



General presentation



Contents

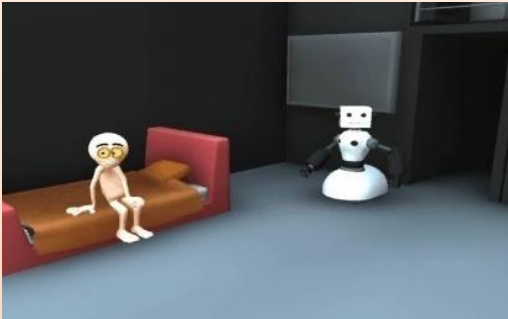
- **Robocap and Cognitive Consumer Robot for Elderly-Care: HomeMate**
- **Collaborative actions in ISRI/SKKU**

HomeMate: Cognitive Consumer Robot



HomeMate: Next Generation of Consumer Robot Capable of Errand/Manipulative Services

Targeted for **Caring Elderly or Disabled** with Three Major Service Scenarios: **Errand**, **Medicine Delivery** and **Video Chatting**



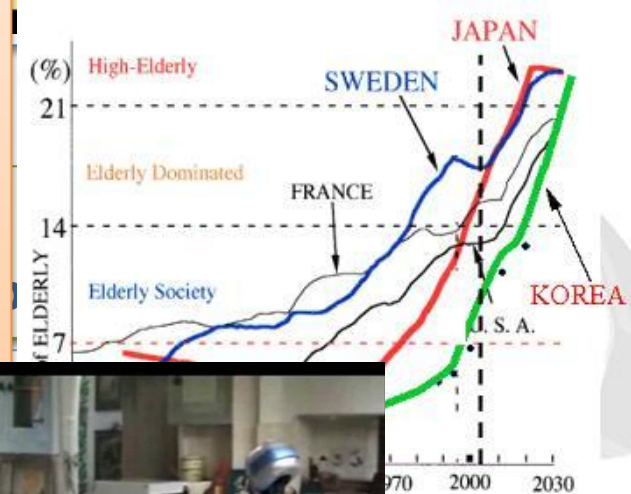
Errand



Medicine Delivery

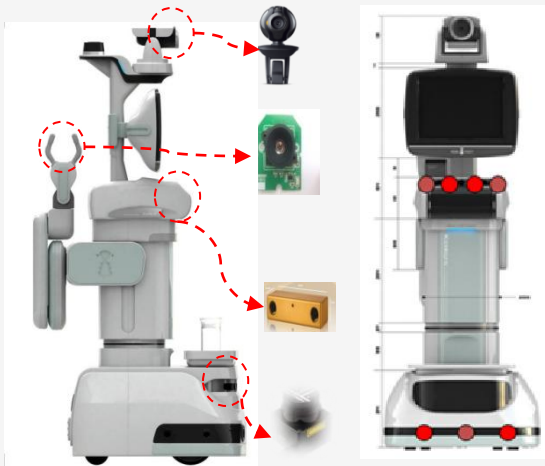


Video Chatting



Elderly Care Robots: HomeMate

❖ ISRI/SKKU with Yujin, BonaVision, GT and PSU



Low-cost Sensor, Actuator, Platform!!
Performance compensated by dependability!!



Harmony in appearance with functionality:
to overcome Uncanny Valley



Targeting for U.S and Korean Markets in consideration of Environment and Culture



Robocab



Objective

Autonomous Unmanned **Transport Robot Service** Development
For **Ride-Share** in the Crowded Town or Campus

Section		Performance
Operation mode		Auto/Semi-auto/Remote
Speed	Auto	25km/h
	Semi-auto	25km/h
Sensor	Position	Camera, GPS, LIDAR, IMU
	Obstacle detection	Camera, LIDAR, Ultra-sonic
	Environment detection	Camera, LIDAR
Communication		WiFi/WiBro/3G
Position Error		Avg. 15cm, Std. 20cm
Delay of environment change		Obstacle 0.1 sec Landmark 1sec
Keeping Distance With surroundings	In driving	Min. 1m
	In parking	Min. 50cm



Core Technologies to be developed

environment recognition/understanding based safety skill : drivable road, pedestrian, obstacle and landmark recognition



Create Argument-reality



GPS/vision based Ubiquitous position recognition



Human-Vehicle Interaction skill for user convenience



Ride Share System



platform, system and network for transport service robot and ride share



Plan For The Years

1st Year

- ✓ Design a unmanned transport robot platform
- ✓ Function: Track based self driving

Self driving Driving along straight line track

Safety Detection of pedestrians and obstacles

Interaction Keyboard/touch screen

**Platform/
Ride Share**

- Prototype design of Unmanned transport platform integrated sensors
- S/W Test of sensor linkage



2nd Year

- ✓ Product a unmanned transport robot platform prototype
- ✓ Function: vision/laser based path driving

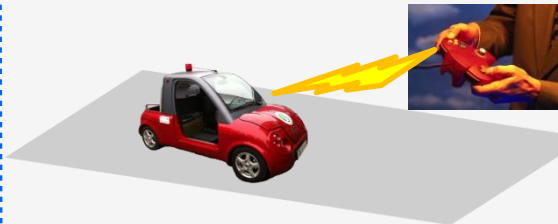
Self driving Pass setting and tracking function

Safety Static/dynamic obstacle detection and vehicle control

Interaction Vehicle control using smart phone

**Platform /
Ride-Share**

- Evaluate the basic performance of the Prototype unmanned transport platform integrated sensors
- Basic performance test of unmanned driving



