

Introduction to CPS Robot Blueprint Family

June 20, 2022

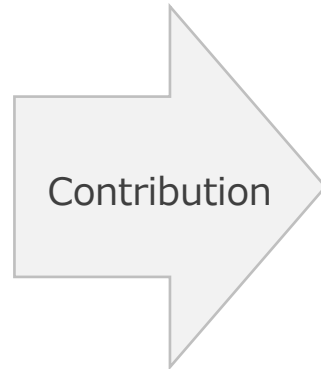
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Vision

› Robotics can contribute to the achievement of SDGs



SDGs

Industries where current robots are difficult to apply

E.g., Food-service industry, Agriculture, ...

- › Challenges in these industries
 - › Objects with diverse shapes, flexibility, and frictional properties
 - › Uncertain environment
 - › High-mix small-lot production



“SIP SSES”

<https://sip-sSES.net/wp-content/uploads/2022/01/%E3%83%A2%E3%83%8E%E3%81%A5%E3%81%8F%E3%82%8A%E6%97%A5%E6%9C%AC%E4%BC%9A%E8%AD%B0%E5%8E%9F%E7%A8%BF.pdf>

SSES (Sensor-Rich Soft End-Effector System)

Ritsumeikan University and other companies research and develop SSES to solve challenges in SIP.
*SIP: Cross-Ministerial Strategic Innovation Promotion Program

› SSES Approach

- › Enhancement of cognitive ability
 - › Sensor-rich technology for multi-dimensional data acquisition
 - › AI/IoT technology with force/contact information
 - › IoT maintenance and inspection technology
- › New Mechanical
 - › Flexible manipulators using polymer materials
 - › Advanced 3D printing technology

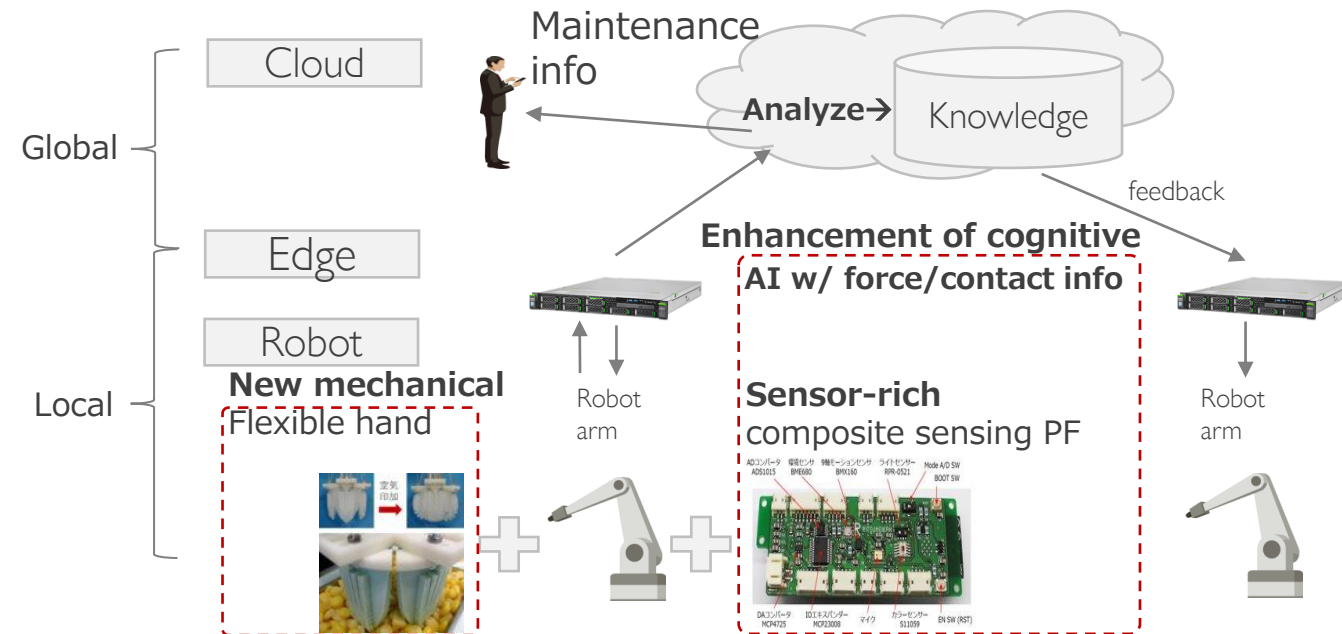


Figure: SSES architecture(<https://sip-ses.net/>)

