

Dispensing Materials of mobile Robot cooperating with Perception Sensor Network

Kijin An, JiGwan Park, Minh Do Hoang and JongSuk Choi
 Center for Bionics, Korea Institute of Science and Technology, Seoul, 136-791, Republic of Korea
 (Tel : +82-2-958-6815; E-mail: {kijin.an, ji22gwan, minhhud, pristine70}@gmail.com)

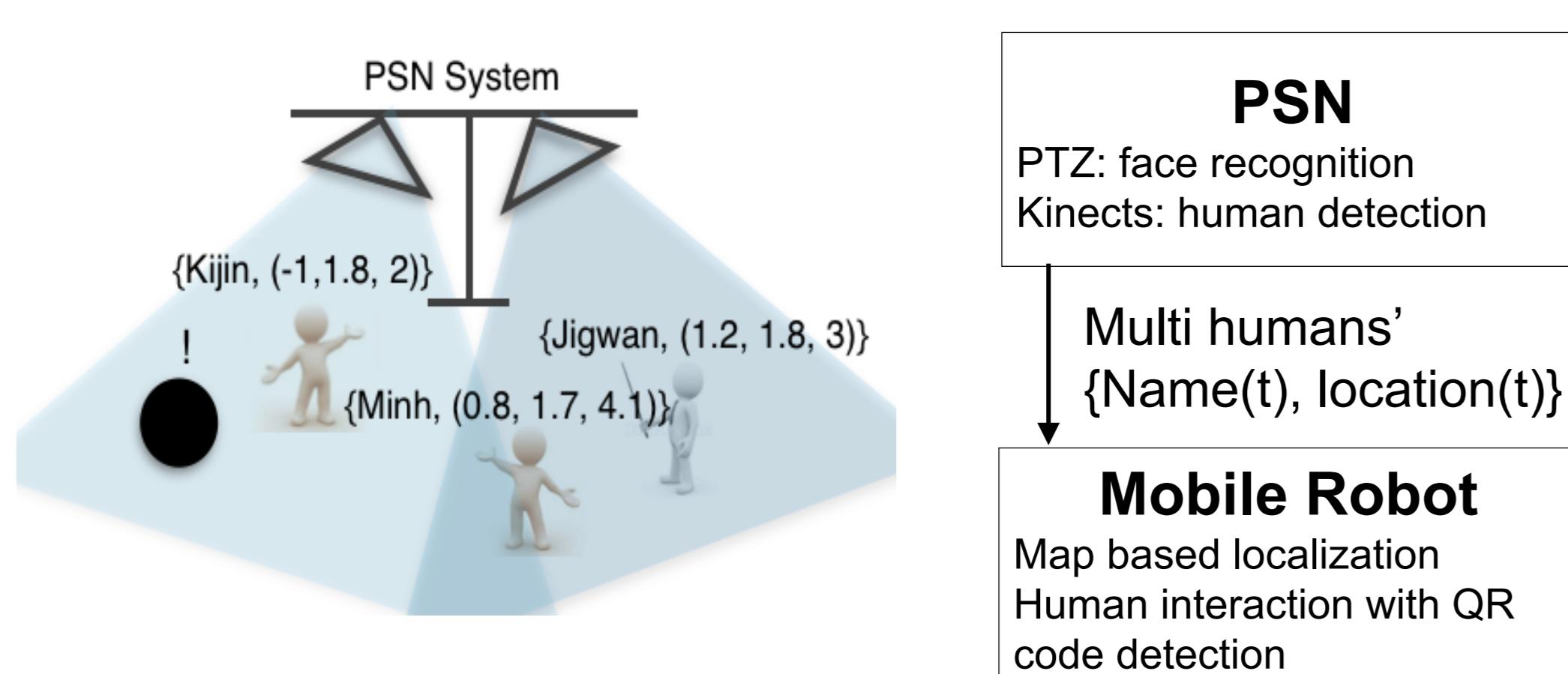
INTRODUCTION

- Perception Sensor Network (PSN) for assisting mobile robot about human' global **location** and face **identification** over multi sensors
- Propose **fusion methods** for seamless tracking of location and identification based on PTZ operations
- Tested a **HRI scenario**, mobile robot **sequentially dispensed paper materials** stacked on a robot shelf aided by PSN

