

Implementation of OPRoS to a human-friendly guide robot,

FURO

Ph.D. Se-Kyong Song
CEO of FUTURE ROBOT



Dec.11, 2012

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1. FUTURE ROBOT

FUTURE **ROBOT** is making a *'future robot'*.

Established Venture Company in August, 2009

Located in Pangyo Techno-Valley (Silicon Valley of Korea)

Robot Design, Manufacturing & Robot Solution Provider

Service Robot Global Leader in Future



FUTURE ROBOT is in the spotlight with 'FURO'.

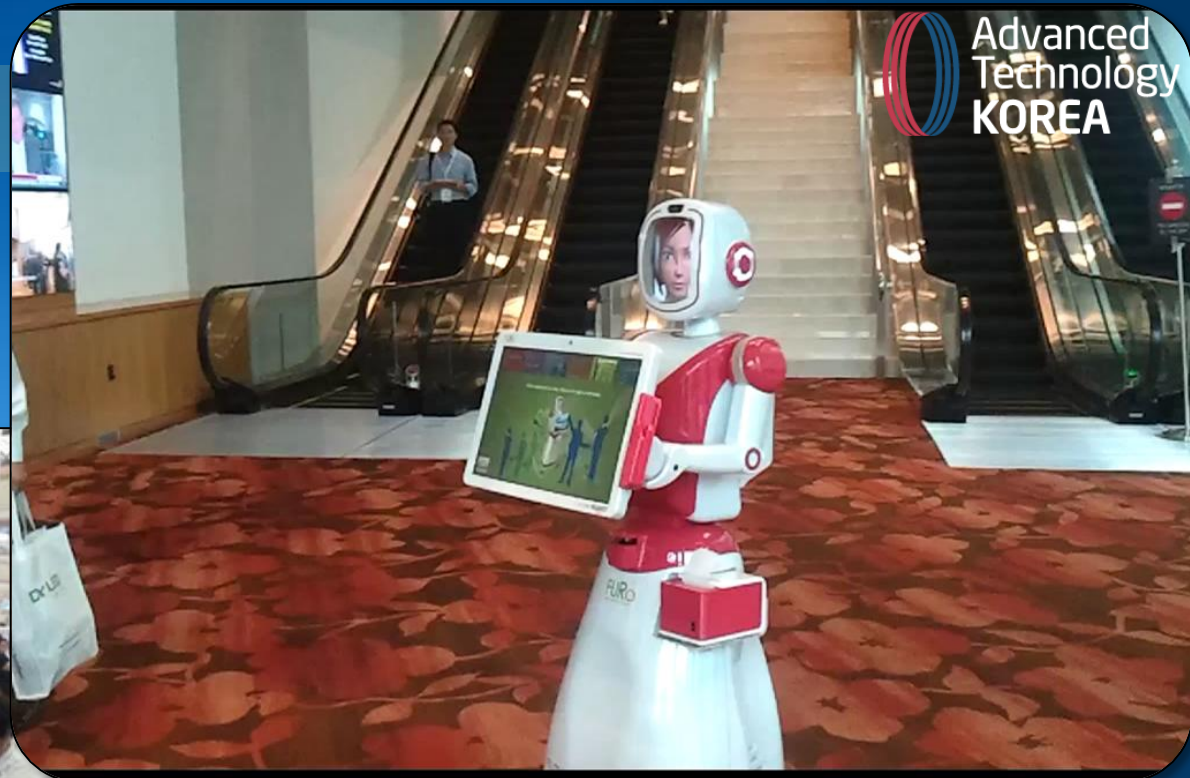
CeBit 2012 in German



Hong Kong Electronics Fair 2012

FUTURE ROBOT is in the spotlight with 'FURO'.

Roadshow in Singapore



KOMAF Fair 2012 in China

FUTURE ROBOT is a service robot leader.



FUTURE ROBOT has appeared on Worldwide Media with 'FURO'.



2. CEO Song

I am making FUTURE ROBOT.

Ph.D. Se-Kyong Song



Graduated from KAIST, Specialized in Robotics & Control

2002~2008 Worked in Samsung Electronics

2008~2009 Worked in Philips Electronics

2009.8 Established FUTURE ROBOT

2012 Awarded several notable awards from the government

A 'First Mover' to open service robot global market

Robotics Trends | **ROBO Business Leadership Summit** | OCTOBER PITTSBURGH

Service and Healthcare

Future Robot Introduces New Humanoid Kiosk

The Korean company has sold 100 FURO-K robots to Brazil

By Robotics Trends' News Sources - Filed Oct 02, 2012

Future Robot has unveiled a new service robot called FURO-K that will function as a friendly kiosk. The company claims that people often prefer to wait in line to speak with a human employee rather than using an intimidating kiosk, so it has been designed to look cute and inviting. Furthermore, instead of sitting in a corner, the robot scoots around greeting customers in a synthesized voice to explain its features.

The robot comes with an integrated circuit card (ICC) reader, and near field communication (NFC) for non-contact data transactions. If you're old-fashioned it will also accept credit card payments and can print you a receipt. The company has already sold the robot to major hospitals in Korea and will begin providing services this month.

From right: FURO, Future Robot's CEO Se-kyong Song, and FURO-K, a robot kiosk

More Service and Healthcare stories

- Future Robot Introduces New Humanoid Kiosk - Oct 02, 2012
- Helper Robot Unveiled by Toyota - Sep 28, 2012
- Bionic Eye Reawakens Blind Woman's Optic Nerve - Sep 18, 2012
- A Robotic Arm Collects Curbside Trash - Sep 12, 2012
- Checking Your Gucci Bag with a Robot - Sep 05, 2012

"The key strength of Future Robot, in my opinion, is its human-robot interaction technology which is compatible with all other robots. As Steve Jobs ushered in a new smart society with the convergence of art and technology, I hope that Future Robot will pioneer the new robot age with the convergence of robots and technology," said Future Robot's CEO, Se-kyong Song, who started the company following stints at Samsung and Philips robot research labs after graduating from the Korea

KioskMarketplace

INNOVATION #3,996

The Samsung SUR40 with Microsoft® PixelSense™

Future Robot gives 'life' to kiosks

Tags: Digital Signage, Future Trends, Interactive / Touchscreen, Video Gallery

The narrator on The Discovery Channel show on robotics called them "a hybrid between a smartphone and a smart machine."

And the new Future Robots, or FUROs, from Korean robotics startup Future Robot are an interesting hybrid indeed, of robotics and interactive kiosk and digital signage technologies — one rife with potential for possible digital signage or self-service kiosk applications in retail, hospitality or maybe even food service. (Imagine a mobile robot that can roll up to a restaurant table, let patrons order via a touchscreen interface and then let them pay via their smartphone or a card swipe...)

According to **Korean IT Times**, the FURO interactive robot can provide a variety of services "by reading users' intentions in different situations" by observing users' movement, face and voice, and then conveying the "matched dialogue, facial expression, movement and necessary information." The robots can move around freely on wheels hidden beneath their skirts, and they have anime-style faces on smaller screen "heads" that will show changing facial expressions in response to different stimuli, like smiling to new people or tearing up when someone walks away.

