



A simultaneous robot service scheme for Multi-users

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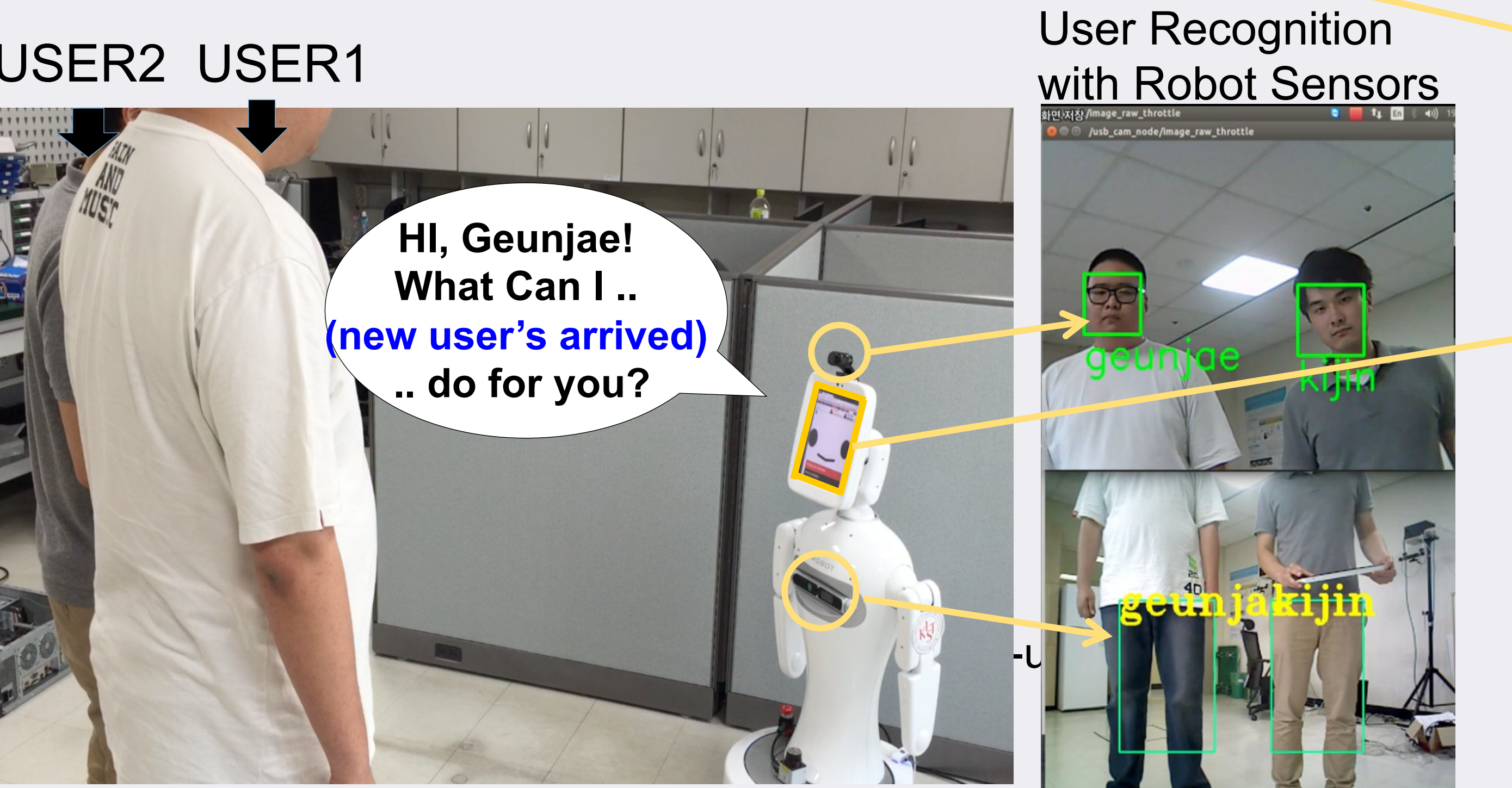
INTRODUCTION

- In this work, we suggested a **service-scheduling scheme** for handling the service flows of **multi-users**.
- **User intention** is analyzed by not only **distance** and **face identification of users** but also the **vocal request** obtained by robot sensors.
- For a simultaneous service support, the spawned services are registered in the **service-queue**.
- Robot provides services to users with the proposed scheduling policy and dynamic screen of robot.

