COMP3516: Data Analytics for IoT

Lecture 0: Course Logistics

Chenshu Wu

Department of Computer Science

2026 Spring

香 港 大 學
THE UNIVERSITY OF HONG KONG

Course Information

- Time & Location:
  - Tue 15:00-15:50 (**MB167**)
  - Wed 09:00-10:50 (**LE1**)
- Instructor
  - Dr. Chenshu Wu
  - Email: chenshu@cs.hku.hk
  - Office: Rm 315B, CYC Building
  - Office hours
    - Tue: 9:00 am-10:30 am
    - Fri: 9:00 am-10:30 am
    - **By appointment:** https://calendly.com/cswu-1/comp3516-office-hours

- Tutor
  - Mr. Yuemin Yu
    - Email: yuyuemin@connect.hku.hk
    - Office: HW101
  - Office hours
    - See Moodle

Moodle Course Site

- Homepage
  - https://moodle.hku.hk/course/view.php?id=127990

  - Course Information
  - Teaching plan
  - Lecture Notes
  - Lecture/tutorial Videos
  - Assignments information
  - Announcements and Updates

  - Discussion Forum
    - Peer to peer discussions & asking questions
    - **Ask questions on Moodle** (Questions by email will be redirected to Moodle)

Course Format

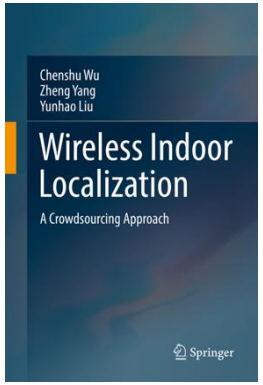
- Lectures and tutorials will be delivered *f2f* in teaching venues.
  - No real-time online streaming

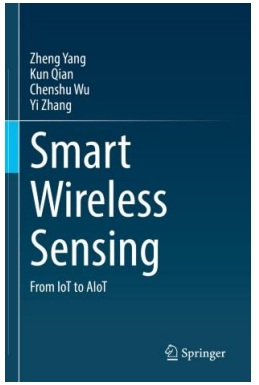
- Video-recording of lectures/tutorials
  - Will be provided during the add/drop period
  - Will be provided if I remember to do so, at best-effort (i.e., no QoS guarantee, not for every lecture)

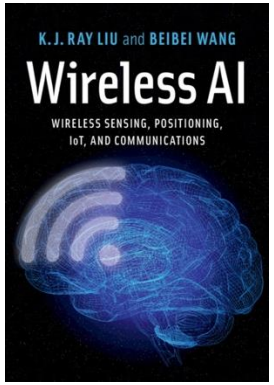
Course Information

- Material
  - Lectures: Slides, notes, research papers
  - Moodle for discussions and questions
  - No textbook is required

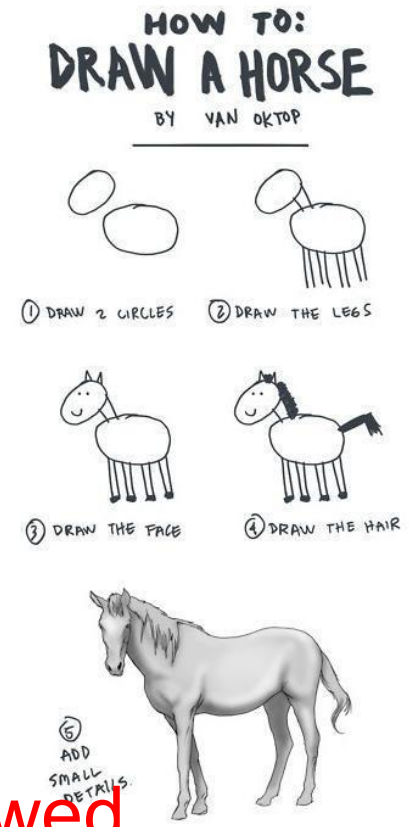
- Reference Books
  - Smart Wireless Sensing: From IoT to AIoT
  - Wireless Indoor Localization: A Crowdsourcing Approach
  - Wireless AI: Wireless Sensing, Positioning, IoT, and Communications