The robots were shown at this year's CeBIT show in March, and Future Robot CEO Se-kyong Song told the Times that the show "was very exciting for us to show our technologies and also gain more innovative ideas from them. One buyer from Brazil who ordered over 100 FUROs came up with new business model — mobile (moving) advertisements. As FURO moves around in airports or exhibitions, they said, the back screens which are remotely operated can be utilized for advertisements while the front screen performs ordinary information services."

The company loaded this segment of a Discovery Channel show focusing on its robots onto its YouTube channel:



IFA 2012 TechWatch

BBC NEWS TECHNOLOGY

LET'S BRIDGEMAN THE WORLD'S ENERGY MIX. LET'S GO.

14 March 2012, last updated on 14 Mar 2012

Innorobo 2012: the latest developments in robot research

Photo: Future Robot

FURO-K SERVICE ROBOT FUNCTIONS AS A FRIENDLY KIOSK

NEWS: 10/02/2012 08:00 AM

CLICK HERE

KEEPING MOVIE

PRINTER

Kaspersky 1™ to Detect Flame

FURO on Media

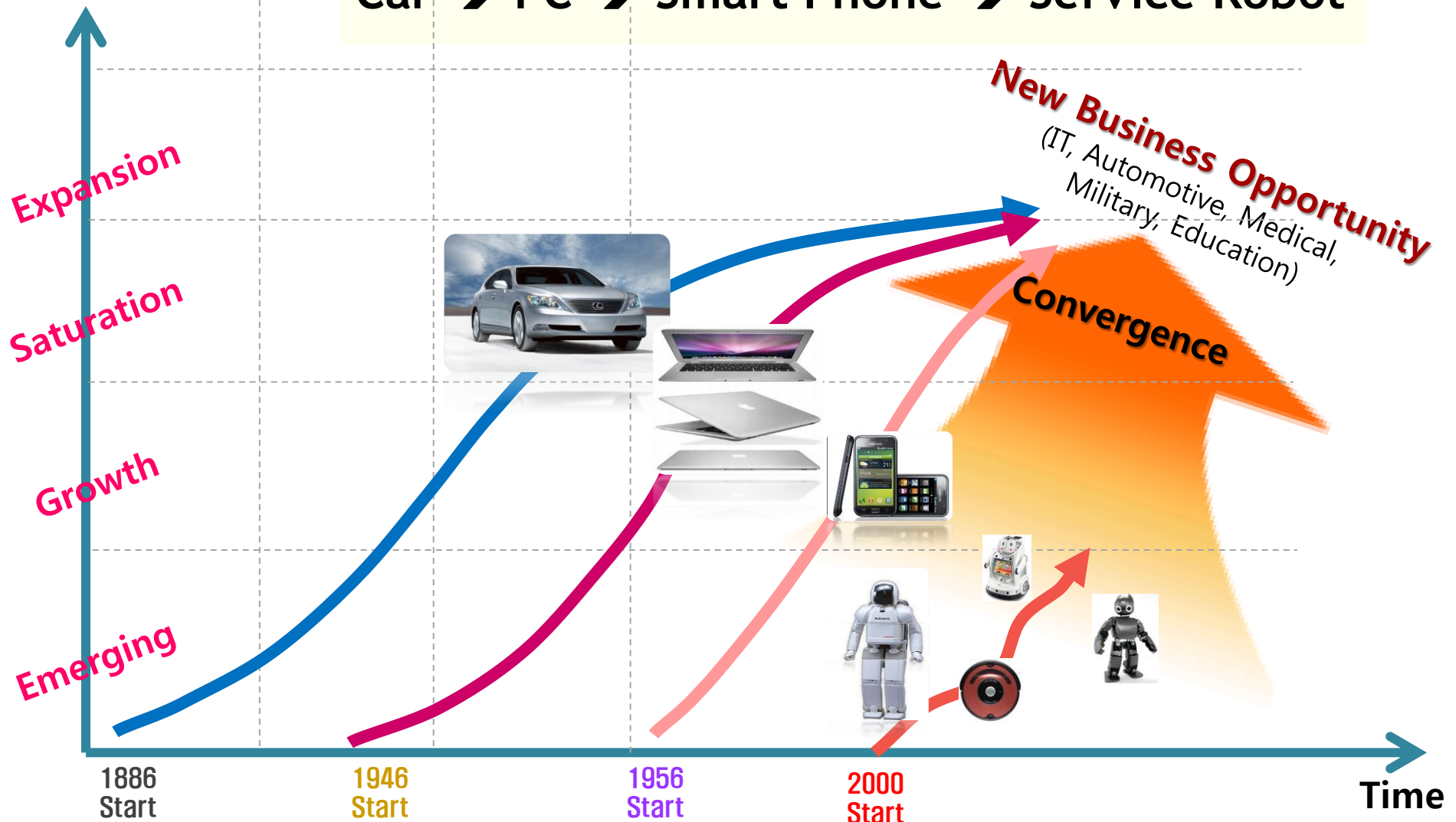
Global robotics news sites

B2B Sites

3. Service Robot

Human-Robot Coexisting World is Coming Soon!

Car → PC → Smart Phone → Service Robot



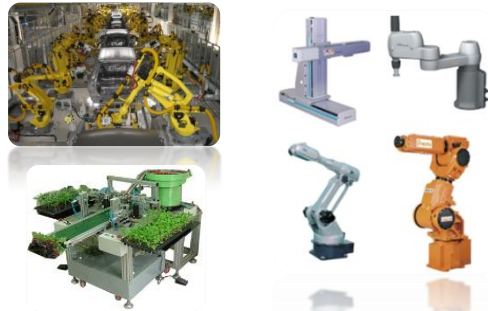
Service robots may be totally different from industrial robots.

Industrial Robot

Service Robot

Configuration

High-Tech. Device



Artificial Being



Key Technology

High Performance/time

- Accuracy↑ Repeatability↑ Speed↑ Payload ↑

High Reliability

Key Component Technology

- Actuator, Sensor, Controller

CHASM

Appearance (Design)

HRI (Human-Robot Interaction)

