NEC人臉識別防遊走系統 及 陪伴機械人
- 支援認知障礙症長者及其照顧者

NEC Face Recognition Anti-Wandering System & Companion Robot
- Supporting Elderly with Dementia and their Caregivers

NEC Hong Kong Limited

2021

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NEC creates the social values of
safety, security, fairness and efficiency
to promote a more sustainable world
where everyone has the chance to reach
their full potential.

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their full potential.

Company Profile

NEC Corporation - Profile

Orchestrating a brighter world **NEC**

Company Name:	**NEC Corporation**
Address:	**7-1, Shiba 5-chome, Minato-ku, Tokyo, Japan**
Established:	**July 17, 1899**
Vice Chairman of the Board:	**Takashi Niino**
President and CEO:	**Takayuki Morita**
Consolidated Revenue:	**¥ 3,095.2 billion (Fiscal year ended Mar. 31, 2020)**
Number of Consolidated Subsidiaries:	**300 (As of Mar. 31, 2020)**

Anniversary

120 years

Thank you for all your support.
NEC is committed to being
a great partner and corporate citizen
for another 120 years to come.

Establishment

Established **1899**

Group Companies **300**

Revenue **USD 28.4 billion**

Technological capabilities

Face recognition
Fingerprint recognition
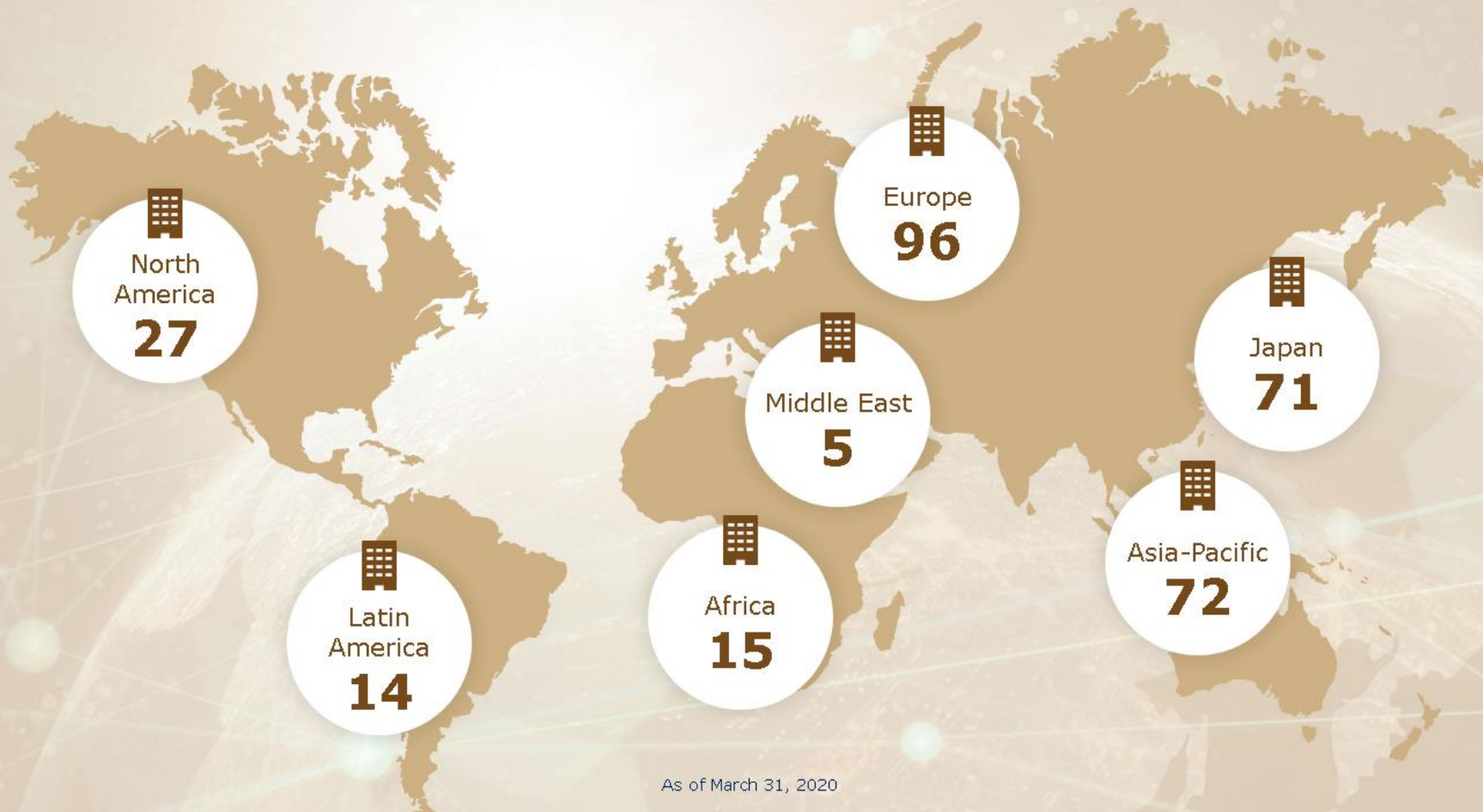Iris recognition

Global **No.1**

Employees **112,638**

Orchestrating a brighter world **NEC**

Global Network

Our 300 group companies do business in more than 50 countries

North America
27

Europe
96

Middle East
5

Japan
71

Latin America
14

Africa
15

Asia-Pacific
72

As of March 31, 2020

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NEC Hong Kong Ltd - Profile

NEC

NEC Hong Kong Limited

Company Name :	**NEC Hong Kong Limited** 日本電氣香港有限公司
Established :	**May 1, 1984**
Managing Director :	**Ms. Elsa Wong**
Deputy Managing Director:	**Mr. Mamoru Oki**
No. of Employee:	**Approximately 210 (As of APR, 2021)**
Region:	**Hong Kong & Macau**
Major Operations:	**Public Solutions Business, Government Solutions Business, Enterprise Business, Global Business**