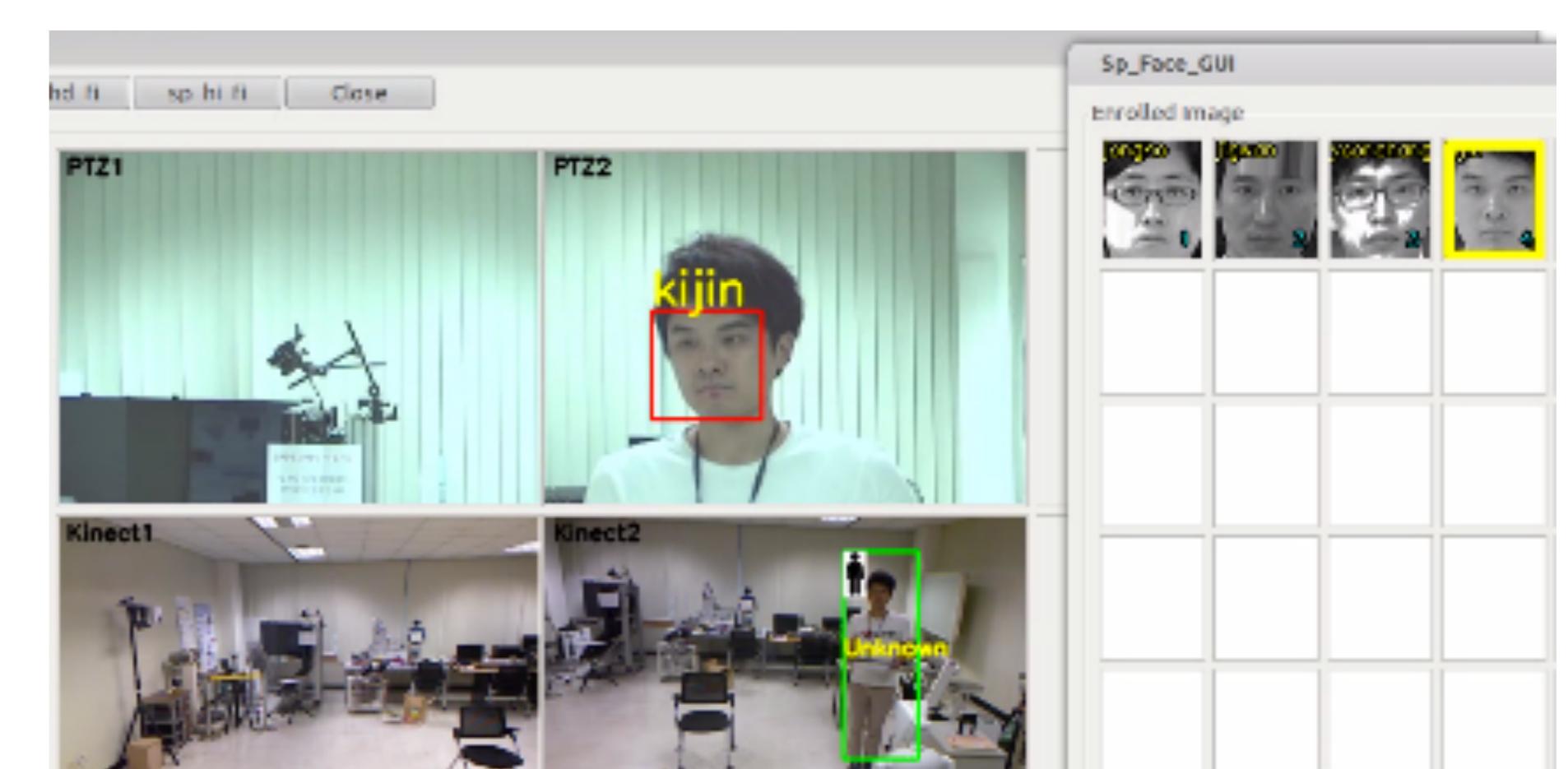