- Emotion , Vividness

Service Contents

Circumstance

Known Environment

- Factory / Automatic Machines

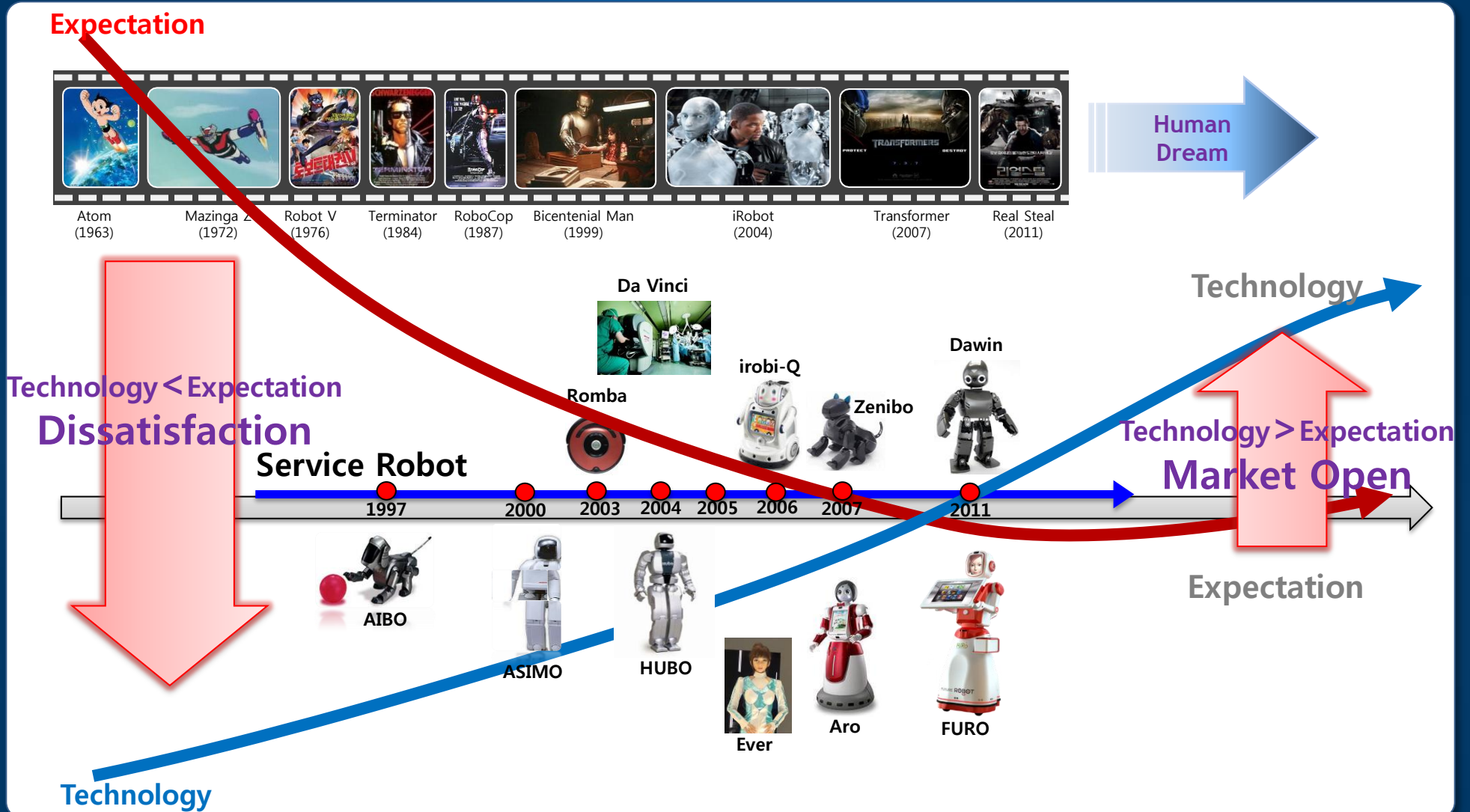
Only Operator (Closed)

Unknown Environment

- Public place / From child to Elderly

User Friendly (Open)

Service Robots have been developed from human dream.

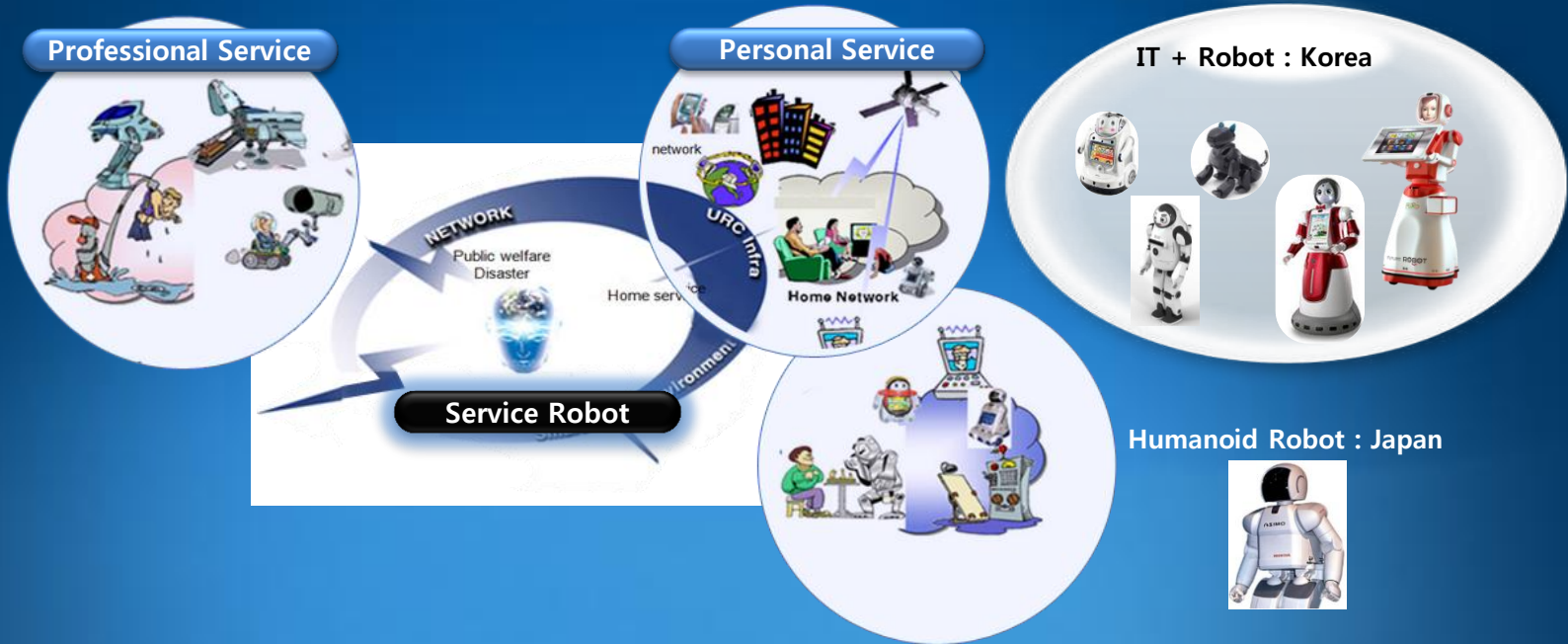


Service Robots have different kinds of types according to application.

Military Robot : USA



Medical Robot



- Service Robots can
- 1 **cognize & perceive** external environment
 - 2 **recognize** situations
 - 3 **independently** and **autonomously** operate