3rd Year

- ✓ Secure the stability of a Unmanned transport robot platform
- ✓ Function: stable driving in real environment

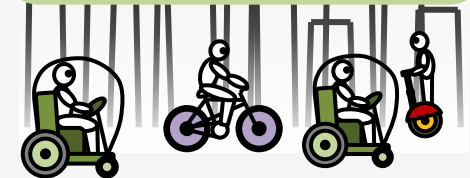
Self driving Improvement of pose estimation performance and extension of transport service

Safety Detection of pedestrians and dynamic obstacles and active avoidance

Interaction Vision based interaction

**Platform /
Ride-Share**

- Secure the platform stability and improve a realization of techniques
- Forward the step of commercialization



**SKKU-LASMEA Joint Platform
Korean Vehicle Integrated Sensors**

Collaborative actions in ISRI/SKKU

- **Visit of partners**

- **Dec.17 (Sat.), 2011, Prof. Sukhan Lee visited ITS (Intelligent Transportation System) Lab, Kumamoto University. He had a presentation for 'Plenary Lecture 1' on *SSI ProSemi 2011 Workshop*.**
- **September, 2011, Gabriel Synnaeve of Emotion team in INRIA has visited ISRC/SKKU and presented his interests with research works and discussed with ISRI members.**
- **April 2012, Prof. J. Hu visited ISRI for introducing the lab's latest test results and see the latest status of ISRI research work.**
- **August, 2012, Prof. P. Martinet (Institut Blaise Pascal) visited ISRC to discuss with ISRC members about some progress on the intelligent vehicles with autonomous navigation and demonstrate his recent research results in the seminar.**

Collaborative actions in ISRI/SKKU

- **June, 2012, Prof. Youcef Mezouar (Université Blaise Pascal) visited ISRC to attend at the conference IAS(Intelligent Autonomous Systems) , which is hosted by ISRC.**
- **2011, Prof. Sukhan Lee visited Université Blaise Pascal, Lasm ea for business related with MTM Robotics.**
- **2011-2012.8, Student Ferit Uzer had stayed in ISRC for the double-degree program between Université Blaise Pascal and SKKU.**
- **From Sept. 2011, Student Zhao Xinshuang stayed in ISRC/SKKU for the double-degree program between Université Blaise Pascal and SKKU**

Collaborative actions in ISRI/SKKU

• Publications

- **As a Springer handbook series, the chapter “Risk-based navigation” in Handbook of Intelligent Vehicles, 2012 is composed and published with collaborative partners.**
- **Jong-Kyu Oh, Sukhan Lee, and Chan-Ho Lee, “Stereo Vision Based Automation for Bin-Picking Solution”, International Journal of Control, Automation, and Systems, Vol. 10, No. 2, (2012) pp. 362-373.**
- **Zhaojin Lu and Sukhan Lee, “Probabilistic 3D object recognition and pose estimation using multiple interpretations generation”, Journal of the Optical Society of America A, Vol. 28, Issue 12, (2011) pp. 2607-2618.**

Collaborative actions in ISRI/SKKU

- **Seongsoo Lee, Sukhan Lee, Seungmin Baek, Seongsoo Lee, Sukhan and Lee, Seungmin Baek, "Vision-Based Kidnap Recovery with SLAM for Home Cleaning Robots", Journal of Intelligent & Robotic Systems, (2011) pp. 1-18.**
- **Sangseok Yun, Bongjin Jun, Daijin Kim, Jaewoong Kim, Sukhan Lee, Mun-Taek Choi, Munsang Kim, Joong-Tae Park and Jae-Bok Song, "Proactive Human Search for the Designated Person with Prior Context Information in an Undiscovered Environments", Journal of Intelligent & Robotic Systems, (2011) pp. 1-21.**
- **Seongsoo Lee, Sukhan Lee and Jason Jeongsuk Yoon "Illumination-Invariant Localization Based on Upward Looking Scenes for Low-Cost Indoor Robots", Advanced Robotics, accepted October 05, 2011.**

Collaborative actions in ISRI/SKKU

- **Yu-Bu Lee and Sukhan Lee, "Robust Face Detection Based on Knowledge-Directed Specification of Bottom-Up Saliency", ET RI Journal, Vol. 33, No. 4, (2011) pp. 600-610.**
- **Hee-Byoung Choi, Sukhan Lee and Jihong Lee, "Minimum Infinity-norm Joint Velocity Solutions for Singularity-robust Inverse Kinematics", International Journal of Precision Engineering and Manufacturing, Vol. 12, No. 3, (2011) pp.469-474.**
- **Sukhan Lee and Lam Quang Bui, "Accurate estimation of the boundaries of a structured light pattern", Journal of the Optical Society of America A, Vol. 28, Issue 6, (2011) pp. 954-961**

Collaborative actions in ISRI/SKKU

- **Organizations of workshop**
- **The 12th International Conference on Intelligent Autonomous Systems(IAS) was held in June 26-29, 2012 at Jeju Island of Korea and regarding workshops, “Personal Transport Service Robots” are held.**
 - **The chairs of the conference were Prof. Sukhan Lee and Prof. Youcef.**

New project proposals

- **In September 2012, a proposal was submitted to the Ministry of Health and Welfare of Korea under the program entitled “Technology for the well-being of elderly in Aging Society”. The project submitted entitled as “Development of Elderly Assistant Robot”.**
- **The elaborated proposal for 2012 program of the Korean Ministry of Education, Science and Technology, *Hosting Foreign Premier Institutes to Korea* administrated by the Korea National Research Foundation is submitted with the consideration of the potential collaboration partners.**

THANK YOU!