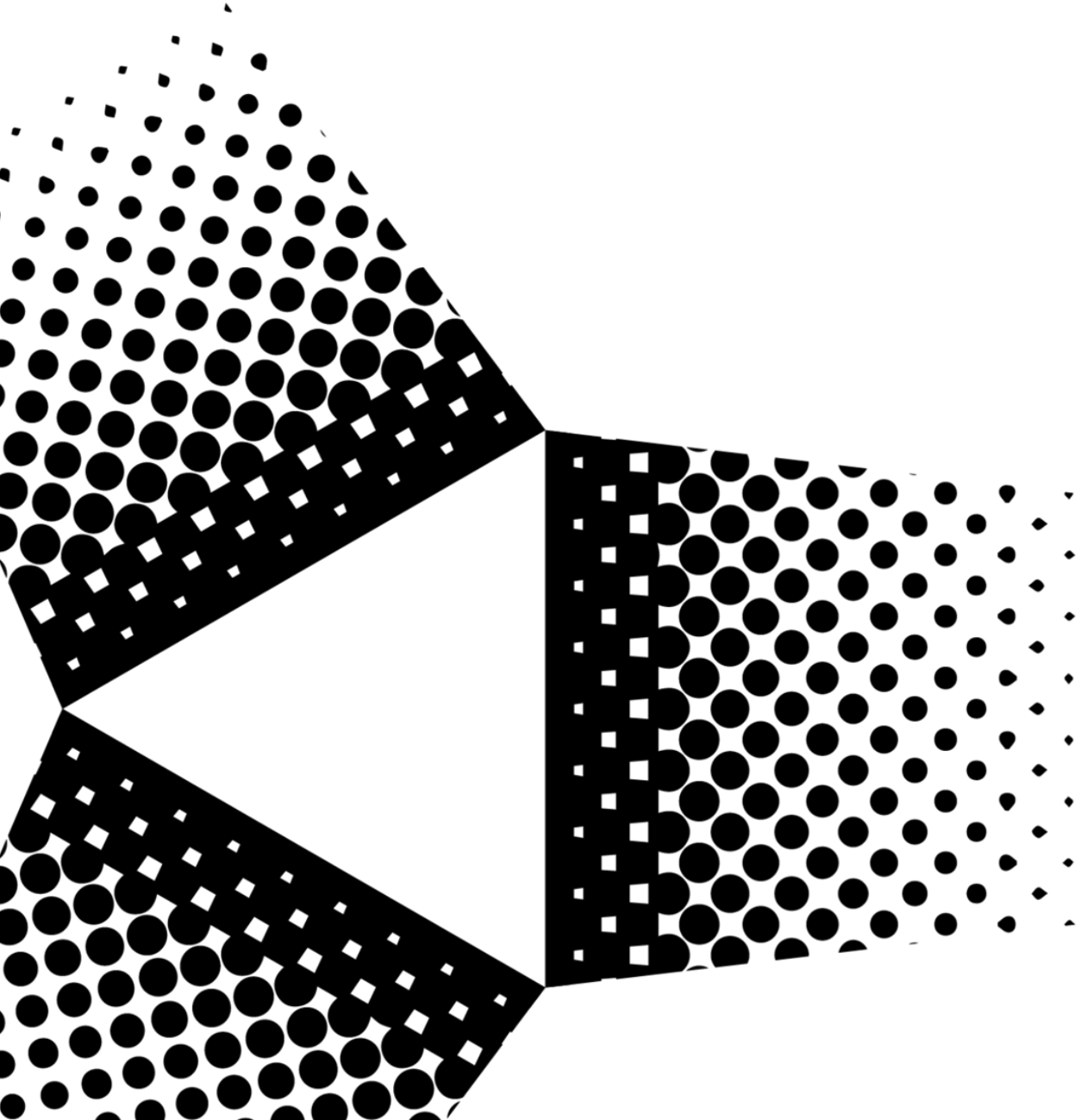
ACADEMY OF 跨學科學院
INTERDISCIPLINARY STUDIES



Thank you!