<Outstanding Smart City Solutions Awards>
presented by etnet media

<Most Innovative Smart City Technology Award>
presented by MediaZone

<Caring Company 2018-2020>
presented by HKCSS

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Seminar Topic & Speaker's Biography

NEC

Seminar Topic & Speaker's Biography

Seminar Topic:

NEC人臉識別防遊走系統 及 陪伴機械人
- 支援認知障礙症長者及其照顧者

NEC Face Recognition Anti-Wandering System & Companion Robot
- Supporting Elderly with Dementia and their Caregivers

Kelvin Chan joined NEC Hong Kong Limited in 2006, being a Head of Sales of the Global Security Division Unit to deliver tailored Smart City capabilities for delivering better efficiency, safety, and new business possibilities. Kelvin graduated from McMaster University in 2003 with a Bachelor's Degree in Computer Science and Economics and he has over 17 years of IT related experience.

Kelvin's broad exposure covers Artificial Intelligence (AI), Biometrics and System Integration, and he has experienced in mega projects in both Hong Kong and Macau market. Kelvin is a powerful force in the workplace and uses his positive attitude and tireless energy to encourage others to perform and succeed.

Kelvin Chan 陳偉基
Head of Sales 銷售主管
NEC Hong Kong Limited
日本電氣香港有限公司

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NEC Face Recognition Anti-Wandering System

- Supporting Elderly with Dementia and their Caregivers

Dementia in Hong Kong

70
year old or above

85
year old or above

2039
Around
300,000

3 Times

103,433
2009

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Amnesia
失憶

Aphasia
失語症

Wayfinding
difficulty
迷路

When the elderly with Dementia get lost 48-72 hours, the **dead rate will increase 30 - 40%** if no one help.

Wandering Problem

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Traditional Anti-Wandering System

➢ **Elderly need to wear the wearable anti-wandering devices:**

RFID Wristband

Washable RFID Tag

RFID Pin

➢ **Problems for Traditional Wearable Anti-Wandering System:**

Main Problems for Traditional Wearable Anti-Wandering System →

Unstable Performance

Need to Renew Regularly

Easy to Remove

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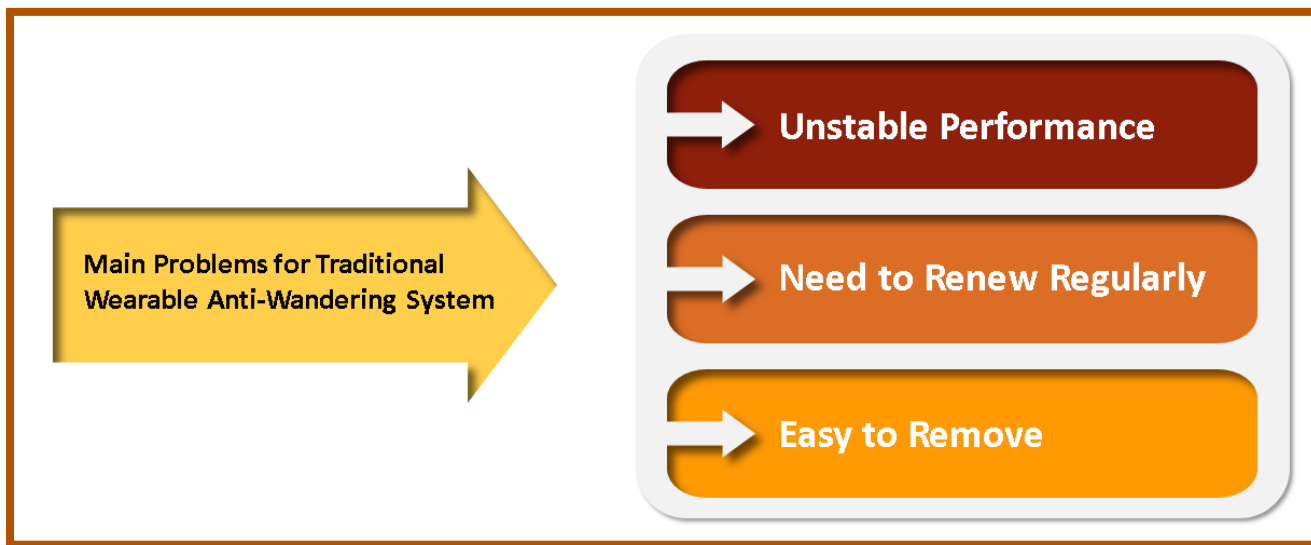
NEC Face Recognition Anti-Wandering System

Face Recognition

+

Anti-Wandering System

Step 1

User Enrollment

Still photos / live camera images of targets
+
Personal particulars & demographics
↓
Register into database

Step 2

Face Capture

Facial images detected from photos / videos
↓
Convert into small feature files
↓
Smooth enrollment & matching servers for processing

Step 3

Face Matching

Compares captured faces with pre-registered photos
↓
When a match is found, system will trigger an alert in real time
+
Provide nearest matching photo with a threshold index *(indicate how approximate the two faces are)*
+
Show related identity info via Alert Viewer Console

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NEC Face Recognition Anti-Wandering System

NEC Face Recognition Anti-Wandering System is designed for monitoring exits and preventing the elderly from wandering off a facility unguarded.