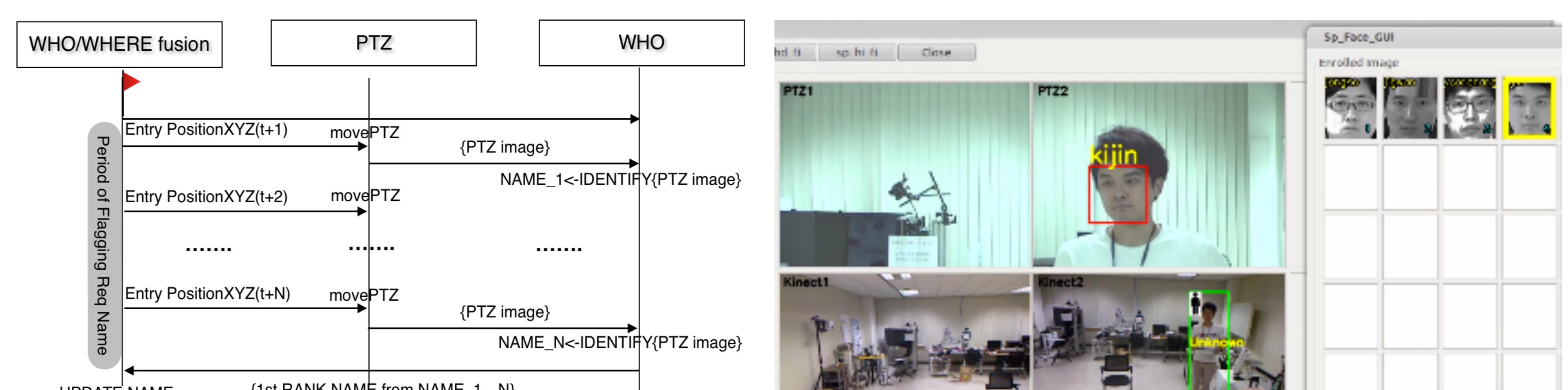
METHOD

