



Research with a Social Impact

IEMS5910 Project Briefing (2018-19)

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My Research Goal and Objectives

- To design and implement **human-centered service systems of societal significance**, by applying and innovating theory and practice within and beyond the scope of interest of IE.
- Three current objectives; applying IE knowledge and skills to develop systems:
 1. for users with **communication disabilities** to **communicate**.
 2. for users with **social impairment** to **socially interact**.
 3. for users with **intellectual disabilities** to **learn and excel**.

Interdisciplinary Research for Social Wellbeing

- Selected **interdisciplinary research projects** that have social impacts:
 - Semantic Image-Based Cloud Augmentative and Alternative Communication (Cloud AAC) System (collaborate with [SAHK](#)香港耀能協會) (2018-2020, [ITF](#) Public Sector Trial Scheme)
 - Promoting Nonverbal Communication Skills Among Children with Autism Spectrum Disorders through Online Social Robotics (collaborate with CUHK Department of Educational Psychology) (2015 – 2016, [KTF ICON Project](#), [CUHK KTF](#))
 - Robot-based Intervention to Reduce Challenging Behaviors in Children with Autism Spectrum Disorders (collaborate with CUHK Department of Educational Psychology)(2016-2019, [KPF ICON Project](#), [CUHK KTF](#))
 - Context-Aware Augmentative and Alternative Communication with Bluetooth Low Energy Beacons (collaborate with [Caritas Resurrection School](#)明愛樂群學校; a special education school for students with moderate intellectual disabilities and [Tokyo Metropolitan University](#), Japan) (since 2016; will apply new funding)



Research Projects with Social Impact (1)

- **Semantic Image-Based Cloud Augmentative and Alternative Communication (Cloud AAC) System**
 - Supported by the [Innovation and Technology Fund](#)
 - Led by [CUHK Department of Information Engineering](#) (Professor Rosanna Yuen-Yan Chan) and supported by [SAHK \(香港耀能協會\)](#).
 - Aims at paving the very last mile of telecommunication networks by [providing telephone communication services to non verbal users](#) who have severe communication disabilities (e.g., those with Cerebral Palsy, Autism Spectrum Disorders, and Dementia)
 - SAHK serves 15,000+ families in Hong Kong with members having special needs
 - Ongoing R&D activity: semantic symbol recommendation using social connectionist approach
 - Co-Is: Professor Calvin Chan and Professor Dahua Lin
- Scholarly research outputs produced from this work so far
 - R.Y.-Y. Chan, “Cloud augmentative and alternative communication for people with complex communication needs,” in *Proc. of IEEE GLOBECOM 2014*, 2014, pp. 2727 - 2732.
 - R. Y.-Y. Chan, J. Ding, W.-K. Lam et al., “Making Telecommunication Services Accessible to People with Severe Communication Disabilities”, in *Proc. of the Sixth Annual IEEE Global Humanitarian Technology Conference (GHTC 2016)*, Seattle, WA, USA, pp.105-112.



Research Projects with Social Impact (3)

- **Promoting Nonverbal Communication Skills among Children with Autism Spectrum Disorders through Online Social Robotics (2015-2016)**
 - A completed project supported by the [CUHK Knowledge Transfer Fund](#)
 - Interdisciplinary collaboration between members from CUHK [Department of Educational Psychology](#), [Department of Information Engineering](#), and [Department of Mechanical and Automation Engineering](#)
- Scholarly research output produced from this work so far
 - [So, W.C., Wong, M.K.Y., Cabibihan, J-J., Lam K-Y., Chan Y-Y, & Qian H-H \(in press\). Using robot animation to promote gestural skills in children with autism spectrum disorders. *Journal of Computer Assisted Learning* \(ISI SSCI\).](#)



(Sing Tao Daily, 26 March 2015)





Research Projects with Social Impact (4)