Step 1

Enroll photos of the elderly to the Face Recognition System for enrollment

Chan Tai Man
Male
85 Years Old

Step 2

The Anti-Wandering System installed NEC Face Recognition technology on CCTV network for identifying and locating the elderly. When the system detects the elderly near a CCTV-monitored exit, the system will capture the facial image of the elderly for matching and identification, then an alert will be sent to the Nurse Station to inform staff and caregivers. The system can monitor all exits, with no blind spots to support elderly care services.

Anti-Wandering

Sound Alert

Elderly with Dementia

Staff

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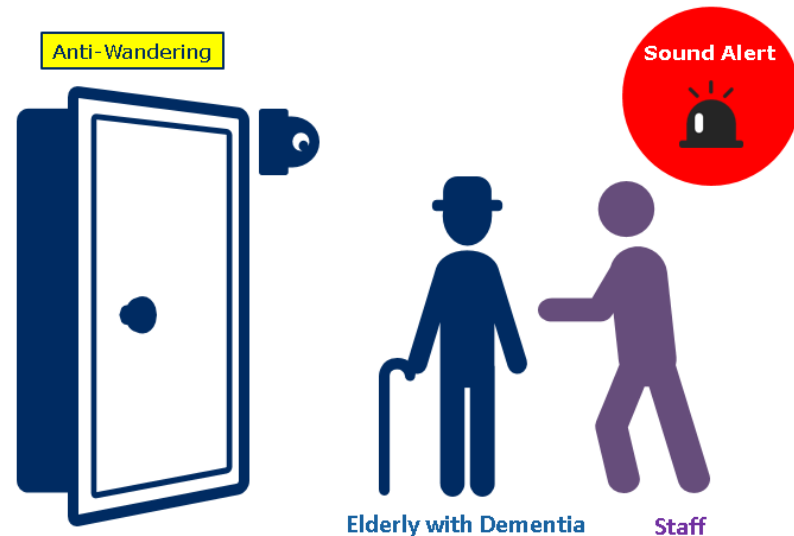
Performance of NEC Face Recognition Technology

NEC Face Recognition Anti-Wandering System can identify people even when they are **wearing mask, glasses and hat.**

Mask ✓

Glasses ✓

NEC Face Recognition

Mustache ✓

Hat ✓

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High Performance — Most Accurate and Fastest real-time facial matching

Easy Implementation — Simply use common hardware for implementation
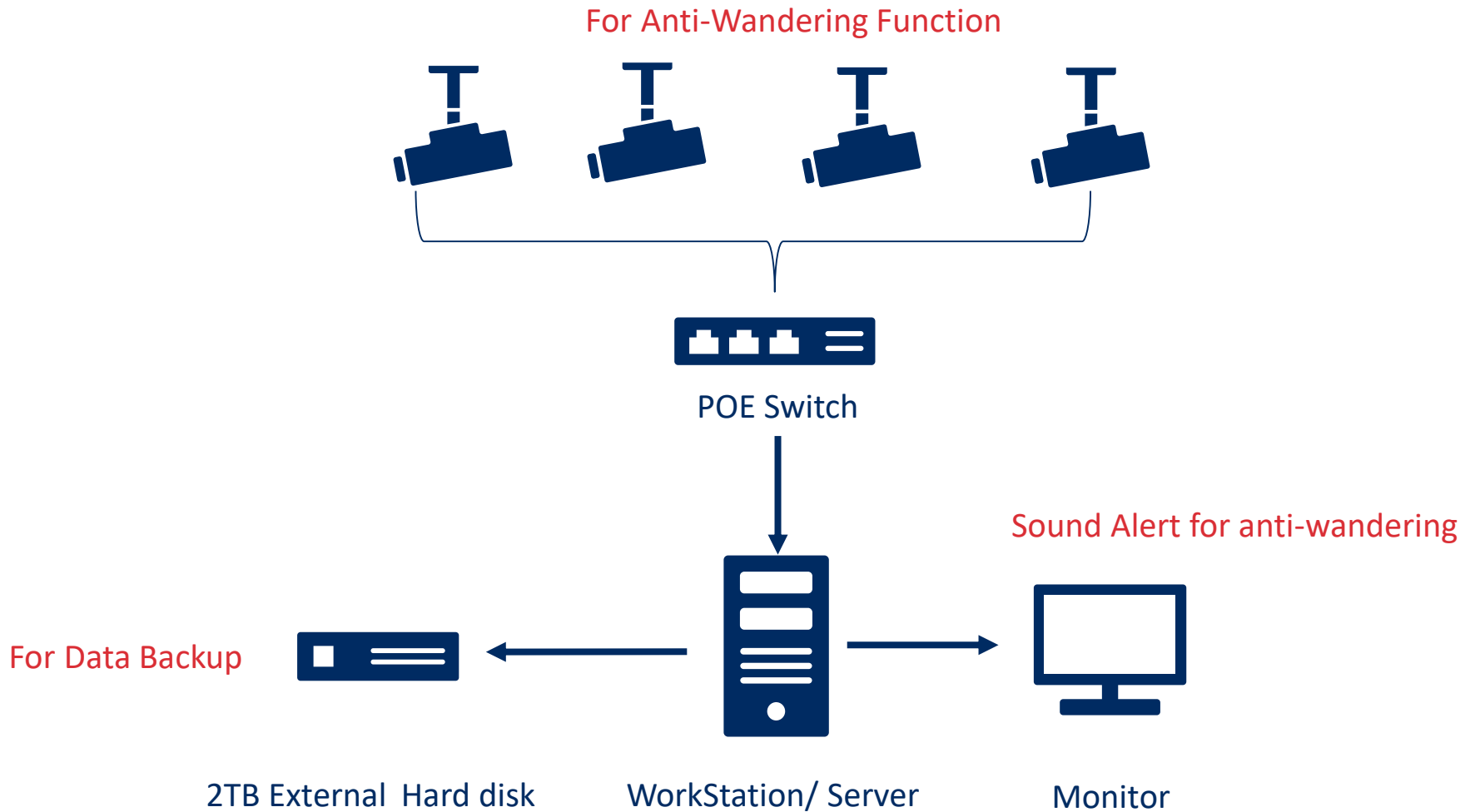
Cost-effectiveness — No need for replacements and less manpower needed for tracking compared to wearable anti-wandering devices
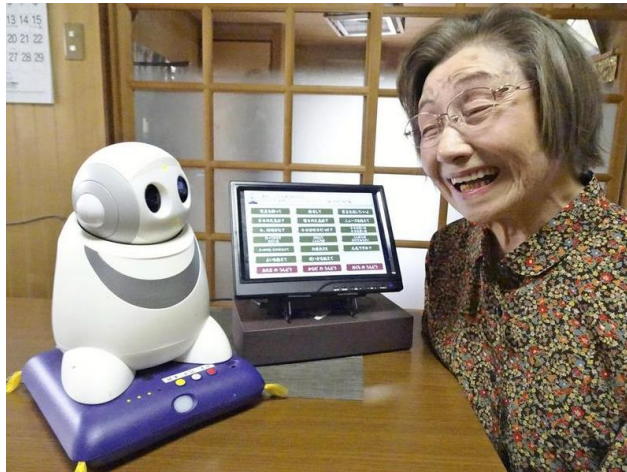
High Flexibility — Offer One-to-One and One-to-Many matching algorithms, and allow customization for specific operational needs