MOTIVATION

- Limited and **varying** sensing view of **mobile robot**
- Proposed an axillary **Perception Sensor Network (PSN)** for assisting mobile robot service, which **shares the global human information** obtained by fusion mechanism
- RGBD Sensor: human detection, PTZ: face recognition

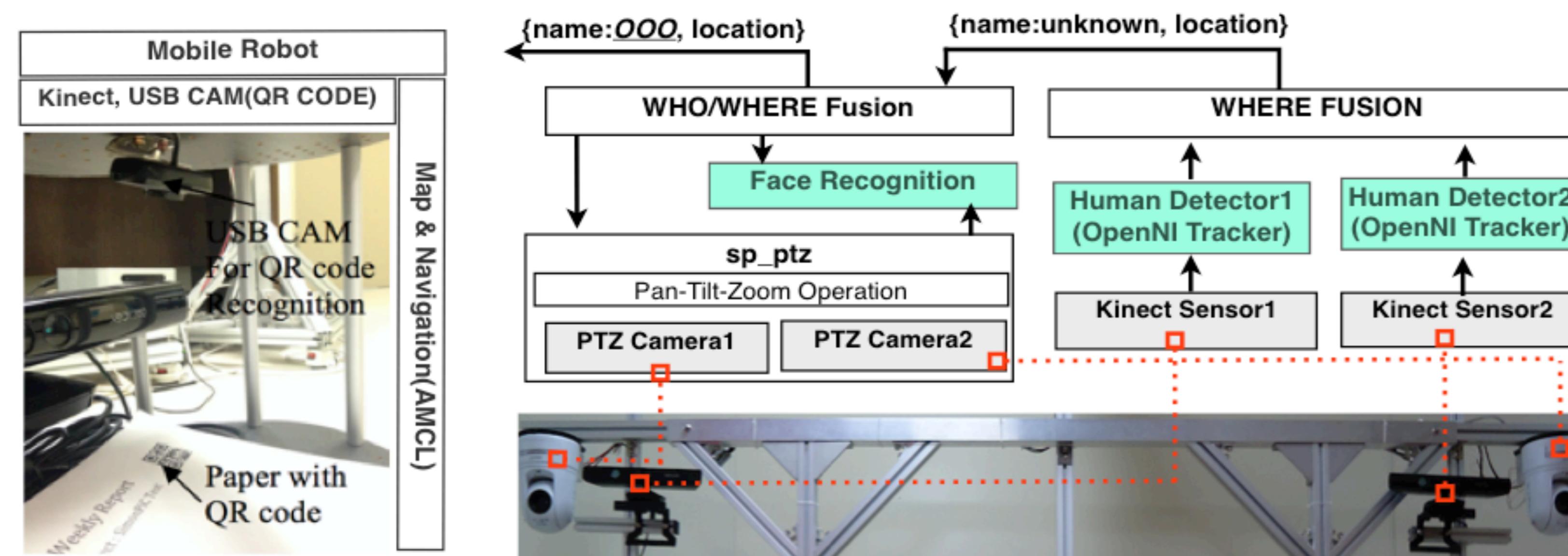


Proposed WHERE-WHO FUSION: Opportunistic manner face identification under pan-tilt-zoom operation



- ① Random selection of an entry within where fusion result $H_{unknown}$
- ② Face identification in highlighted face by controlling PTZ unit
- ③ Probable face identification; ranked 1st name during an interval is replied
- ④ Replied Name is jointed to the nearest distance entry of $H_{unknown}$

PROPOSED PERCEPTION SENSOR NETWORK (PSN)



Proposed WHERE FUSION: similarity-based location fusion method

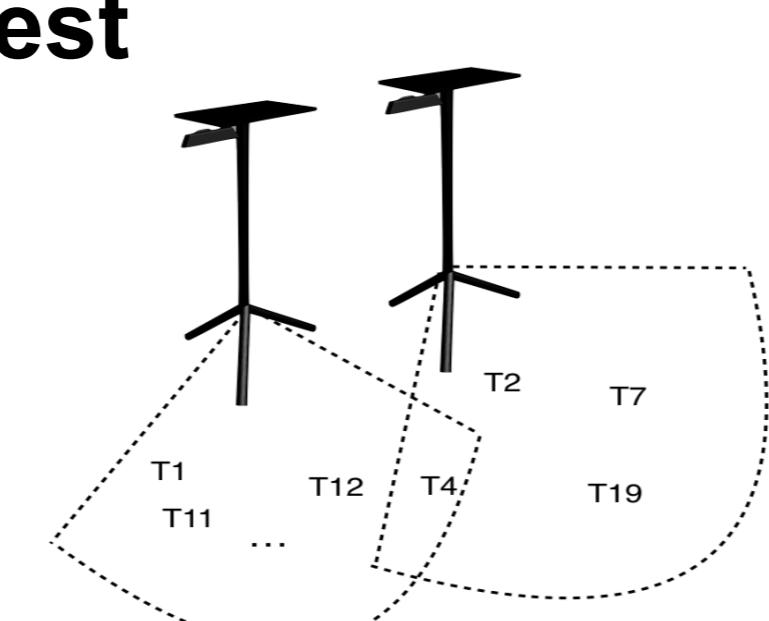
- Determination of Reliable **targets list** $H_{unknown}$ and **seamless handover** on the sensors boundary
- Virtual global coordinate by using sensor pose calibration
- Similarities of humans are defined, considering interaction area
- High scored Similarity human pair on the boundary are aggregated to the dominant one