- **Robot-based Intervention to Reduce Challenging Behaviors in Children with Autism Spectrum Disorders (2016-2019)**
 - An ongoing project supported by the **CUHK Knowledge Transfer Fund**
 - Interdisciplinary collaboration between members from CUHK **Department of Educational Psychology**, **Department of Linguistics and Modern Languages**, and **Department of Information Engineering**

HONG KONG
Friendly gestures from robots inspire autistic children in Hong Kong
Chinese University programme has reduced the challenging behaviour of students, particularly relating to anger and mood swings
PUBLISHED: Wednesday, 29 June 2016, 4:54am
UPDATED: Wednesday, 29 June 2016, 7:05pm

(SCMP, 29 June 2016)

社交機械人教自閉童溝通 訓練用手勢表達驚煩餓

【明報專訊】自閉症兒童普遍有溝通和社交障礙，尤其在非語言溝通上。香港中文大學首次引入社交機械人，協助教導自閉兒兒童辨認手勢及以手勢傳達需要和感覺，提升溝通能力。研究發現，透過機械人動畫影片及社交機械人教學，自閉症兒童的手勢溝通技巧有明顯進步。

本港約有13.2%的特殊需要兒童有溝通和運動發展問題，其中約半數為自閉症兒童。根據中大教育心理學系助理教授蘇詠芝，自閉症兒童的社會適應能力較低，但透過機械人教學，能有效提升其社交能力。她說：「我們希望透過機械人教學，讓自閉症兒童能夠更自信地與人交往，並改善他們的社交技巧。」

大教育心理學系助理教授蘇詠芝，聯合中大工程學院信息工程學系和文學院語言學系組成跨學科的研究團隊，設立手勢溝通訓練計劃「妙手可言」，首創利用人工智能機械人，透過動畫影片教導兒童辨認不同手勢，並透過機械人教學，讓兒童學習如何用手勢表達自己的需要。

(Mingpao, 29 June 2016)

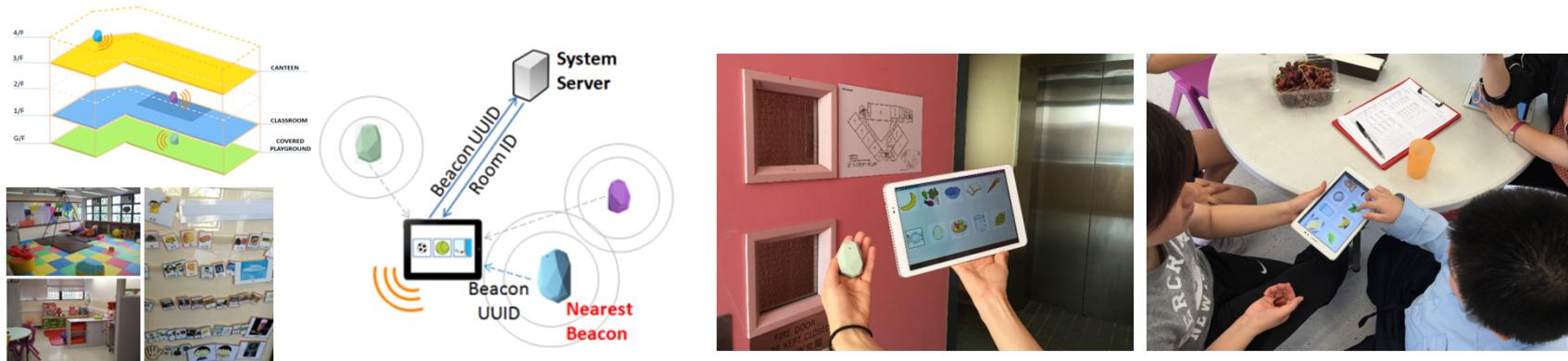


(TVB News, 29 June 2016)



Research Projects with Social Impact (2)