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Implementation of NEC Face Recognition Anti-Wandering System

For Anti-Wandering Function

POE Switch

Sound Alert for anti-wandering

For Data Backup

2TB External Hard disk

WorkStation/ Server

Monitor

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NEC Social Robot has Face Recognition technology to identify and monitor the elderly. When the elderly near the exit, Robot will provide friendly reminders by voice **in Cantonese** to remind the elderly not to leave the Elderly Home.

Anti-Wandering

Hello! Mr. Chan. Where do you want to go?

Around 0.5 m distance

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NEC Social Robot

- Supporting Elderly with Dementia and their Caregivers

NEC

NEC Social Robot

Caring for Elderly
with Dementia

Training for Children
with Autism

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NEC Social Robot – Smart Technologies

Voice Recognition:

- Voice recognition microphone

- Noise canceling microphone

Face Recognition:

- Face recognition camera

- Camera for shooting

Sensors:

- Human detection

- Temperature sensor

- Humidity sensor

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NEC Social Robot - Multiple functions

Socially Connected

- Video call to family, friends or doctors
- Audio phone call
- Send messages

Healthy Lifestyle

- Dancing with robot
- Proactive exercise reminder
- Diet improvement system

Interactive Modalities

- Speech recognition
- Face & emotion recognition
- Touch interface
- Smart watches

Personalized Services & Novelty

- Daily service pattern analysis
- Personalized services
- Uploading own music & books
- Ongoing new services

Therapy Games & Quiz

- Cognitive (picture) quizzes
- Bingo games
- Calendar task planning and reminder

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NEC Social Robot has accumulated **10 years** of application experience. Robot can support **people with dementia** to live independently, and help reduce negative behavioral and psychological symptoms.
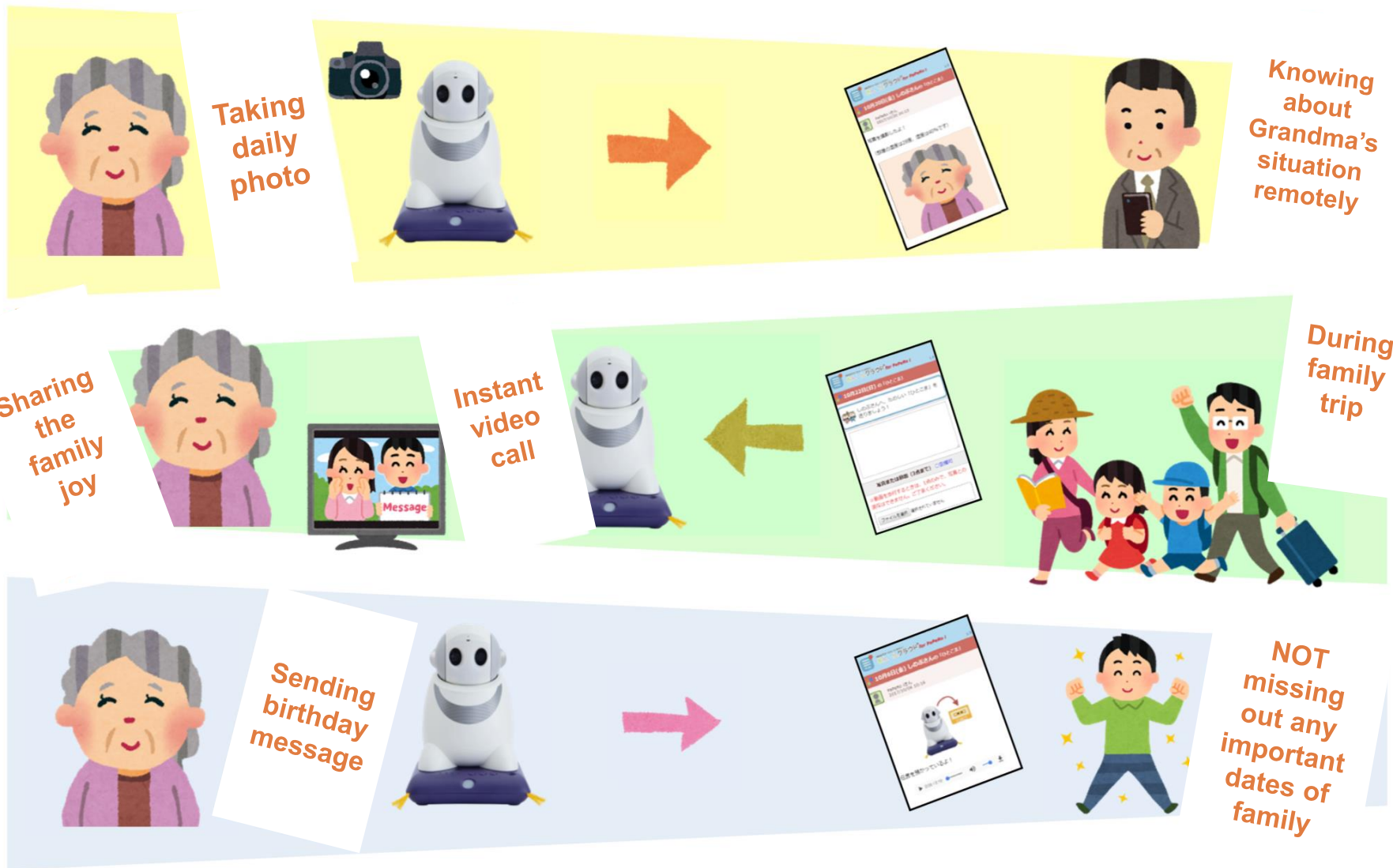
NEC Social Robot offers a wide range of functions for elderly with Dementia :