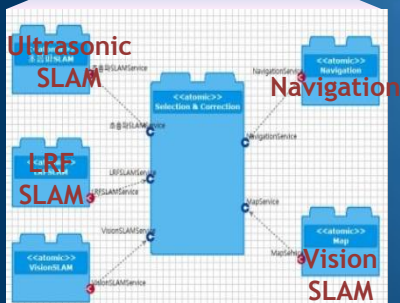
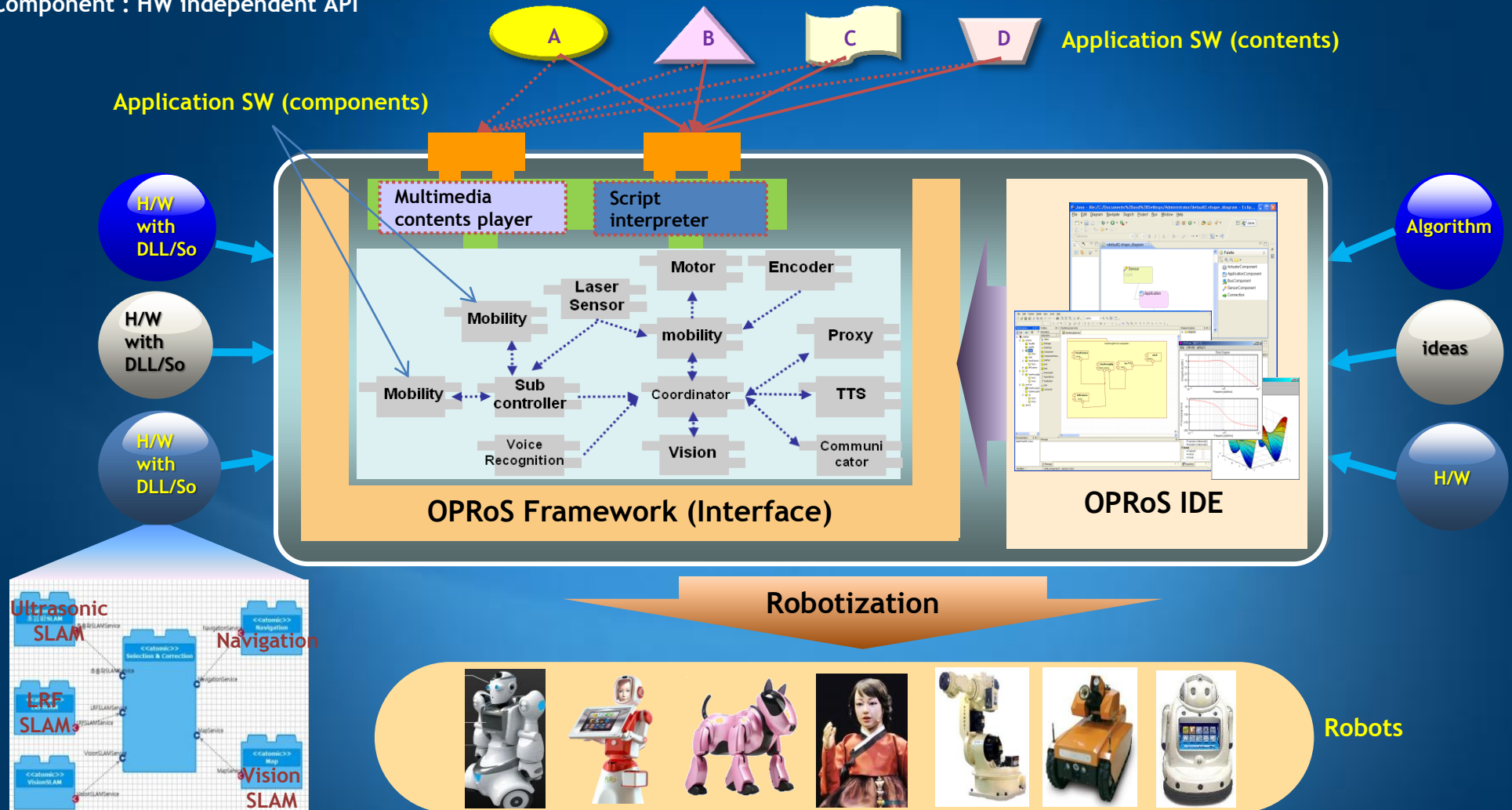
4. OPRoS

OPRoS(Open Platform for Robotic Services)

<http://www.opros.or.kr/>

OPRoS is a Open Platform for RObotic Services.

Component : HW independent API



OPRoS will provide new services as a integrated M/W.

Realtime scheduling service for the component performance (0.1ms)

Monitoring service for the components & core engine

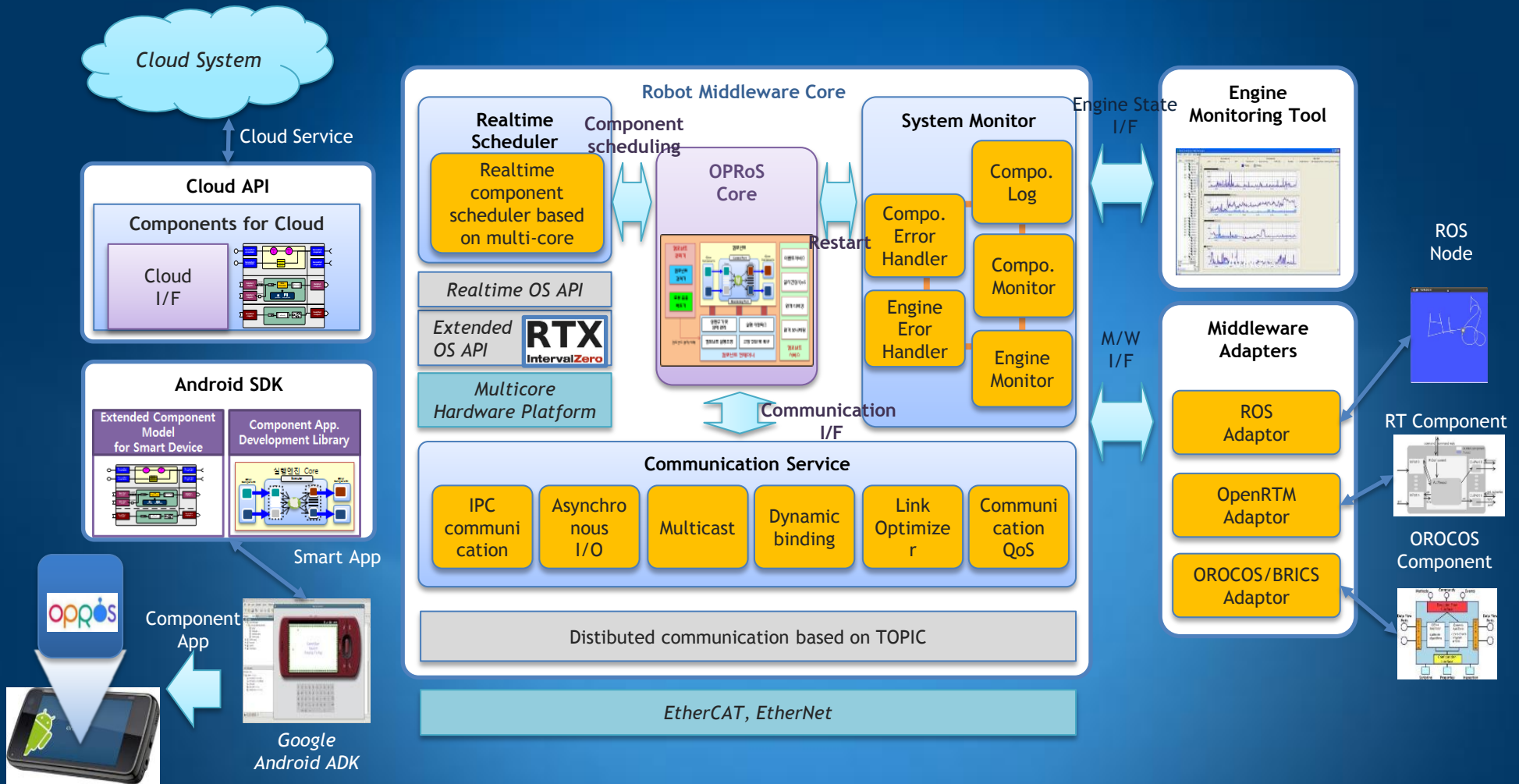
High performance distributed communication middleware service

Cloud service components

Support other robot middlewares like ROS, OROCOS

Development toolkits for the Android app. components

OPRoS will be evolved as a global robot middleware.