SSES use case and demo



Remove dishes from table



Dishwashing



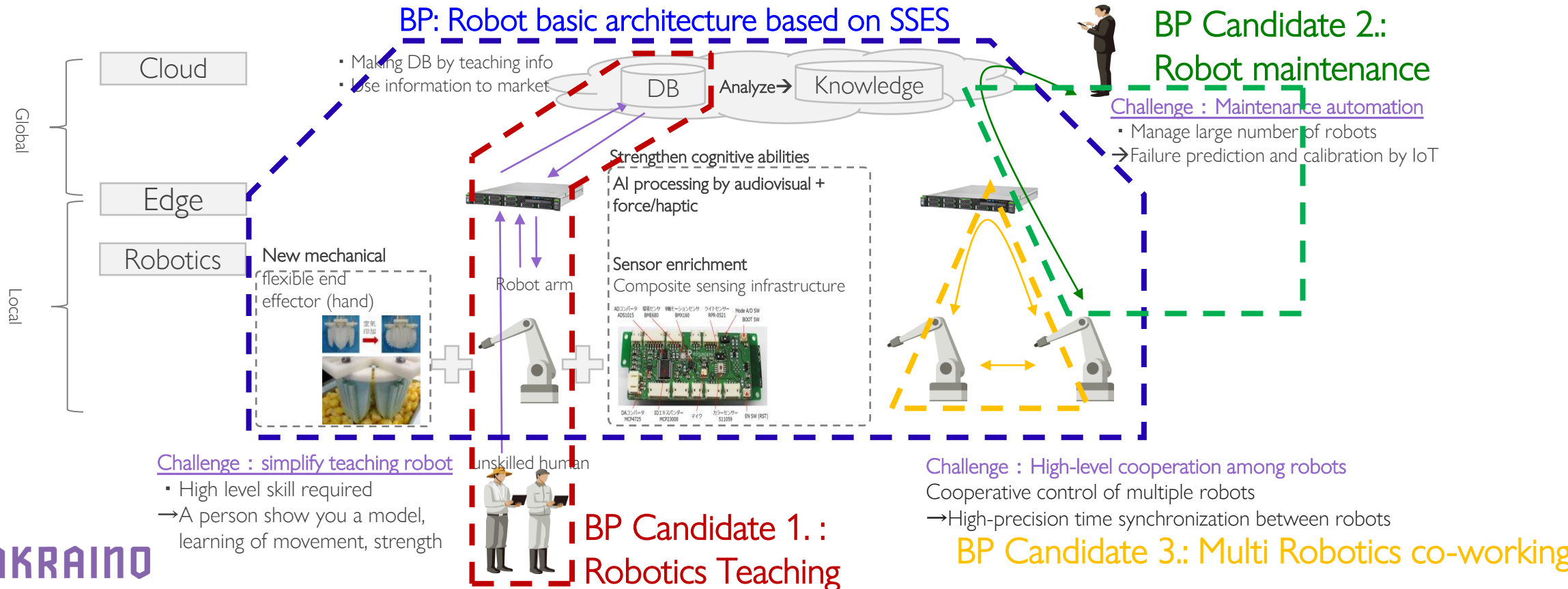
Serve on plate



All video from
SIP SSES project
<https://sip-sses.net/publicinformation/>

CPS Robot Blueprint family overview

- › Will release “CPS Robot Blueprint family” and “Robot basic architecture based on SSES” in Akraino R6.
 - › Provide open software stack based on SSES to apply robotics to any industry easily.
 - › There are some Blueprint candidates based on challenges in social implementation of robots. We will propose them as new Blueprints in the future.



