SOBITS efforts in OpenSource for General Purpose Life-Support Robots
— ROSConJP 2024 —

**Choi Laboratory and Hagiwara Laboratory,
Department of Information Processing Systems Science,
Graduate School of Engineering, Soka University of Japan
VALENTIN Keith**

創価大学

Who we are?

Bachelor and graduate students work together, from hardware to software, toward the realization of life support robots in a home environment.

Achievements

・2024 RoboCup Malaysia Open, **Best HRI Award**

・2024 RoboCup JO OPL **1st**, Edu 5th, S-OPL **1st**

・2023 RoboCup France OPL **(1st time parcipation)**

・2023 RoboCup JO OPL **1st**, Edu 3rd, S-OPL **1st**

・2022 RoboCup JO OPL **1st**, Edu 2nd, S-OPL **1st**

・[...] SOBITS has been participating <u>since 2010</u>!

Light of Soka Univ.

SOBITS

2

Part 1: Intro. to Life-Support Robots
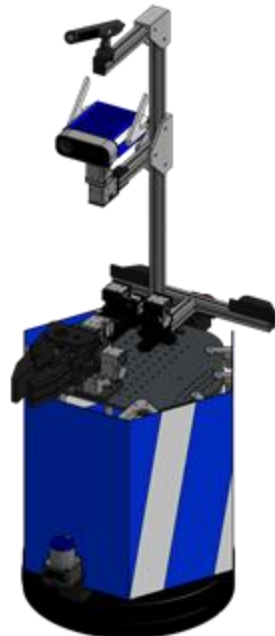
Robot Developing from scratch

Those are our main participants in RoboCup @Home

・ Our robot series are called "**SOBIT …**"

・ "Students driven" **hardware development** and **intelligent system** deployment.

Toyota HSR　　**SOBIT EDU**　　**SOBIT MINI**　　**SOBIT PRO**　　**SOBIT LIGHT**

4

Main development purpose

・Test the capabilities of Kachaka in **RoboCup@Home Education**
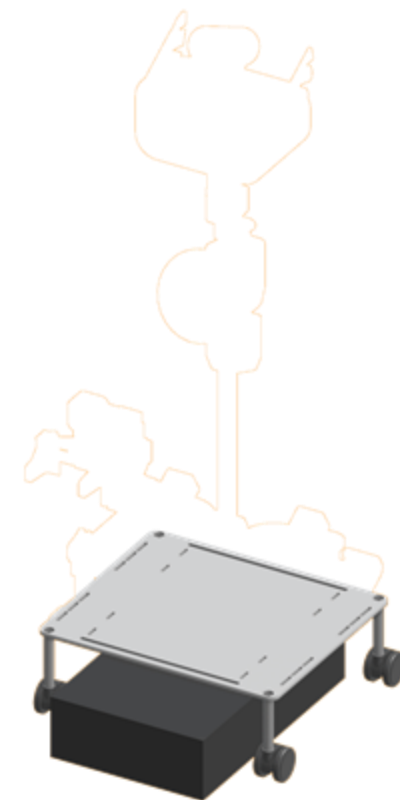
League as a future possible recommended platform

- Share our know-how about customized platforms

- Challenging Tasks where adaptability is required

Characteristics

・Category : Detachable mobile manipulator

・Weight   : Less than 15 kg   →

    Portability   👍

・Size   : 45(W)x38(D)x105(H) cm   →

5

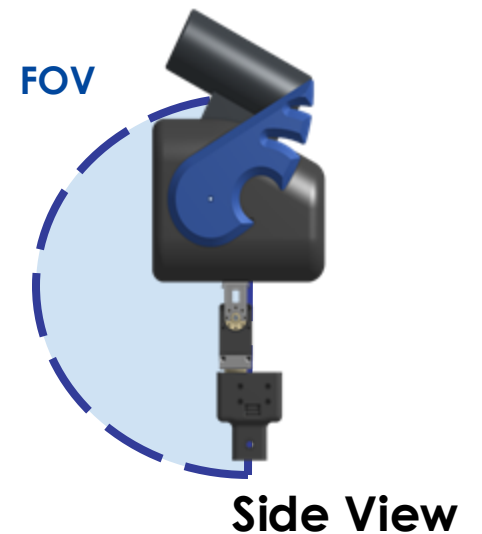**SOBIT LIGHT**

Compact

Head Characteristics

A mechanism that corresponds to the human sense of sight and hearing. Its eyes enhances HRI.
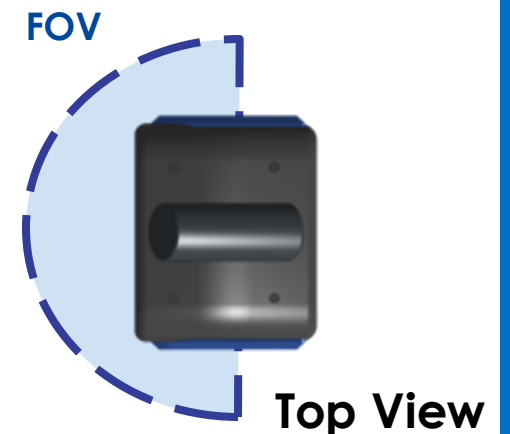
Specifications

- **Mechanism**
  - Pitch-Roll (horizontal-vertical motion)

- **Moving range**
  - 180° for each actuator

- **Sensors**
  - RGB-D camera (Ex.: RealSense)
  - Microphone (Ex.: Directional mic)

Head Structure

FOV

Side View

FOV

Top View

※ RealSense, ORBBEC, ZED and many other cameras also offers ROS support and depth quality

創価大学

Manipulator Characteristics

A mechanical part that operates objects. Accurate detection is required.