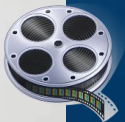


<http://www.opros.or.kr/>

5. FURO

FURO (Future Robot)

FURO is a smart service robot like smart phone.



Service Application

COEX_Shopping Mall



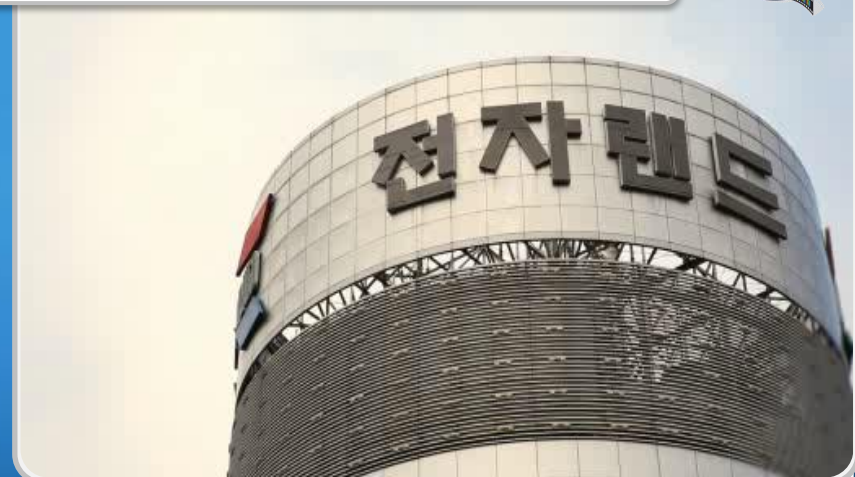
Seoul Nat'l Univ. Hospital



Severance Hospital



ETLAND_Tax Free Shop, Cinema



Service Application

HYUNDAI ASAN Museum



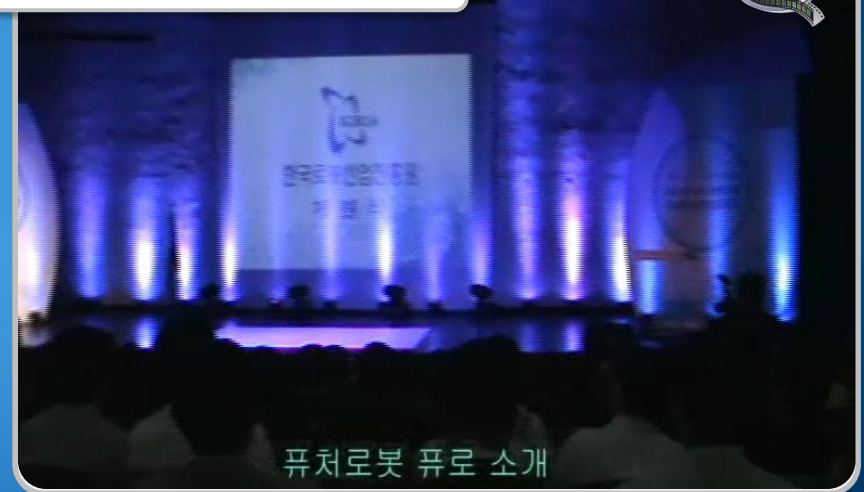
Gwancheon Nat'l Science Museum



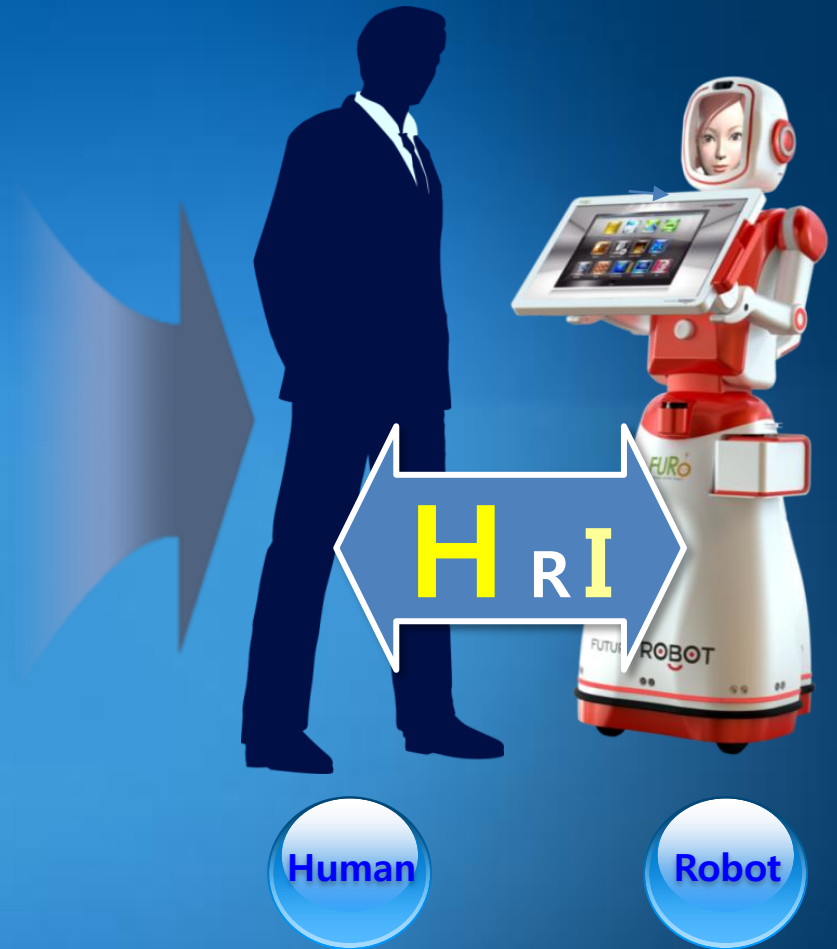
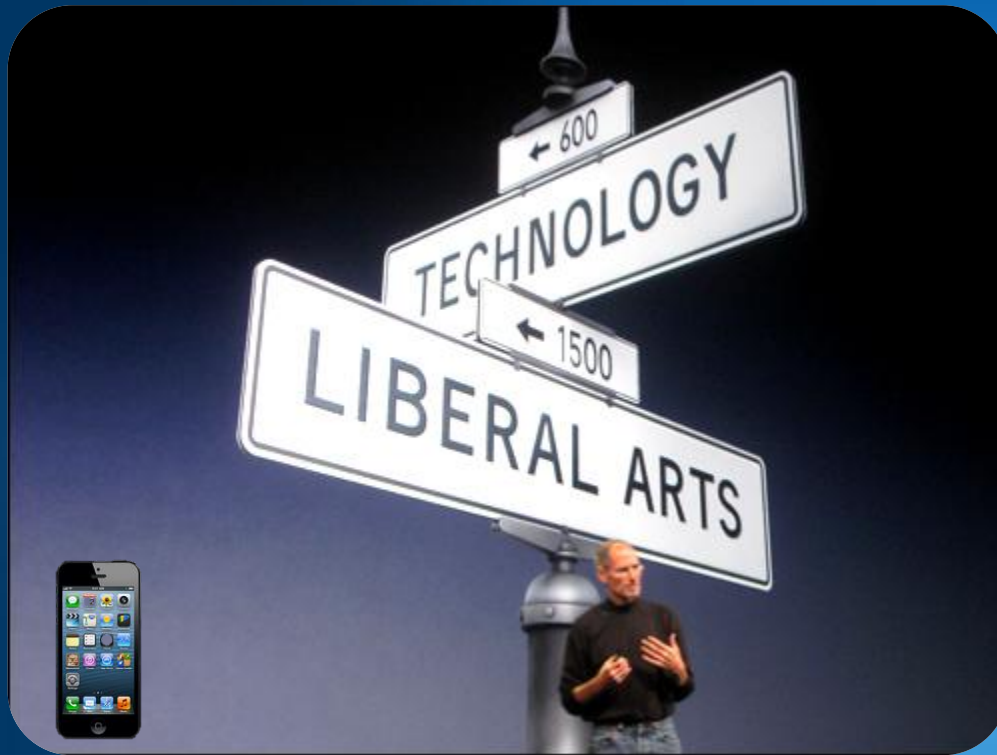
Restaurant, SBS TV