- Suitable for elderly with Dementia for Home-based Personal Care

- Interactive Communication
  (including Cantonese, Mandarin & English)

- Companionship

- **Interactive Modalities**

- Real Time Reminder

- Socially Connection

- Real Time Video Call

- Healthy Lifestyle

- **Personalized Services & Novelty**

- Therapy Games & Quiz

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Connecting with Families & Friends

Story of a Grandma who has Dementia & is living in an institution..

Taking daily photo

Knowing about Grandma's situation remotely

Sharing the family joy

Instant video call

During family trip

Sending birthday message

NOT missing out any important dates of family

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NEC Social Robot - Training Programs & Games for elderly with Dementia:

賓果

問答題

謎語

自訂程式

家人辨認

腦筋訓練遊戲

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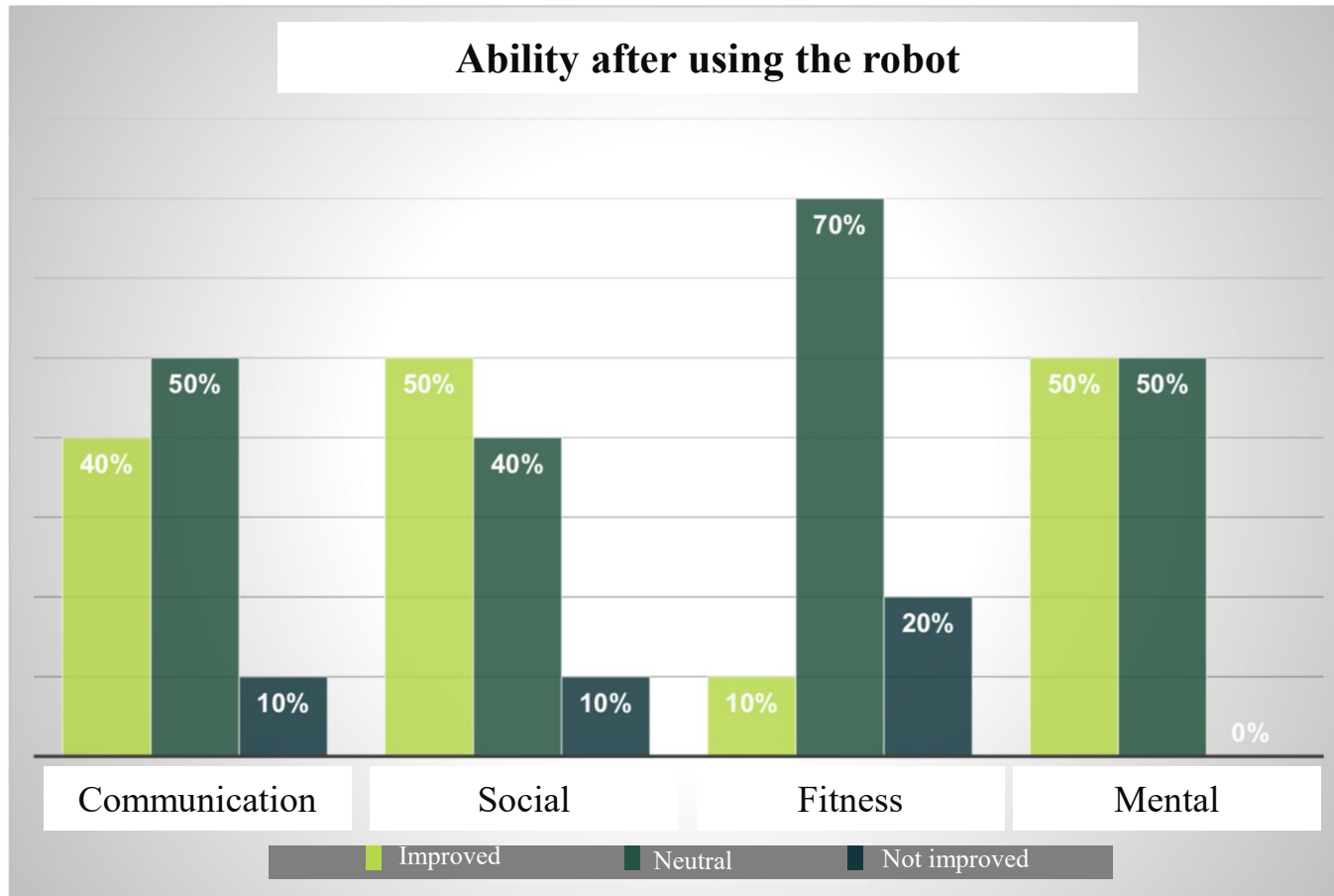**Case:** Trial Programme for using **NEC Social Robot** in one of the Elderly Home in Hong Kong