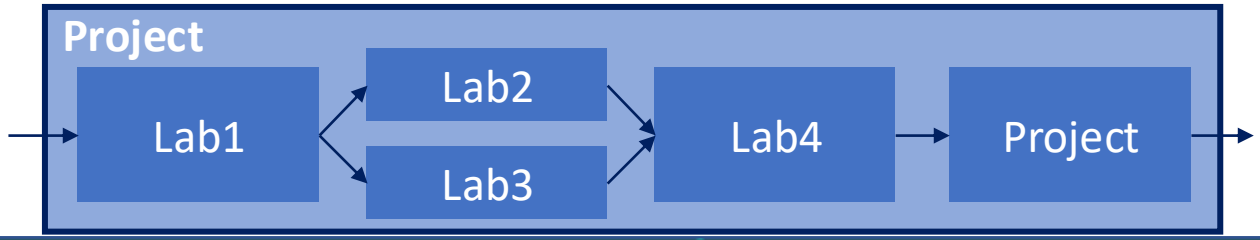




Exams and Assignments



- Problem sets (individual assignments) [10%]
  - In-class quizzes?
- Four labs (individual assignments) [20%]
  - Lab 1: Signal Basics
  - Lab 2: Fast Fourier Transform
  - Lab 3: Correlation
  - Lab 4: Filtering
- Course Project (group task) [30%] – NO slip days allowed.
- Individual Project?
- Final Exam [40%]

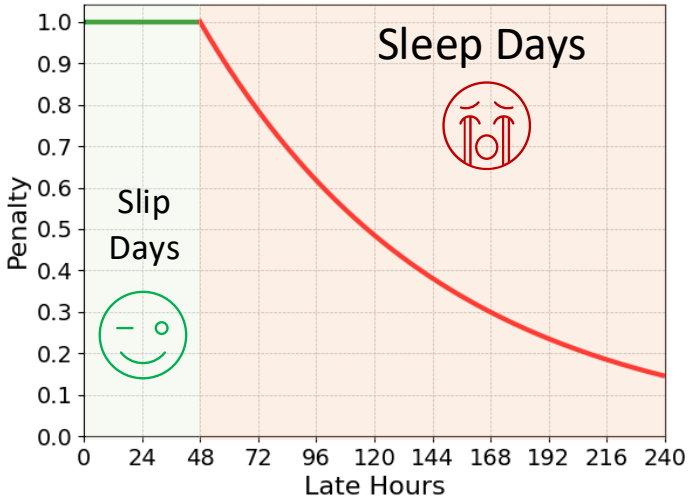


Late Submission: Slip Days Policy

- Each assignment has a due date and a due time, which will be posted on the course web page. For assignments, we will use a system of "slip days" to give you some flexibility with the assignment deadlines. **Each student starts the term with 5 slip days**, which can be used to push back assignment deadlines. Slip days work as follows:
    1) Pushing an assignment deadline back by one day (24 hours) costs one slip day.
    2) An assignment deadline can be pushed back at most three days.
    3) Partial slip days are not allowed, e.g., it is not possible to use part of a slip day to push a deadline back by six hours.
    4) Slip days are not transferable from one student to another.
    5) The slip days will be applied automatically* as is needed according to the exact timestamp of submission.
    6) A **FREE late window of 30 minutes** is allowed to accommodate potential technical issues upon submission. In other words, submissions made within 30 minutes after the deadline need no slip days to cover them.
    7) **All the thresholds will be observed strictly**. For example, a submission that is late for 1801 seconds (i.e., 30 minutes plus 1 second) will use one slip day.
- **Assignments that are submitted late (with not enough slip days to cover them or more than 3 days) will still be accepted, but deducted to $p = 0.99^t$, where t is the uncovered late time rounded up in hours.**

* Let D be the deadline, and T your submission timestamp. The number of slip days that will be used for a submission, noted as SD, is calculated as follows:

```
if (T - D) <= 30 minutes, SD = 0;
else if (T - D) <= 24 hours, SD = 1;
else if (T - D) <= 48 hours, SD = 2;
else if (T - D) <= 72 hours, SD = 3;
else SD = 0 & mark *= p.
```



Example: If you have 2 remaining slip days, and are late for four days, you still get 60% of your original score.