Robot Event



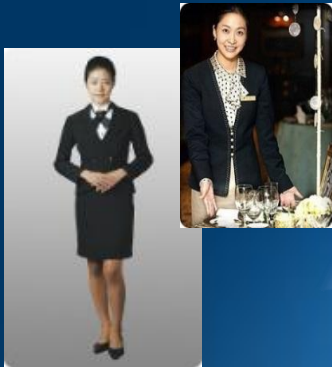
Robotics(Technology) shall be intersected with **Liberal Arts**(Humanism).



HRI(Human Robot Interaction)

FURO is made as a 'Convergence' product based on 'Liberal Art'.

Friendly Service



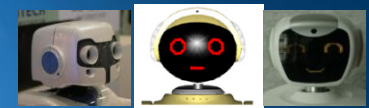
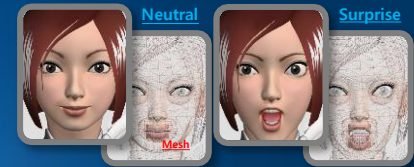
Service + Information



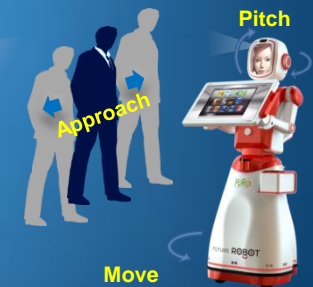
Information Device



Emotional Avatar



Emotion + Dynamics



Dynamic Interaction

FURO has a Open Platform with OPRoS_(Middleware) & FUROWare_(HRI Engine).

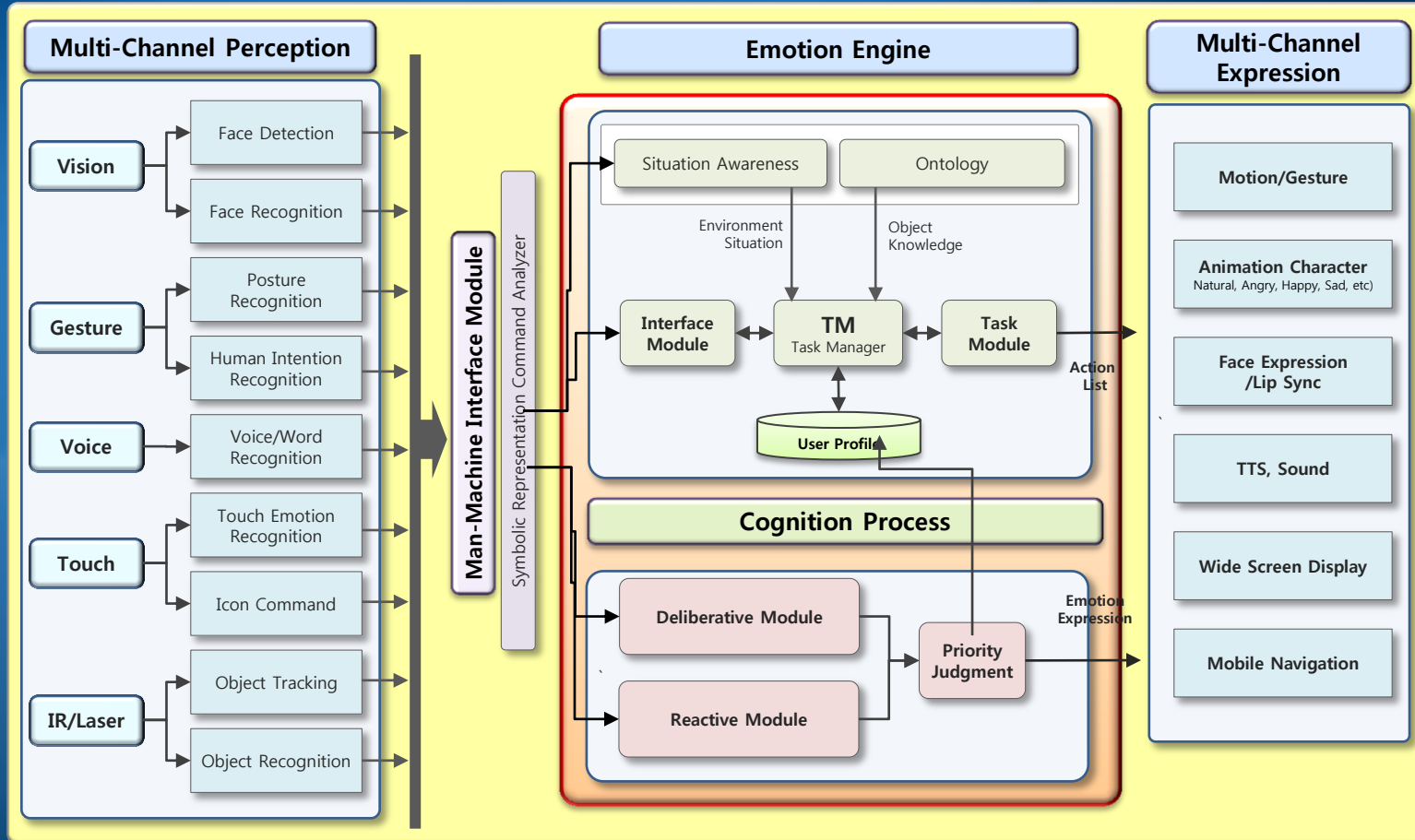
Expresses interactive emotions through multi-channel perception and AI

< FUROWare (HRI Engine) >

1 Perception Component

2 Intelligence Component

3 Expression Component



FUROWare is Robotic solution made of OPRoS components.

Part	Solution (OPRoS Component)	Basic Module	Advanced Option
Perception & Cognition	FURO-Sense	Face Detection	Face/Sex/Age Recognition, Face Servoing
		Human Intention Detection	Human Intention Identification, Human Motion Servoing
		Keyword Recognition	Voice command
		Touch Sense	Emotion Expression according to Touch Pattern
Artificial Intelligence	FURO-Brain	Emotion Engine	Emotion Controller according to service scenario
		Dialogue Engine	Dialogue Engine according to service scenario and emotion status
		Service Robot Platform	Robot Personalization , Task Manager for multi-service events
Action & Expression	FURO-Expression	TTS (Text-to-Speech)	Natural TTS and Lip Sync
		Sound Effect	Emotional Sound Effect according to service scenario
		Language (Korean)	English, Japan, Chinese, France, German (30 countries)
		Character Emotion	Facial Avatar Emotion
		Emotional Gesture	Head, Monitor, Waist, Mobile, LED
Mobility	FURO-Mobile	Navigation	Map Building, Obstacle Avoidance, Object Chaser
		Charging Station	Automatic Recharging
Robot Management	FURO-Manager	Joystick	Voice Command
		Remote Monitoring	Teleoperation / Scheduling / Statistics
		Scenario Editor	User creative robot service editor
Others	FURO-Pay	Card & RFID Reader, Printing	Human Identification / Credit card reader / Printing service

RoIS S/W Framework is a interface with HRI Components suitable for variety of robot service applications.