Purpose: Examine the effectiveness of NEC Social Robot's mental & social support for elderly

Target: **10 elder people (2 elderly with Dementia)**
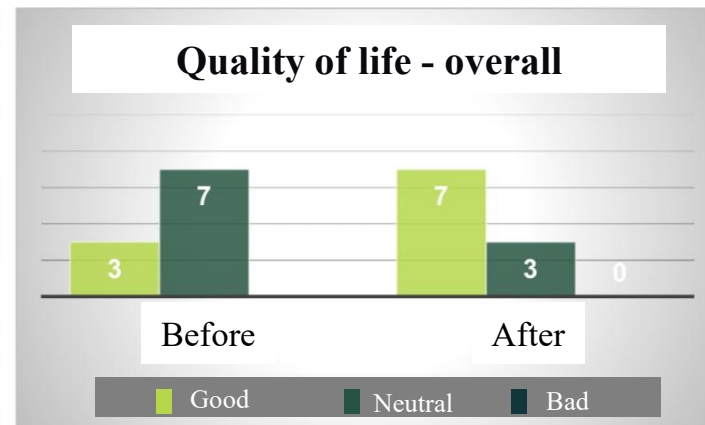
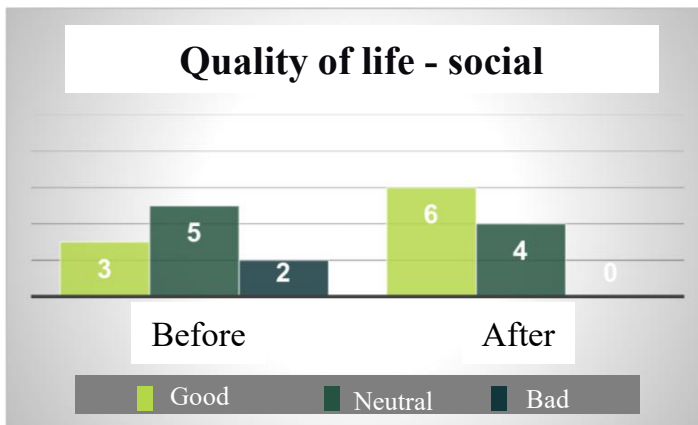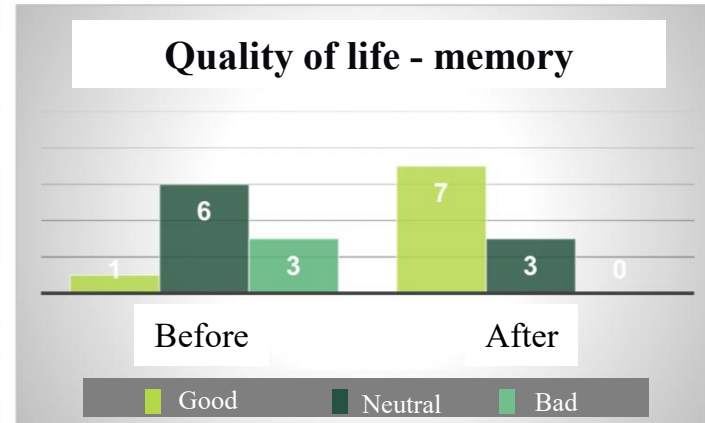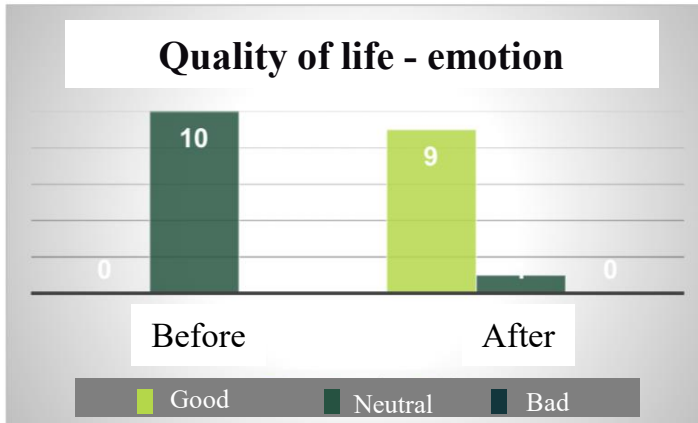**Period:** June – August 2018 (2 months)

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Ability after using the robot

	Improved	Neutral	Not improved
Communication	40%	50%	10%
Social	50%	40%	10%
Fitness	10%	70%	20%
Mental	50%	50%	0%