v3.0 2024 Spring

Plagiarism

- Plagiarism is a disciplinary offence. Any student who commits the offence is liable to disciplinary action
  - https://tl.hku.hk/plagiarism/
- We will make use of software tools to check against your submitted assignments
  - If we identify any suspicious cases, we will invite you to explain to us
  - Both the student who copies other's work and the student who offers his/her work for copying shall be penalized.
- We will follow the departmental guidelines on handling any cases relating to the practice of plagiarism
  - "Both the student who copies other's work and the student who offers his/her work for copying shall be penalized."
- **AIGC/ChatGPT Policy**
  - You are **allowed, and encouraged**, to use any AIGC tools including ChatGPT.
  - You must acknowledge every single place where you use AIGC tools, including the mini-exercises, problem sets, programming assignments.

Course Information

- Prerequisites: MATH1853 or MATH2014; and COMP2119
  - This is an undergraduate course
  - Basic math and signal processing: probability, matrix, complex numbers, …
  - Undergraduate courses on networking, DSP, wireless communications are a plus
  - Python programming (for labs) and others (depending on your project)

Scope of this course

- This course is about …
  - … concepts, technologies, and applications of IoT and AIoT
  - … learning how to sense signals from the physical world
  - … developing sensing and learning solutions to extract information
  - … designing IoT systems that solve practical problems

- Warning 1: The course will be in general challenging for most HKU CS students without relevant background and/or strong motivation to learn.
- Warning 2: The workload is HIGH (but FUN too)!!
- Warning 3: Difficult at the beginning, but gets better when going deeper.

Scope of this course

- This course is NOT about …
  - … machine learning or deep learning
  - … data science
  - … theories in digital signal processing, statistics, wireless communications, computer networks, …
  - … building hardware/circuits

- (instead, we may use these as tools)

Topics

- Introduction
- Connectivity
  - Wireless networks
  - Wireless protocols
  - Wireless communication
- IoT Signals & Data
  - Signal basics
  - Time-frequency
  - Periodicity/Correlation
  - Detection
  - Filtering
  - Similarity
- Radio Analytics: mmWave Sensing
  - Range Estimation
  - Doppler Estimation
  - Angle Estimation
- Radio Analytics: Wi-Fi Sensing
  - Channel State Information
  - Signal modeling
  - Motion detection
  - Breathing rate estimation
  - Speed estimation
- Mobile Analytics: Mobile sensing
  - Inertial sensors
  - Sensing applications
- Location Analytics: Localization
  - Fingerprinting
  - Triangulation/Trileteration
  - Inertial Tracking
- Edge AI
  - Deep Wireless Sensing
  - Edge Learning
- Selected advanced topics

Teaching Plan & Schedule

Week	Mon	Tue (MB167)	Wed (LE1)	Thu	Fri
01		20/01 Course Overview, Intro	22/01 Introduction to IoT		
02	26/01 Labs Release	27/01 Wireless IoT	28/01 Basics of Signals		
03		03/02 Lab 1&2 Tutorials	04/02 mmWave Sensing		
04		10/02 Wireless Channel and CSI	11/02 WiFi Sensing		
05	16/02 *Happy*	17/02 *Chinese*	18/02 *New*	19/02 *Year*	20/02 *!*
		24/02 Lab 3&4 Tutorials	25/02 WiFi Sensing		
07		03/03 Mobile Sensing	04/03 Mobile Sensing		
08	09/03 Reading	10/03 Week	11/03 Enjoy	12/03 Or	13/03 Work?
09		17/03 Project Briefing	18/03 Thermal Sensing		
10		24/03 Indoor Localization	25/03 Indoor Localization		
11		31/03 Deep Wireless Sensing (Data)	01/04 Deep Wireless Sensing (Data, Model)		
12		07/04 *No Class*	08/04 Deep Wireless Sensing (Model)		
13		14/04 System Evaluation	15/04 System Evaluation		
14		21/04 Sensing AI for Health	22/04 TBD		
15		28/04 Course Summary	29/04 Group Presentation		