Ref : Robotic Interaction Service (RoIS) Framework

Referring to Figure 4, this specification defines the RoIS Framework as one that manages the interface not in units of functional implementations incorporated in the robot but rather in abstract functional units applicable to a service application. Such an abstract functional unit is called an "HRI Component." Here, HRI Components (e.g. person detection, person identification) are logical functional elements making up the description of a human-robot interaction scenario.

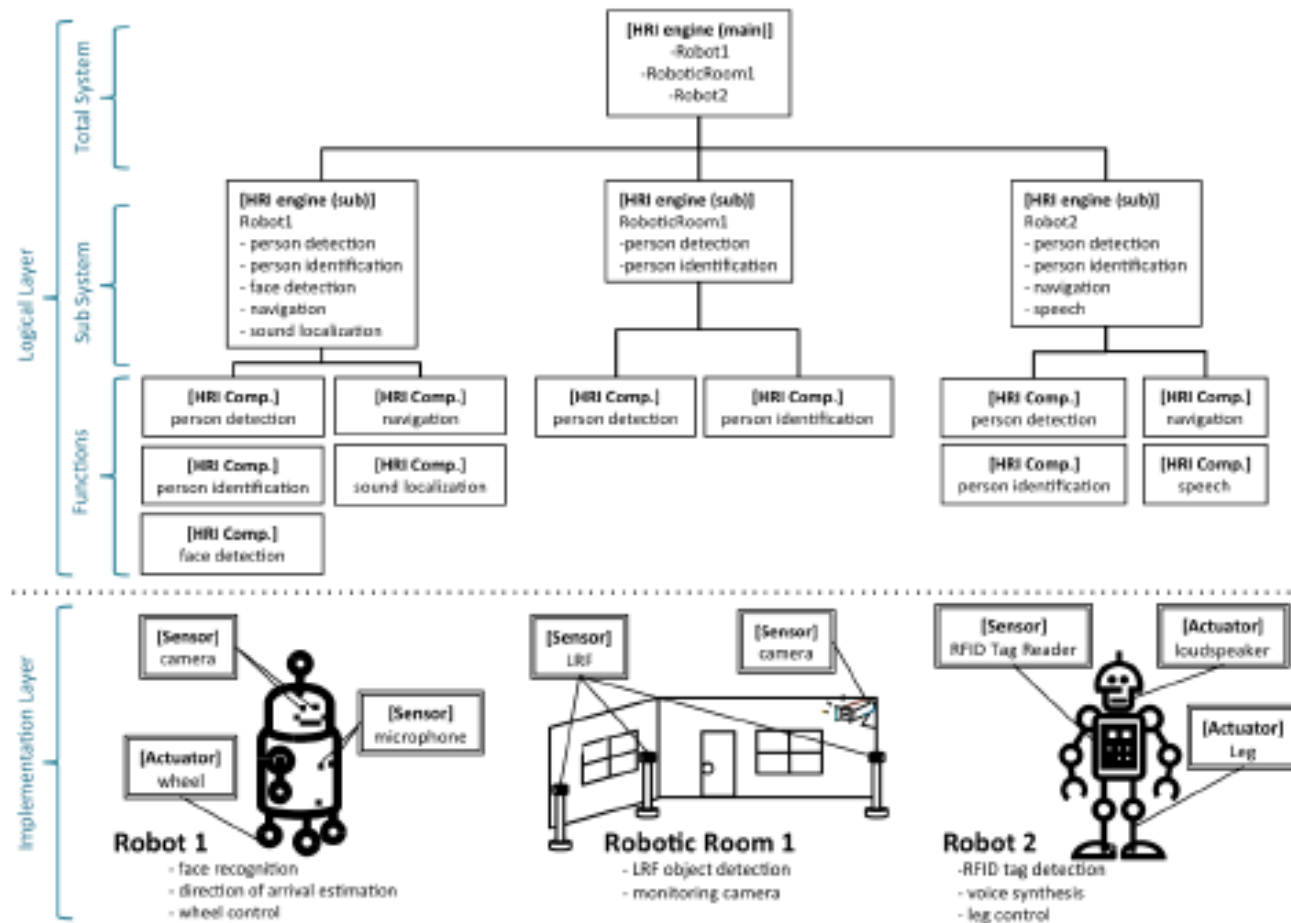
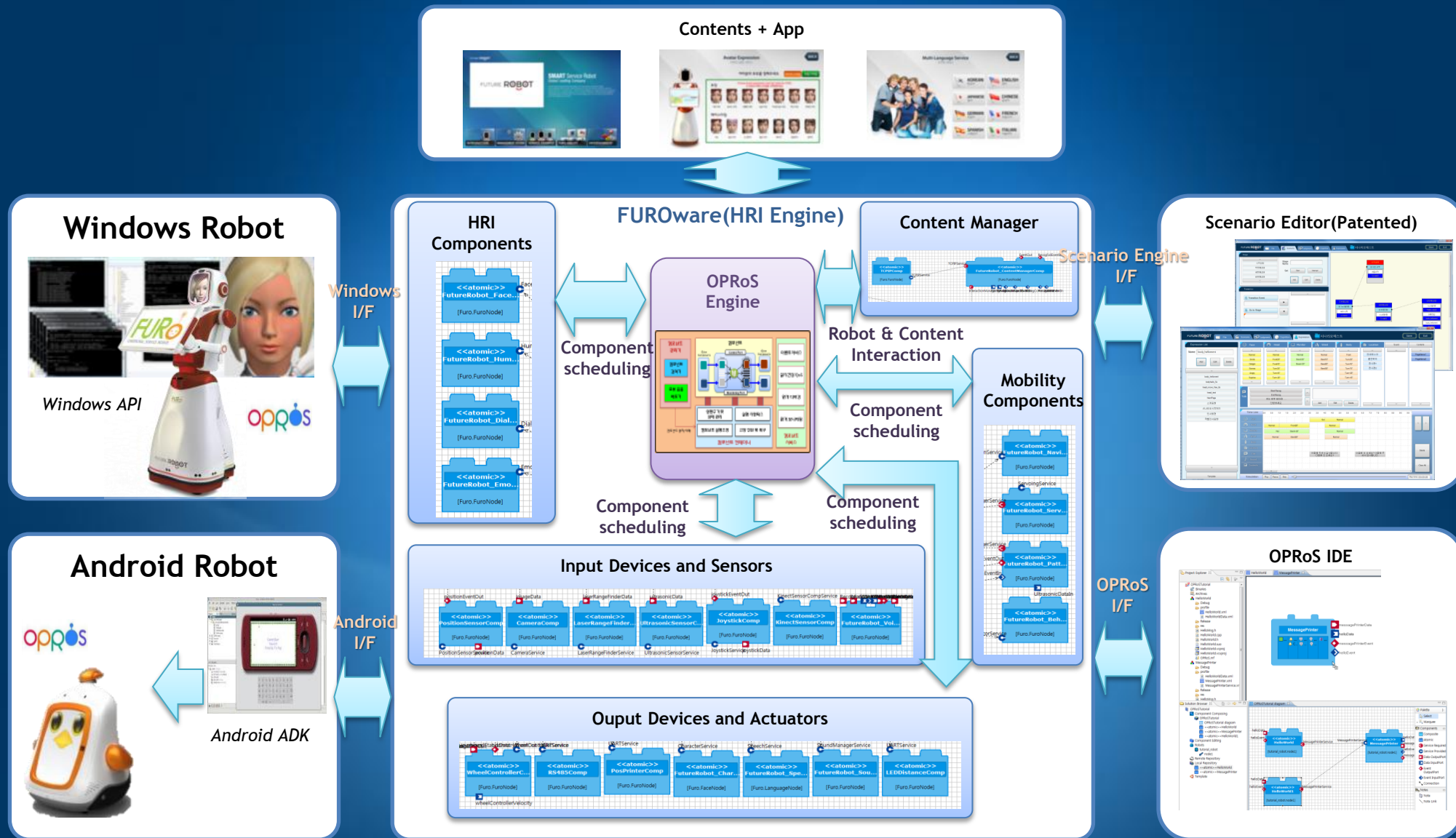