RESULTS

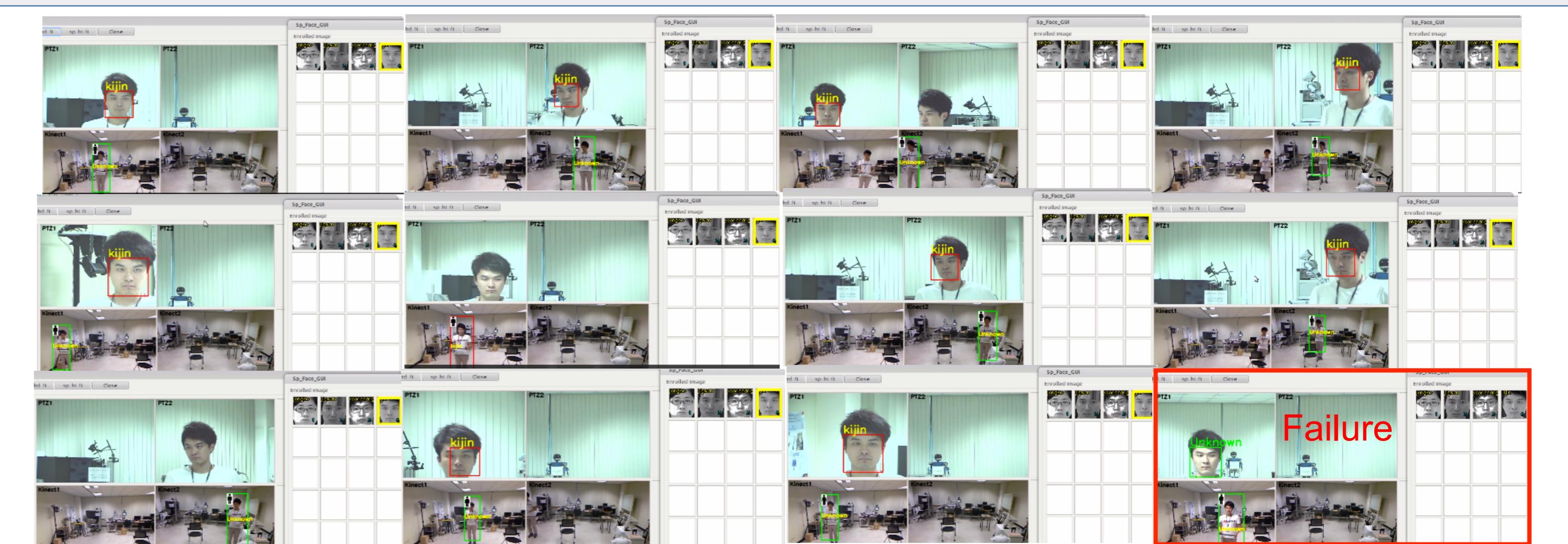
3D position based WHERE-WHO fusion test

Proposed PSN's performance is evaluated by who-where fusion's accuracy of arbitrarily located human because where fusion mechanism could be verified in the middle of pan-tilt-zoom's operation.