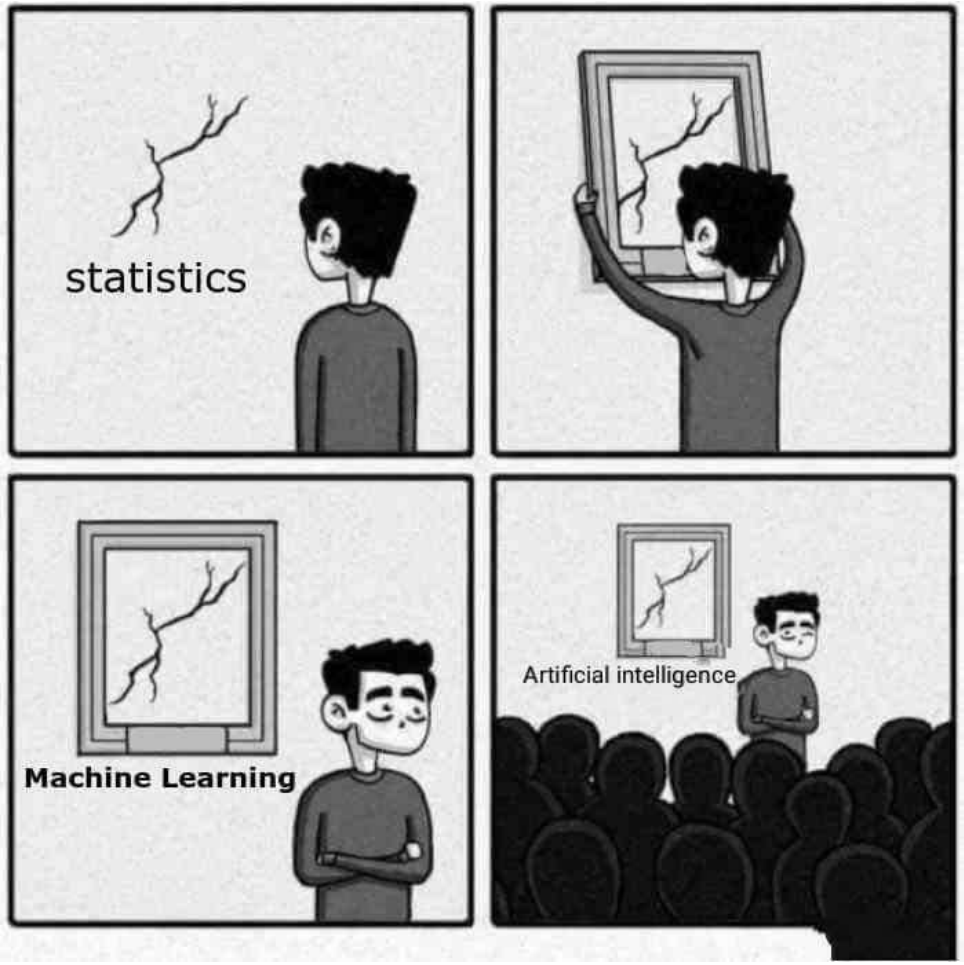
* Schedule and topics may be subject to changes.

Why invest time on this course?

- (1) Want to know my world

Why invest time on this course?

- (2) Want to learn a bit more about machine intelligence beyond computer vision



Why invest time on this course?

- (3) Want to join industry?

IoT Statistics: What is the IoT Market Size?

5. Companies Could Invest Up to $15 Trillion in IoT by 2025

Many companies have already identified IoT devices as a clear value-add for their business. Far from just the technology sector, clothing manufacturers, healthcare providers, and municipalities around the world are investing in new ways to leverage the potential of interconnected devices.

With so much capital pouring into research and development, it's safe to assume that the IoT market size of the next decade will look very different

Reference: https://www.vxchnge.com/blog/iot-statistics

Why invest time on this course?

- (3) Want to join industry?