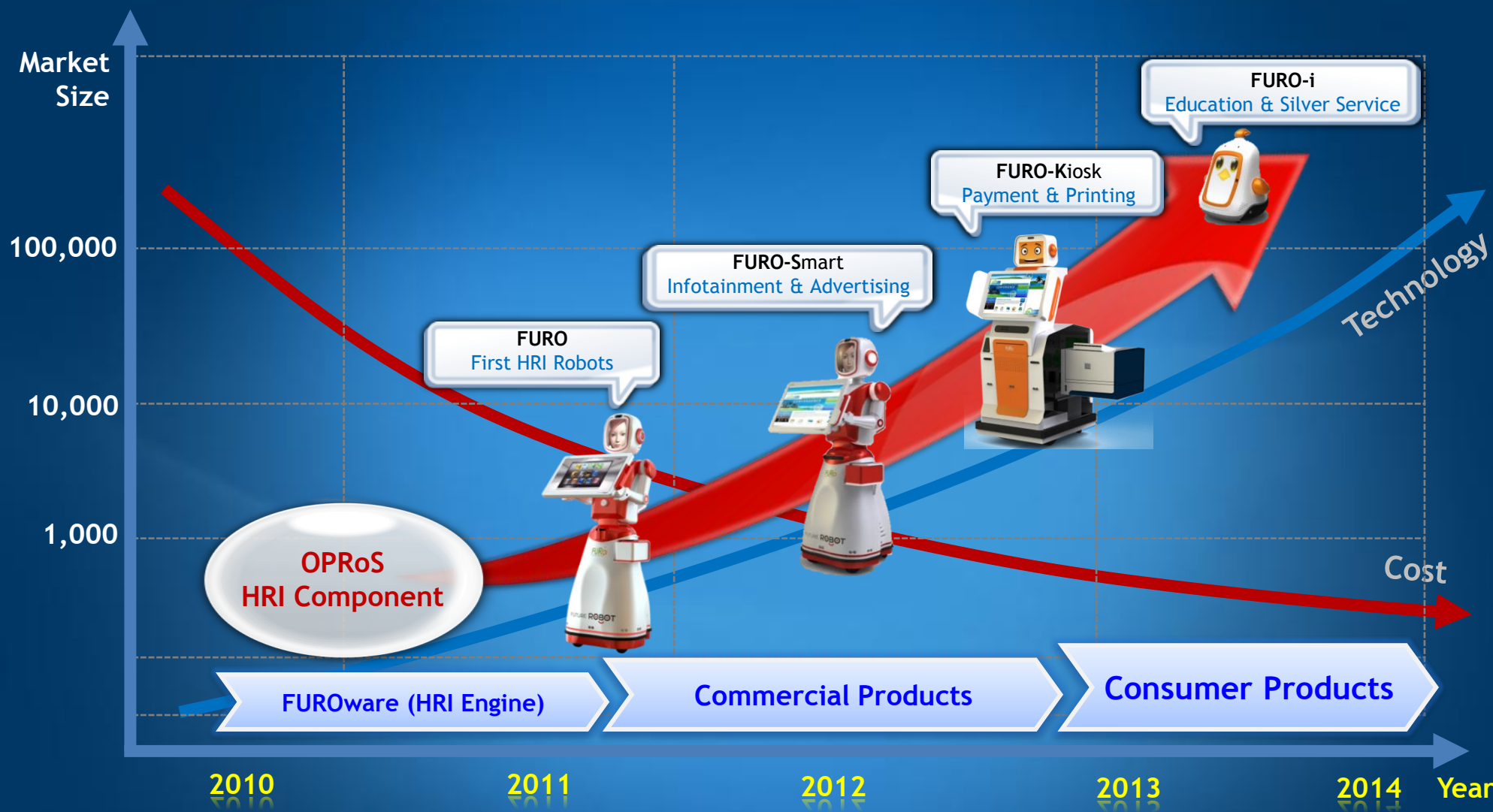
Figure 4: Example of HRI Engine and HRI Components.

FURO S/W Framework is a middleware with OPRoS + FURWare (HRI Engine) suitable for variety of robot service applications.



6. Future

FUTURE ROBOT will be more sustainable with 'FURO (Product)' and 'OPRoS (HRI Component)'.

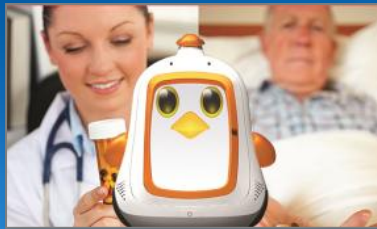


'FURO-i' will live together with humans.

FURO-i Services

Service 1 Health Care Service

- Checking health with U-Health Device
- Health treatment information / Emergency call



Service 2 Mental Care Service

- Pet Design / Avatar / Lip-sync / Interaction
- Delivering emotion with variety of facial expression
- Conversation Service - Caring for lonely



Service 3 Entertainment Service

- Family SNS Service
- Music, Movie, etc / Weather news



Service 4 Education Service

- Interesting smart education service with interaction between robot and kid



FURO-i System



OS : Android 3.x or Window 7

* Battery life - 3 hour(s) / Charging time - 1.5 hour(s)



Intelligent Avatar

Expression of various emotions / Lip sync expressions



Personal Robot : FURO-i

u-Health Care Service



FURO-i (Android Tap 10.1") (Patented)



Service Robots shall be contributed to Worldwide Risks as well as to Humankind Wellbeing.

Aging, Wellbeing, Safety



Society

Energy



Solo, Manpower Shortage,
New Emerging Countries

Economy

Climatic Change, Declining Resources



* Ref. : Robot Future Strategy(2013~2022) / Korea Government / 2012/10.17

FUTURE ROBOT make best effort to build 'better ecosystem'.

Let's build a 'cooperative ecosystem' for human and world.

Open mind ~ Open robot platform



Thank You