NEC Social Robot can enhance elderly's ability in various aspects

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Quality of life - emotion

10 9

Before   After

Good   Neutral   Bad

Quality of life - memory

1 6 3 7 3 0

Before   After

Good   Neutral   Bad

Quality of life - social

3 5 2 6 4 0

Before   After

Good   Neutral   Bad

Quality of life - overall

3 7 7 3 0

Before   After

Good   Neutral   Bad
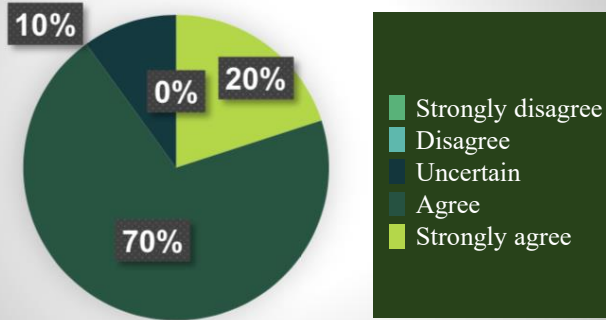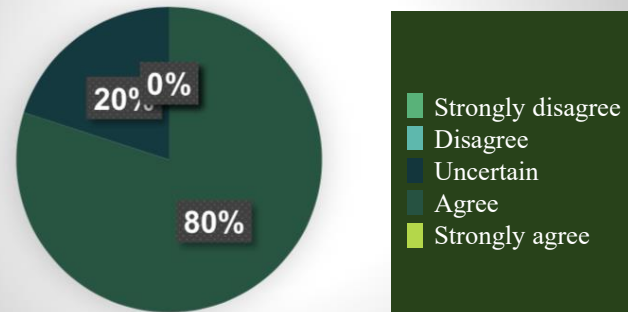
NEC Social Robot is capable of improving quality of life of the elderly, In terms of emotion, memory & social factors
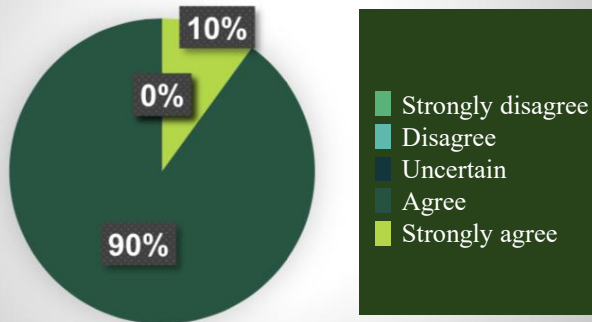
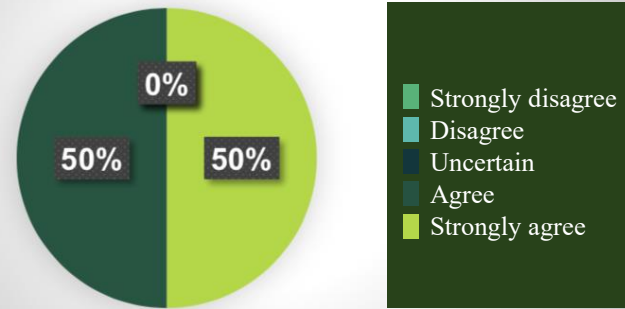# Case Study – Findings (III)

"NEC Social Robot makes me feel better"

- 10%
- 0%
- 20%
- 70%

Legend:
- Strongly disagree
- Disagree
- Uncertain
- Agree
- Strongly agree

"NEC Social Robot reminds me of the good memory"

- 20%
- 0%
- 80%

Legend:
- Strongly disagree
- Disagree
- Uncertain
- Agree
- Strongly agree

"I like to touch NEC Social Robot"

- 10%
- 0%
- 90%

Legend:
- Strongly disagree
- Disagree
- Uncertain
- Agree
- Strongly agree

"I hope NEC Social Robot can come back"

- 0%
- 50%
- 50%

Legend:
- Strongly disagree
- Disagree
- Uncertain
- Agree
- Strongly agree

**NEC Social Robot brings positive impact on the users
ALL of the users would like to use NEC Social Robot continuously**

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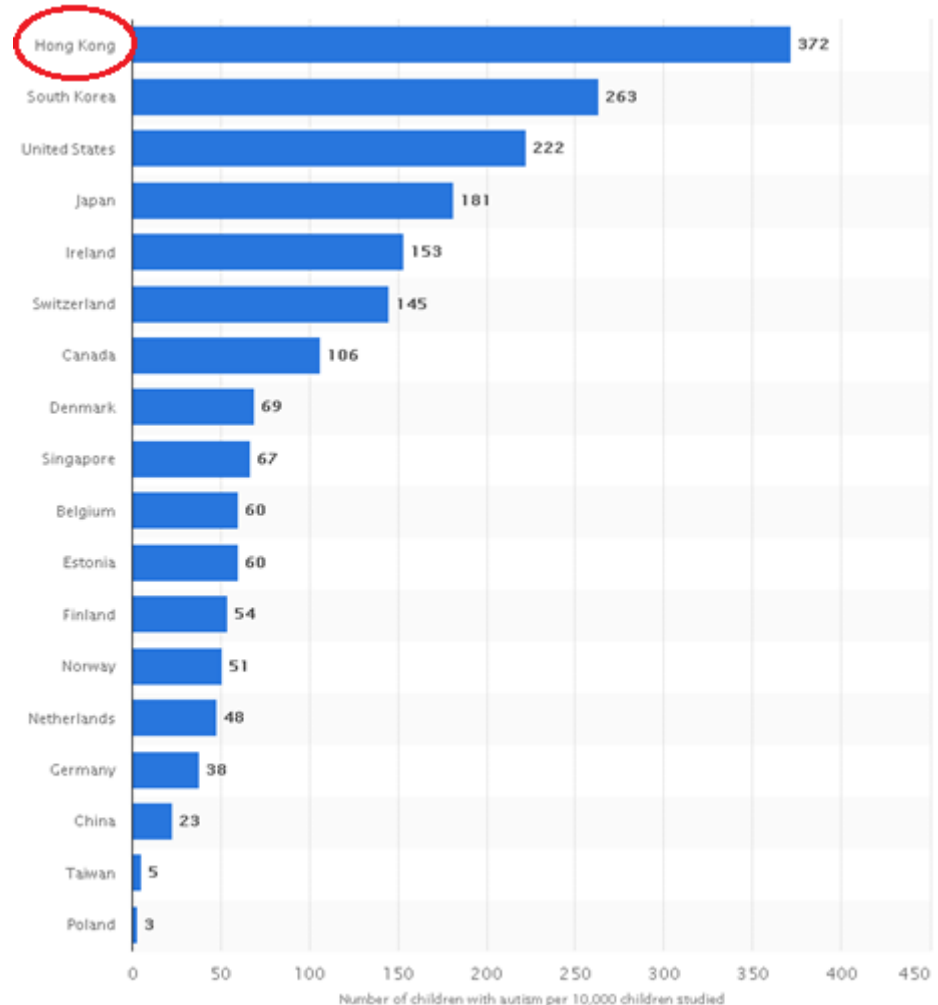
Key facts