8. By 2024, the Global IoT Healthcare Market is Expected to Reach $140 Billion

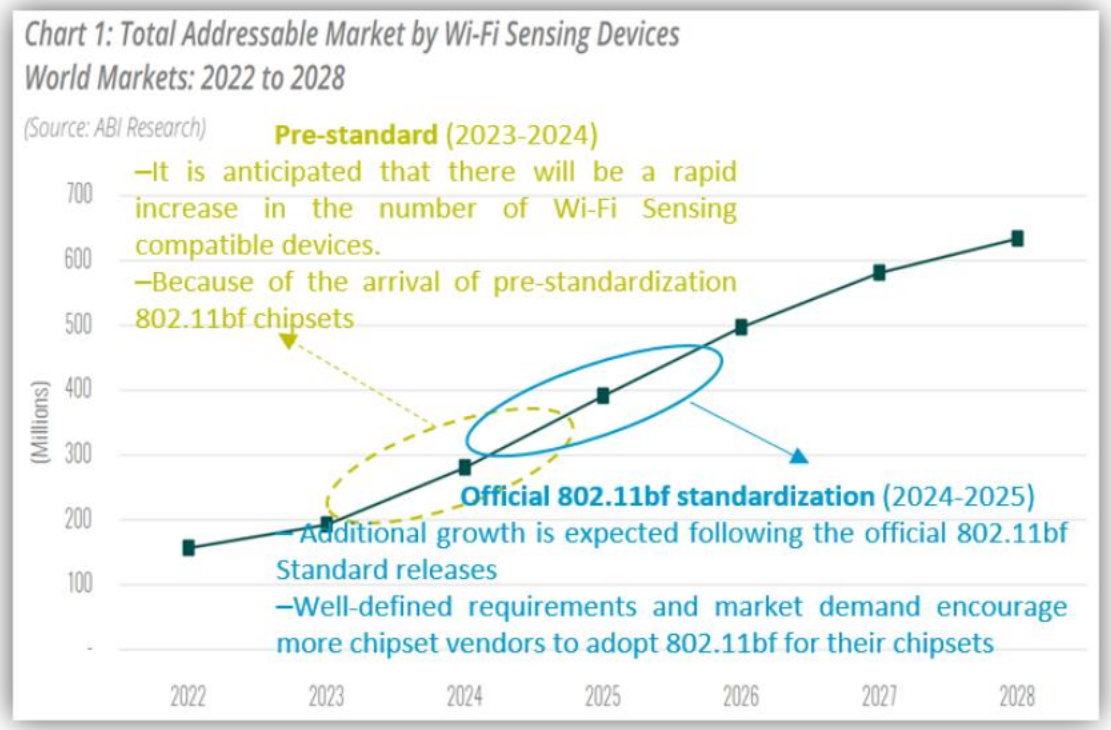
Healthcare is one of the most exciting use cases for IoT technology, which is why the market in that sector is expected to grow by 12 percent annually from 2017 to 2023. The potential of telemedicine and wearable sensors will make it possible for medical professionals to better monitor and treat patients, especially in traditionally difficult-to-reach regions. Although the healthcare sector faces unique challenges owing to the compliance demands of HIPAA/HITECH requirements, improvements in IoT security will help the technology to be applied more broadly in the coming years.

Reference: https://www.vxchnge.com/blog/iot-statistics

Why invest time on this course?

- (3) Want to join industry?

Total addressable market [1]