MOTIVATION

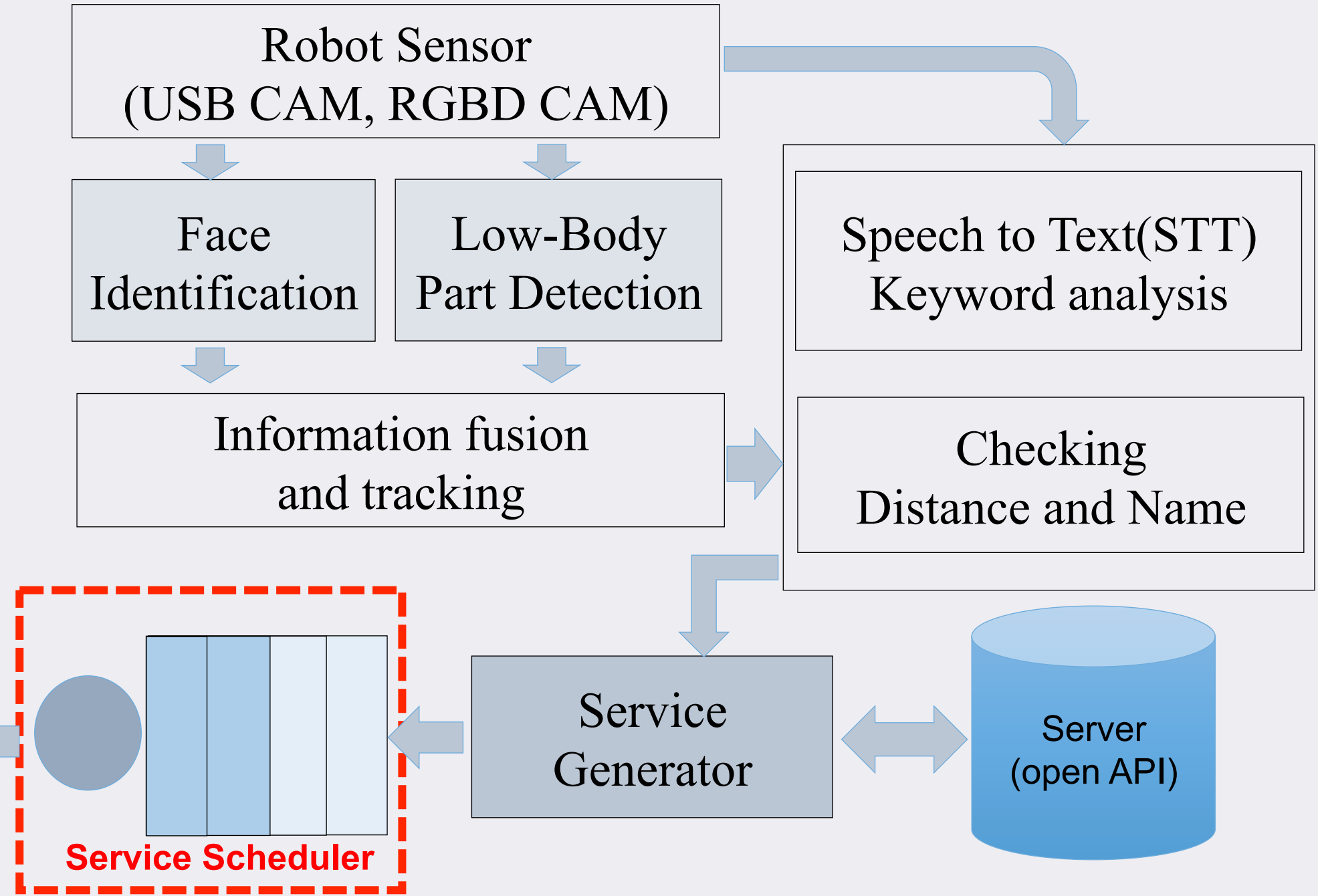
In a **dialog-based** robot service, it is difficult to provide the relevant **services for multi-users** in a **simultaneous** manner because multi-users easily interrupt the other's service.

<Scenario>
USER2 arrived the robot while the robot provides a service to USER1. Without a scheduling policy, services are concurrently spawned and it would spoil the service of USER1.