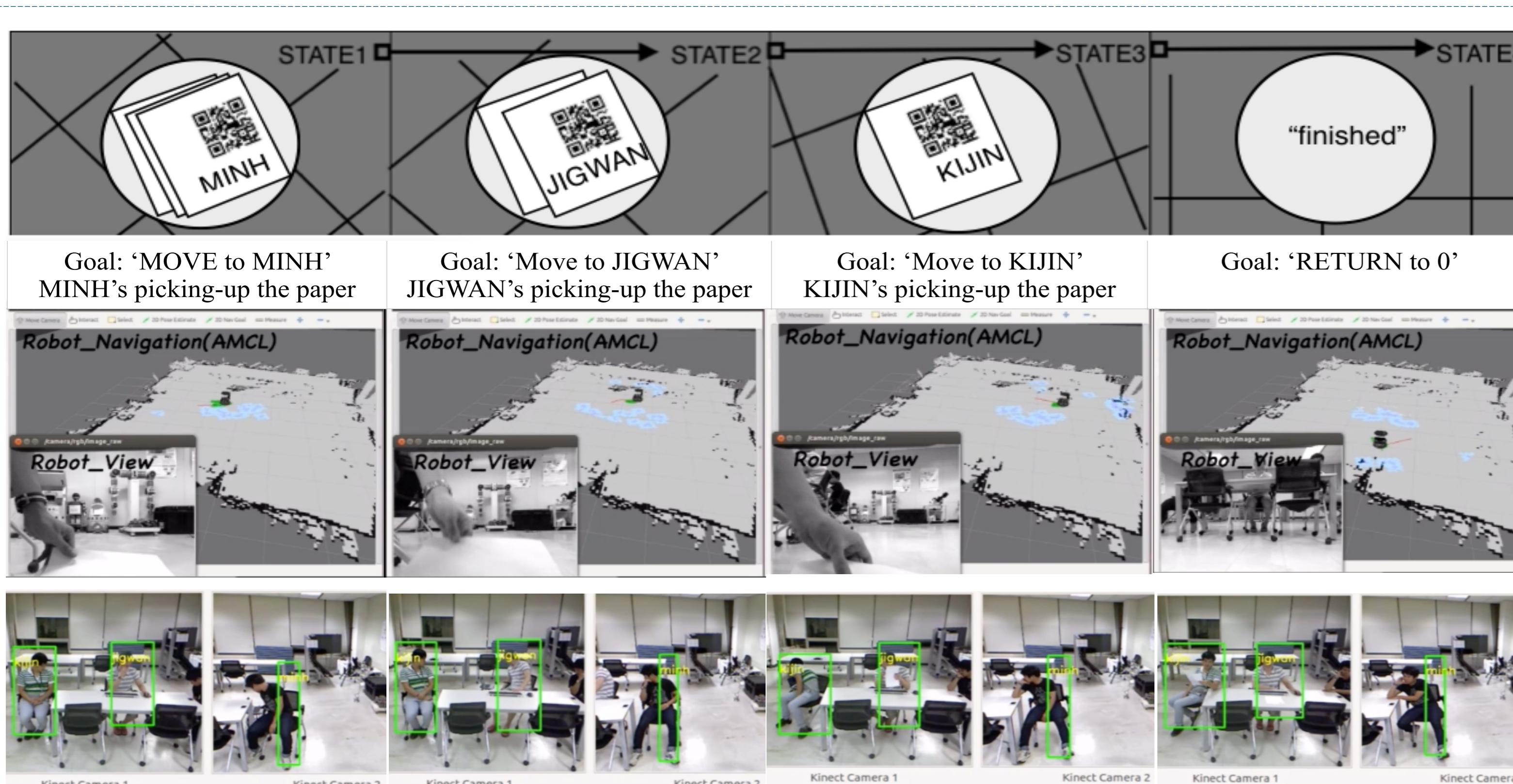
Result	Count/Total	Percentage
Success	18/20	90%
Failure	2/20	10%