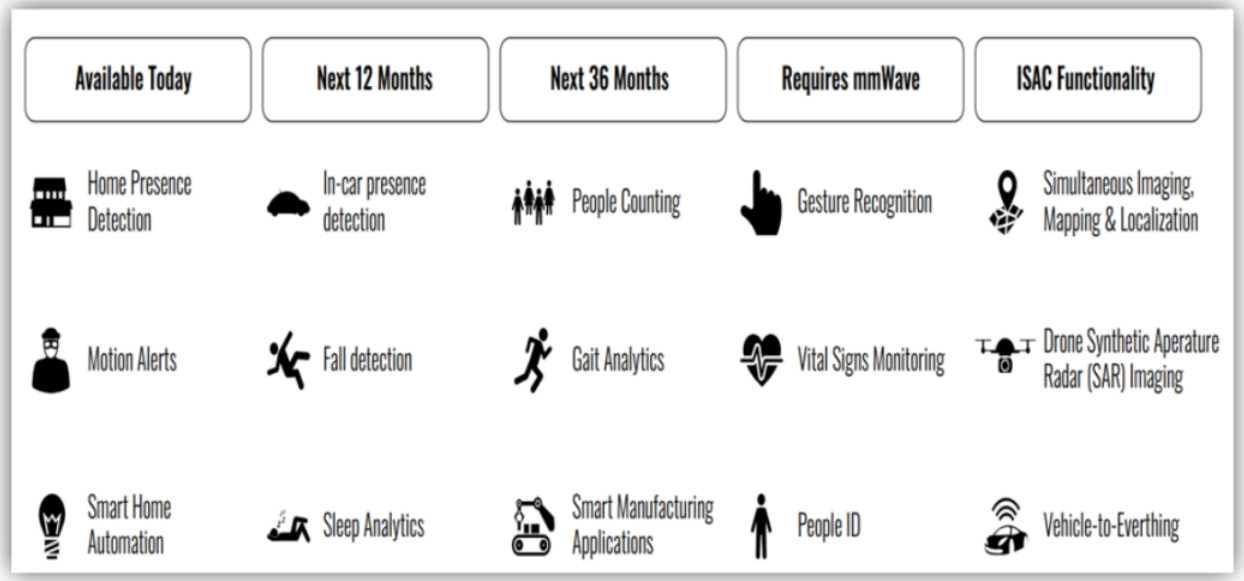


Promising technology and Market !!!

Awards ¥720,000

https://competition.huaweicloud.com/information/1000041958/introduction

Roadmap of use cases for Wi-Fi sensing [1]



Evolving step by step, adopted by more and more customers

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A A A Keyword Search... 語言

About Us Past Events General Information Summit Expo For Exhibitors Media Centre

CES INNOVATION AWARDS 2024 HONOREE

CES Innovation Awards 2025 Honoree

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Face

Pontosense Inc

2024 Honoree in Advanced Mobili

VEHICLE TECH &

FaceHeart Corp

2025 Honoree i

DIGITAL HEALT

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2025

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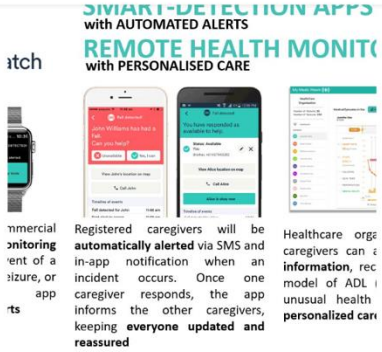
FABRIC FLOOR

Japan - France Bed Co., Ltd.

Fadelisy - AI Fall Detection System

HKSTP - BNET-TECH Company Limited



Fall Alert - My Medic Watch

Australia NSW - My Medic Watch

Fall Detection Devices and System

Kerry Medical Limited

Fall Detection System

Fall Detection System

HANSHIN TECHNOLOGY LIMITED

Fall detection System

Vital Home Solution Limited

Fall Prevention Airbag Vest

IKL i-healthcare Company Limited

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SIGN UP APPLY TO EXHIBIT

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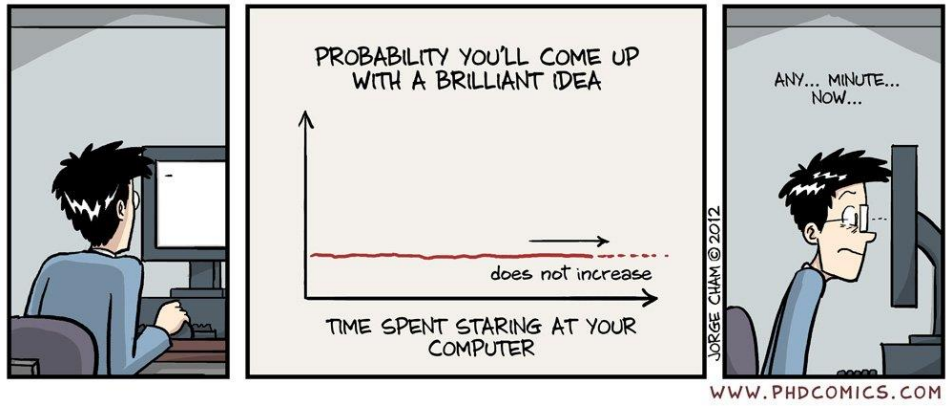
/our