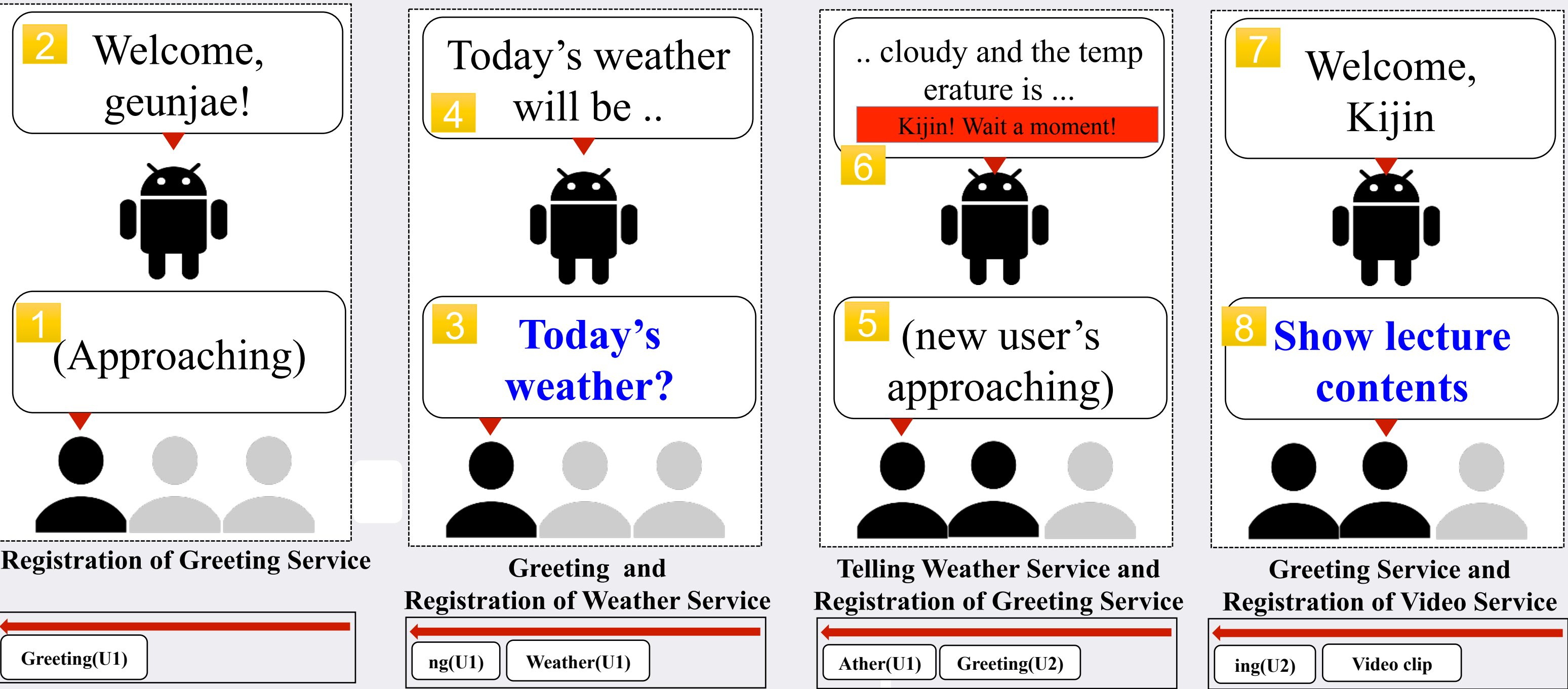
METHODS FOR SIMULTANEOUS SERVICE

<Recognition of Users>
Name and location of user are associated each other based on a locational adjacency. And fusion module tracks these by updating measurements.
<Analysis of Users' intention>
User intention is analyzed by user distance, name and vocal information. We assumed that users have an intention to interact with robot if users are within 1.5 meters to robot. User's specific interest is understood by a simple keyword analysis.
<Service generation based on Scheduling>
Server generates services with open APIs. Finally, generated services are queued in the scheduler first and service is sequentially de-queued and visualized in the client browser.



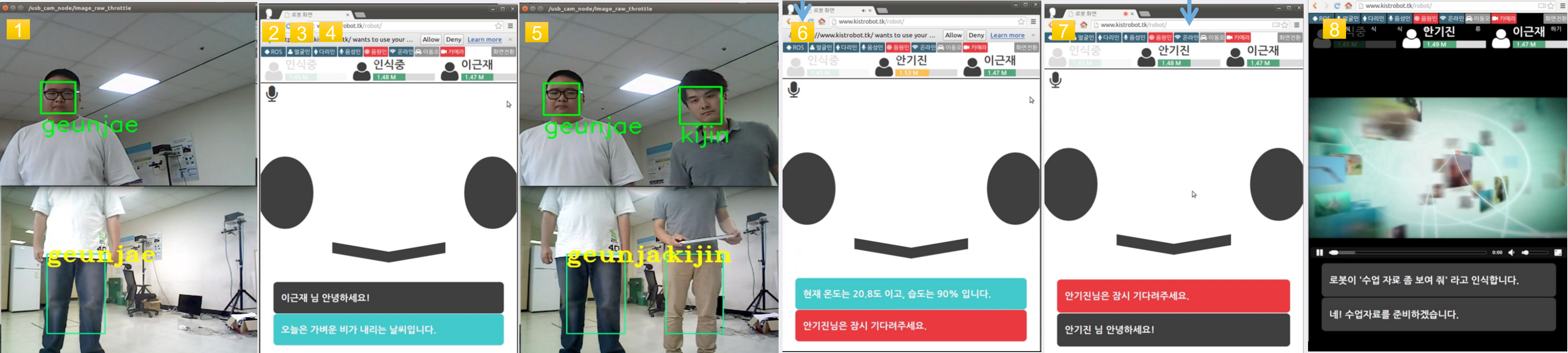
[Problem of Robot Service for Multi-users]

ROBOT SERVICE SCENARIO AND RESULT



<Dialog based Service Property>
• Dialog service has a specific time interval to carry out because the **service has duration to speak messages** to users on the microphone.
<Scheduling Strategy in detail>
• We make **services exclusive** each other; a service is started then all remaining services are not available; it should wait its turn in the service queue.
• Robot **reserves** the new user's service and finishes the previous user first.
• And robot announces its busy condition by showing a comment "wait a moment".
• Robot announces its busy condition to other users by showing the text comment to the newly approaching user. The second user **knows robot's busy condition** due to the first user service. Robot starts greeting service to the second user when the previous user's service is finished.

Robot is announcing its busy condition to the second user because it is still the first user's service turn
After first user's service over and robot start the second user's service



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