Robot basic architecture based on SSES Blueprint

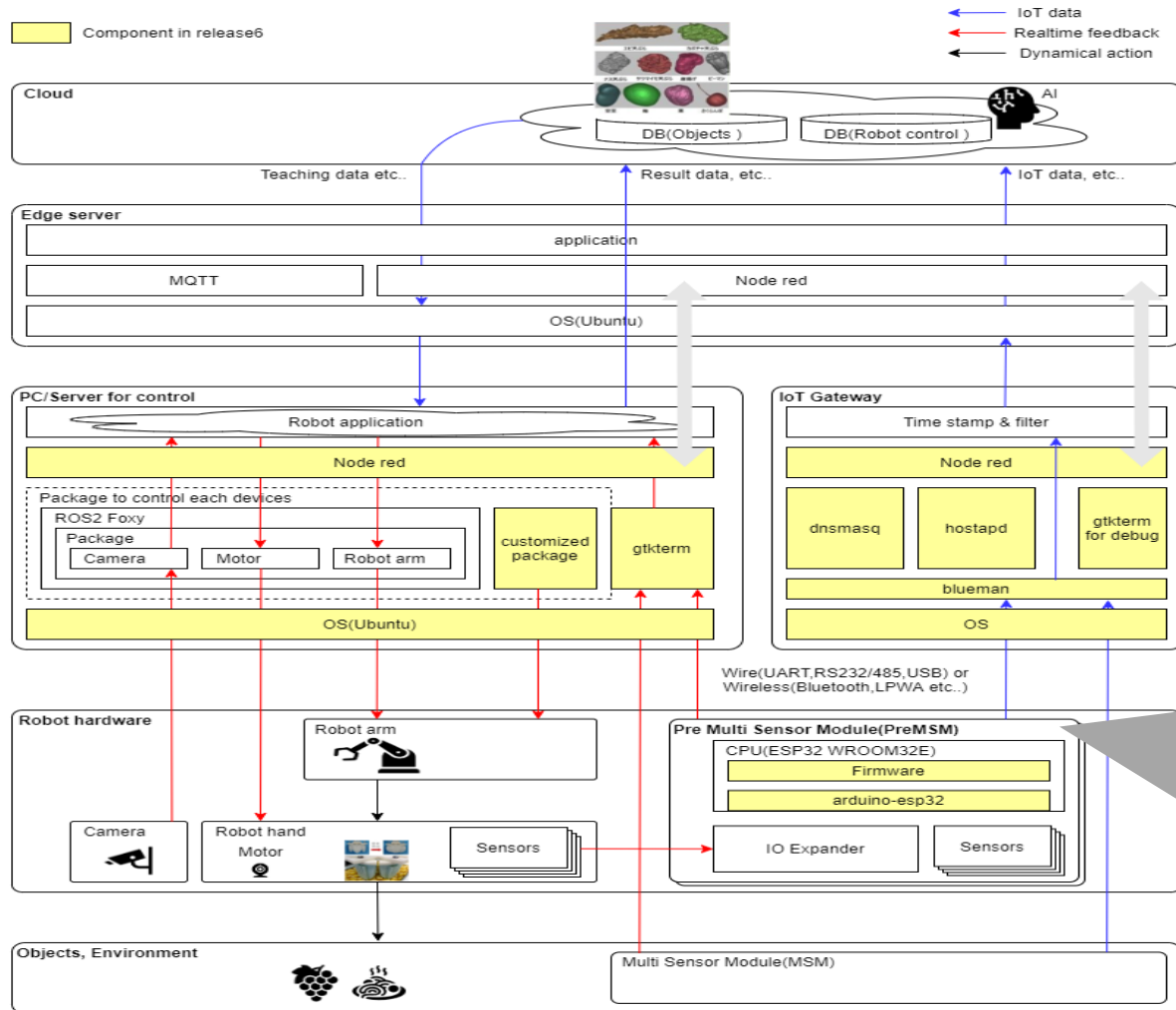


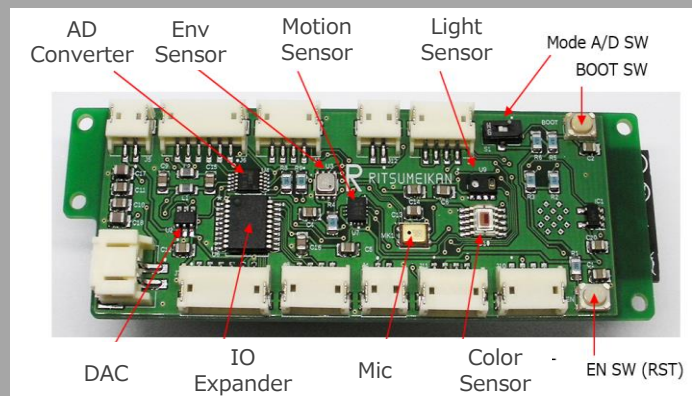
Figure: Detail of architecture



› Documents are available on wiki
[Robot basic architecture based on SSES - Akraino - Akraino Confluence](#)

- › Architecture document
- › Installation document
- › Test document

R-MSM(Ritsumeikan Multi Sensor Module) •Sensor-rich



Robot basic architecture based on SSES Blueprint activities in 2022

- › Enhance current blueprint functionality
 - › Autonomous optimization of Robot Control
 - e.g Parameter optimization of PID control
 1. Store data measured by robot control PC and R-MSM (Robot control result, contact, pressure etc..)
 2. Analyze data in the cloud for better parameters
 3. Feedback parameters to robot control

➔ We will add AI and database components to current blueprint for autonomous optimization.