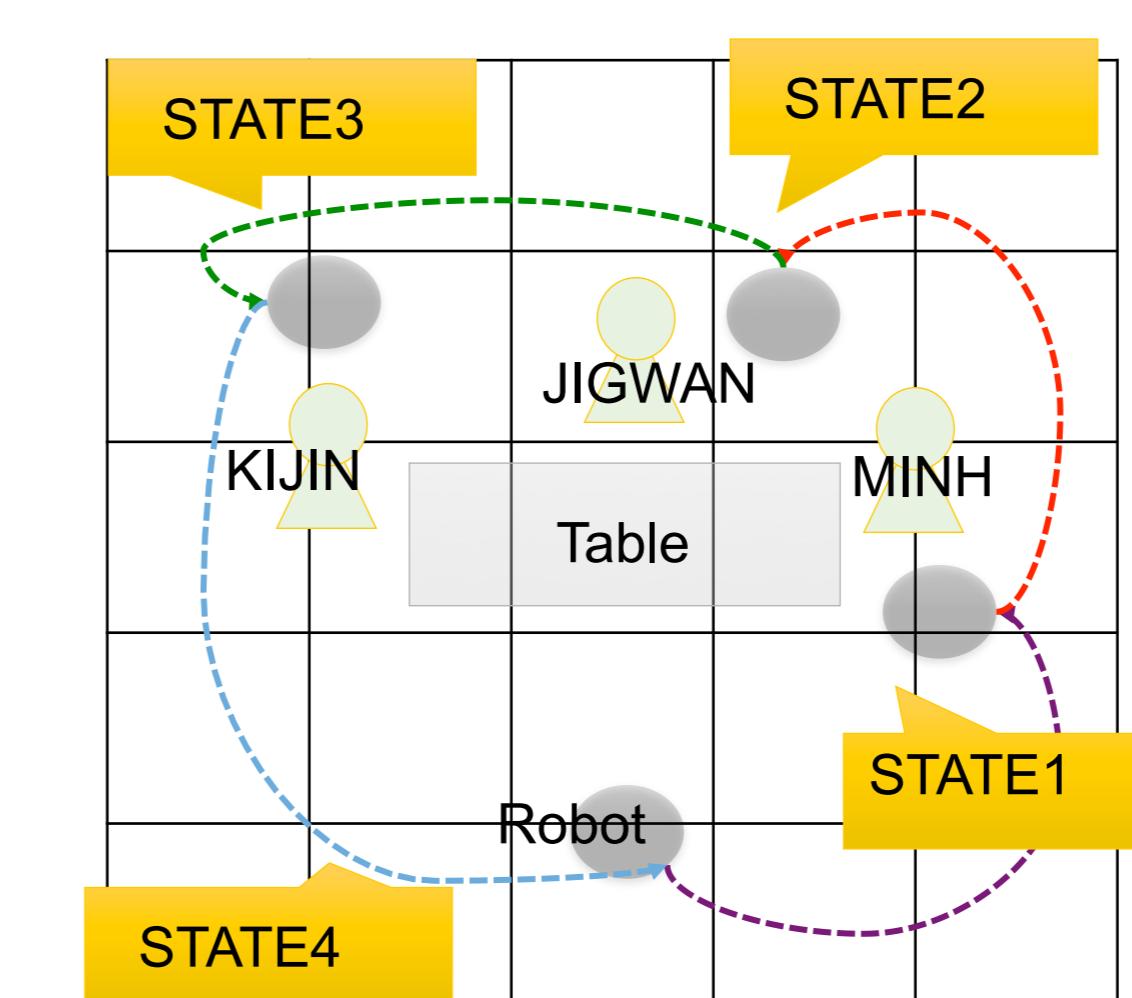
Arbitrarily selected positions on about 5mx5m PSN coverage by using 2kinects, 2ptz cameras



Failure cases 1) localization was not inaccurate so didn't find the face during the interval or 2) face identification was erroneous



Dispensing materials of robot Scenario



- ① Left-top images represent stacked paper materials on robot self. After recognizing of target humans to dispense, robot is sequentially moving to 'MINH', 'JIGWAN' and 'KIJIN' according to order of stacked materials
- ② Robot returns to initial point when dispensing materials service is over
- ③ In left-bottom images, humans are picking up the papers on robot shelf in sequence

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