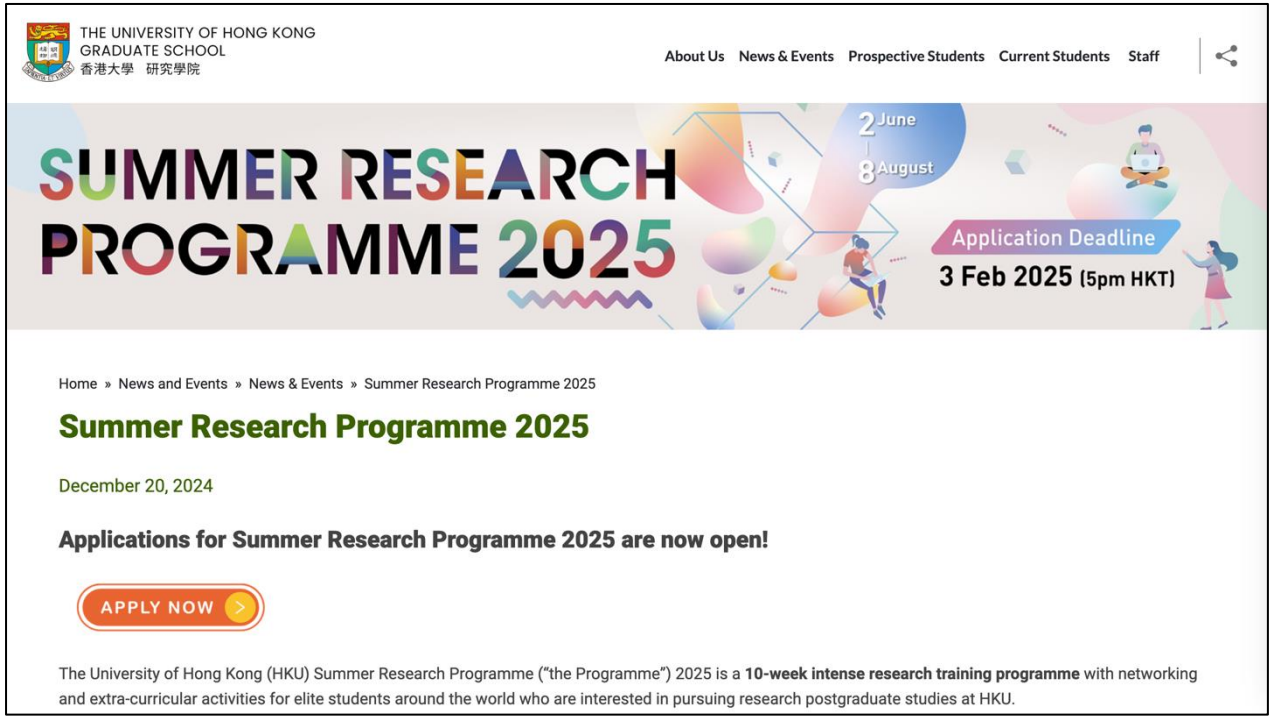
child's well-being. With a simple plug-and-play setup, a sleek design, and future firmware updates that allow it to evolve as your child grows, Kardian Bibi offers parents peace of mind, knowing their child is always

Why invest time on this course?

- (4) Looking for a research direction

HKU AIoT LAB
香港大學人工智能物联网實驗室





Two successful cases (100% success rate for HKU UG) in our lab

Why invest time on this course?

- (5) What's the next big deal about AI?

Physical

Edge

nature sensors

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Editorial | Published: 15 January 2026

A sense of home

Nature Sensors **1**, 1–2 (2026) | Cite this article

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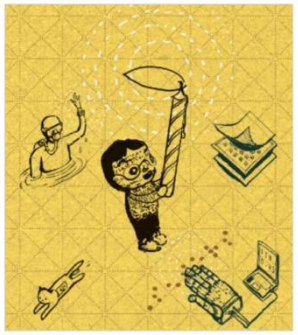
With the launch of *Nature Sensors* we aim to convene the global sensing research community to advance discovery, enable real-world impacts and foster a shared scientific home for sensing research.

Sensing is how all living organisms engage with the environment. From a single-celled amoeba tracing along chemical gradients to a newborn recognizing a mother's face; from starlings weaving in aerial synchrony to sea turtles navigating using Earth's magnetic field, sensing enables life to adapt, survive and flourish. Sensing in humans is inseparable from our identity. Our senses anchor experience in our bodies and shape memories, emotions and cognition. Inspired by the ingenuity of our biology, we have built technologies that emulate our ability to sense.



Why invest time on this course?

- (6) Just have FUN!!
- Course projects

Questions?

- Welcome aboard!