- **Context-Aware Augmentative and Alternative Communication with Bluetooth Low Energy Beacons (2016-)**
 - An ongoing project at its early stage developed by joint research team from **CUHK Department of Information Engineering** and **Caritas Resurrection School** (a special education school for children with moderate intellectual disabilities)
 - Amongst the first mobile app in the world that has successfully implemented iBeacon ranging and micro-location detection functionality to support context-aware augmentative and alternative communication for users with complex communication needs
- Scholarly research output produced from this work so far
 - R. Y.-Y. Chan, X. Bai, and X. Chen et al., “iBeacon and HCI in Special Education: Micro-Location Based Augmentative and Alternative Communication for Children with Intellectual Disabilities”, in Proc. of the **2016 ACM SIGCHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16)**, pp.1533-1539, May 07-12, 2016, San Jose, CA, USA.





My MSc Projects (2018-19): Project 1

- To develop context-aware social robot applications for children with intellectual disabilities using Bluetooth Low Energy beacons.
- A research collaboration between IE CUHK and **Faculty of System Design, Tokyo Metropolitan University**.



Technical challenges:

- No such kind of applications exist yet.
- How to achieve extremely precise indoor positioning using BLE beacons.
- How to collect, model, and analyze contextual data collected from the applications.
- Require a good understanding of cognitive characteristics of users having intellectual disabilities.

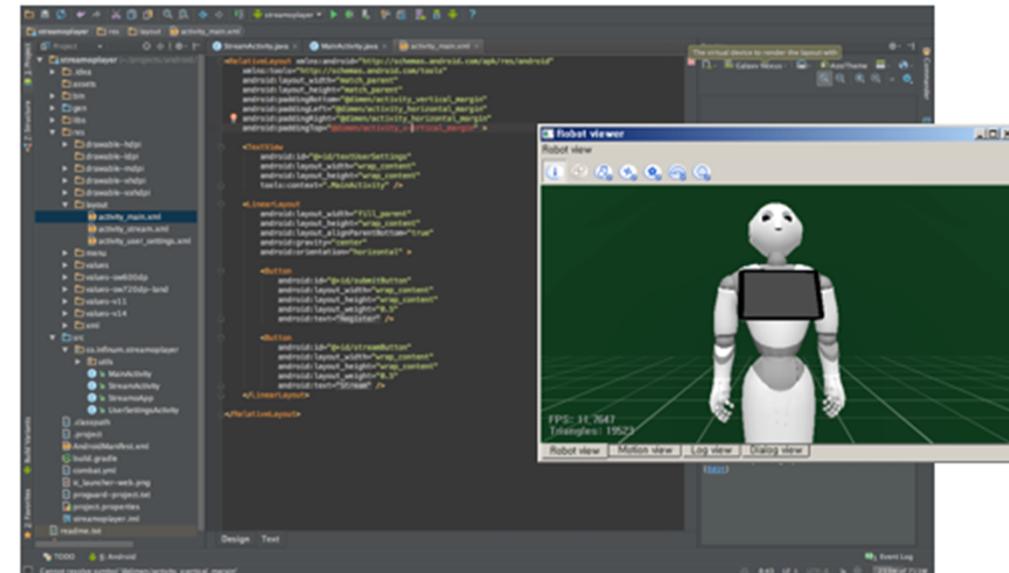


Skills Required

- Good Android programming skills
 - Estimote APIs (run over iBeacon protocol)
 - Pepper SDK for Android



(Estimote.com)



<http://android.aldebaran.com/sdk/doc/pepper-sdk/index.html>



My MSc Projects (2018-19): Project 2

- Systematic Review
- To perform a systematic review on a topic related to the existing theory and practice of **Internet of Things (IoT)** and **Human-Information Interaction**.
 - Need to systematically review on both of the:
 - involved technologies (IoT, contextual computing, etc.)
 - related theories in Cognitive Psychology (spatial cognition, human working memory, embodiment, etc.)
 - existing works in the fields involved.
 - with a fundamental understanding of Phenomenology.



Quota

- Project One: 2 students
- Project Two: 2 students
- Please contact me through email
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