Welcome participants
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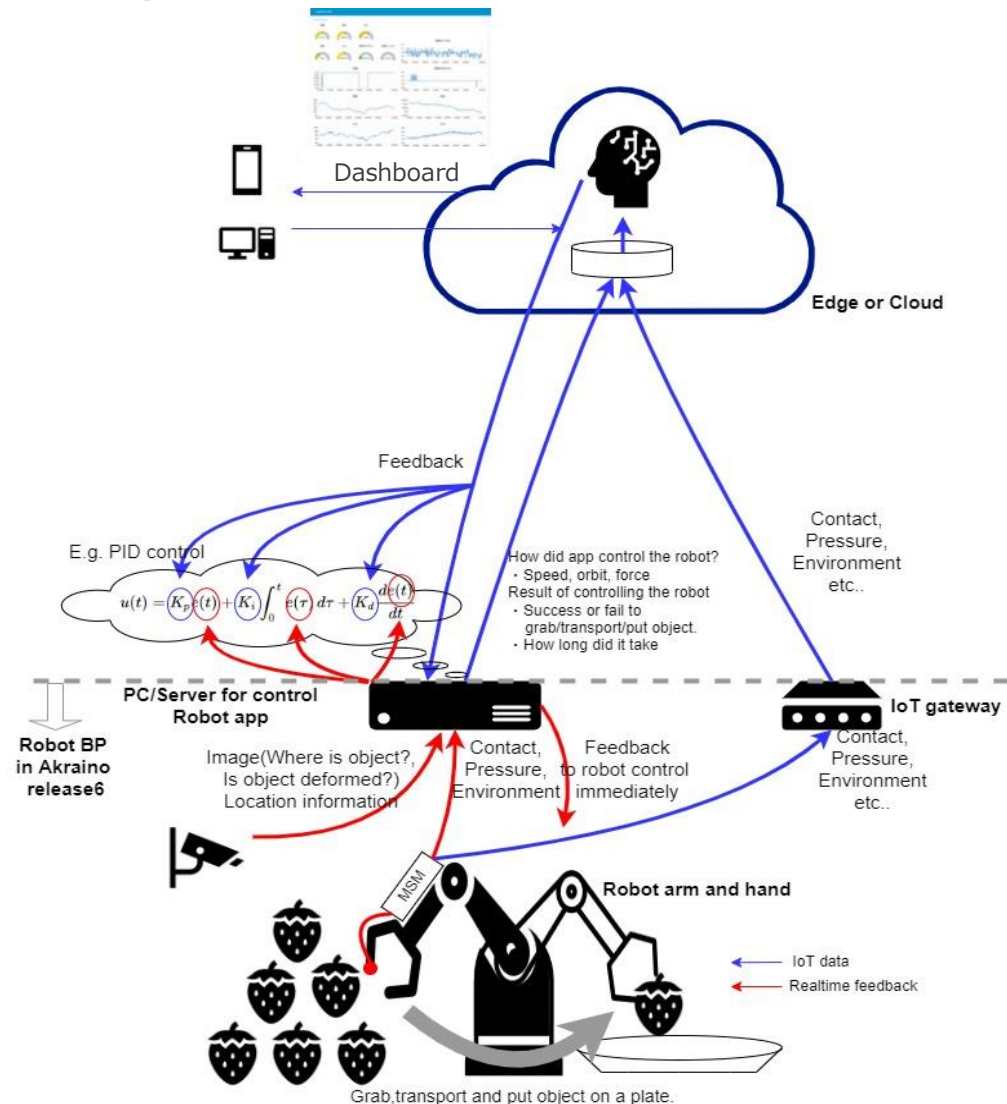


Figure: Enhance Robot basic architecture based on SSES Blueprint

Thanks