- According to World Health Organization, *1 in 160* children in average has ASD in the globe

- Over the past 50 years, studies show that the prevalence of ASD is *increasing globally*

- **Hong Kong** has the *highest prevalence* of ASD among children in selected countries as of 2020

Prevalence of autism spectrum disorder among children in select countries worldwide as of 2020
(per 10,000 children)

Country	Number of children with autism per 10,000 children studied
Hong Kong	372
South Korea	263
United States	222
Japan	181
Ireland	153
Switzerland	145
Canada	106
Denmark	69
Singapore	67
Belgium	60
Estonia	60
Finland	54
Norway	51
Netherlands	48
Germany	38
China	23
Taiwan	5
Poland	3

Number of children with autism per 10,000 children studied

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NECHK and the **Chinese University of Hong Kong (CUHK)** join hands by signing a memorandum of understanding (MOU) in MAY 2018 to promote CUHK's Robot-based Intervention Programme named **"Robot for Autism Behavioral Intervention" (RABI)** for children with autism spectrum disorders (ASD) in Hong Kong.

Ms. Elsa Wong (right), Managing Director of NECHK, and Prof. Alvin Leung Seung Ming (middle), Dean of Education at CUHK sign a MOU on robot for the programme of "Robot for Autism Behavioral Intervention" (RABI)

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NEC Social Robot - Training Programs & Games for teaching children with autism:

Overview:

- Using NEC Social Robots to teach social, communication and self-care skills to **3 to 18 year-old autistic children**

Positive Outcomes:

- Improved **Social Skills** such as concentration, eye contact and mental interpretation for autistic children
- Improved **appropriate behaviors** in different situations
- Enhanced **Self-care skills**

NEC Social Robot:

- Understands and responds to **Cantonese** Instructions with facial expression
- Record & analyze child's speech & body language
- Give instant feedbacks for improving skills
- Teach communicate & social skills
- Practice with children
- User-friendly: computer for carrying out programs

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Parents' Impressions for RABI Programme (I)

▌"The attention and participation of the children improved after modification of the physical setting. Appreciated that!"

▌"My son really learned the social communication skills after studied the RABI programme. With a little hints, he remembered to say hello, have eye contact with people, and speaking in turns, although his social skills still need to improve. I am very thankful to the CUHK RABI Team for creating the Robot Training Programme for autistic children. It really **help children to learn practical social communication skills.** Parents can also learn how to train and communicate with children sustainably."

▌"I am very grateful for teaching children by robots. Children like to study the courses and love robots very much. My son also said that he **likes listening to the robots**, and wants to eat robotic meals (balanced diet), he is now in love with robots!"

▌"Children like robots very much, especially flushed face when talking, they are very cute."
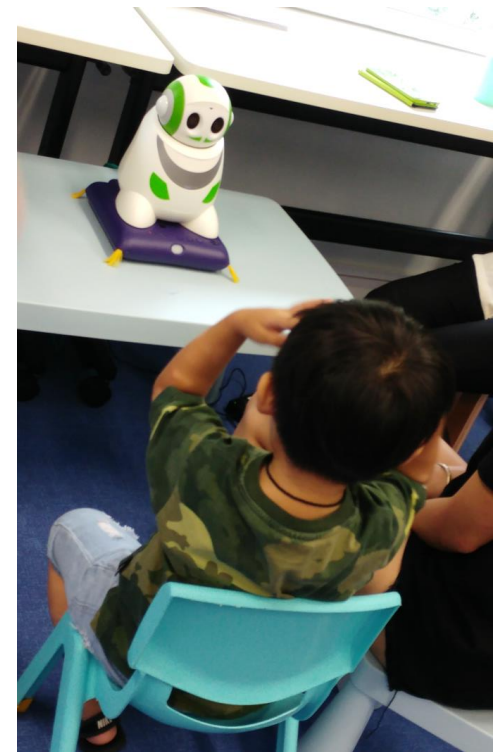
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"Skill Improvement of my daughter after attended the RABI Programme:

1) Take the initiative to pick up

2) More words when expressing

3) Argue with brother when playing toys, know how to keep calm to deal with it (or quicker to calm down), and try to propose a solution."

"My son likes robots very much, he often hanging on the lips, when he did some incorrect behavior, I reminded him about the teaching skills that taught by robots in the class. Also, I always tell him that "If you do well, I will praise you, likes robots praised you." He knows that good behavior will be praised by parents and others, so he **try to change his incorrect behavior**."

"Thank you for letting children to participate the RABI programme. When my son take the class, he will try to do the skills that taught by robots at home, it helps him to change and improve his bad habits. It's amazing! **It's a meaningful and helpful programme for children."**

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