Specifications

・ **Mechanism**

- 7 DoF＋Parallel Gripper

・ **Grasping**

- 1Kg payload, 20 cm-wide objects

- From floor to 50 cm-height range

・ **Sensor**

- RGB-D camera (Ex.:Realsense D405)

Manipulator Structure

Front View　　**Side View**

※ As RealSense L515 was discontinued, RealSense D405 is being used currently.

Mobile Mechanism Characteristics

The robot attach to the body based on the required task

Specifications

・ **Mechanism**

　- Two wheeled differential drive robot

・ **Sensors**

　- 2D LiDAR, 2 RGB cameras, 1 ToF,

　　1 furniture-detection sensor, 4 mics.
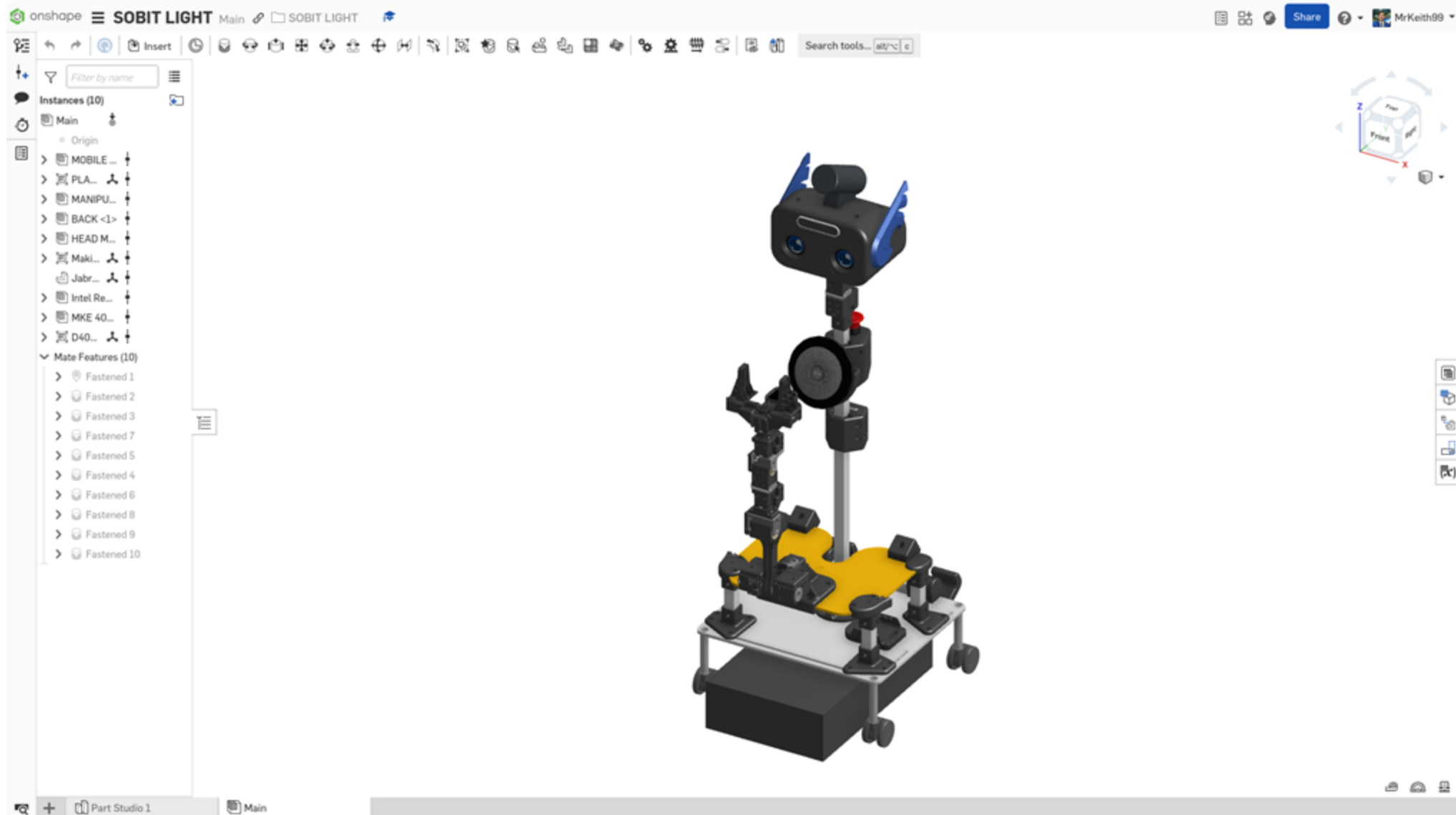
・ **Other**

　- 0.5 m/s linear speed

　- 20 kg payload

**Mobile Mechanism
(Kachaka)**

※ **A combination of API requests and ROS 2 data transmission allows the robot to be controlled**

9

Autonomous Robotics Competition

· RoboCup@Home allows researchers and engineers.

  to understand/improve the current robotics technology.

· Robot skills are tested in real world scenario with common house-works.

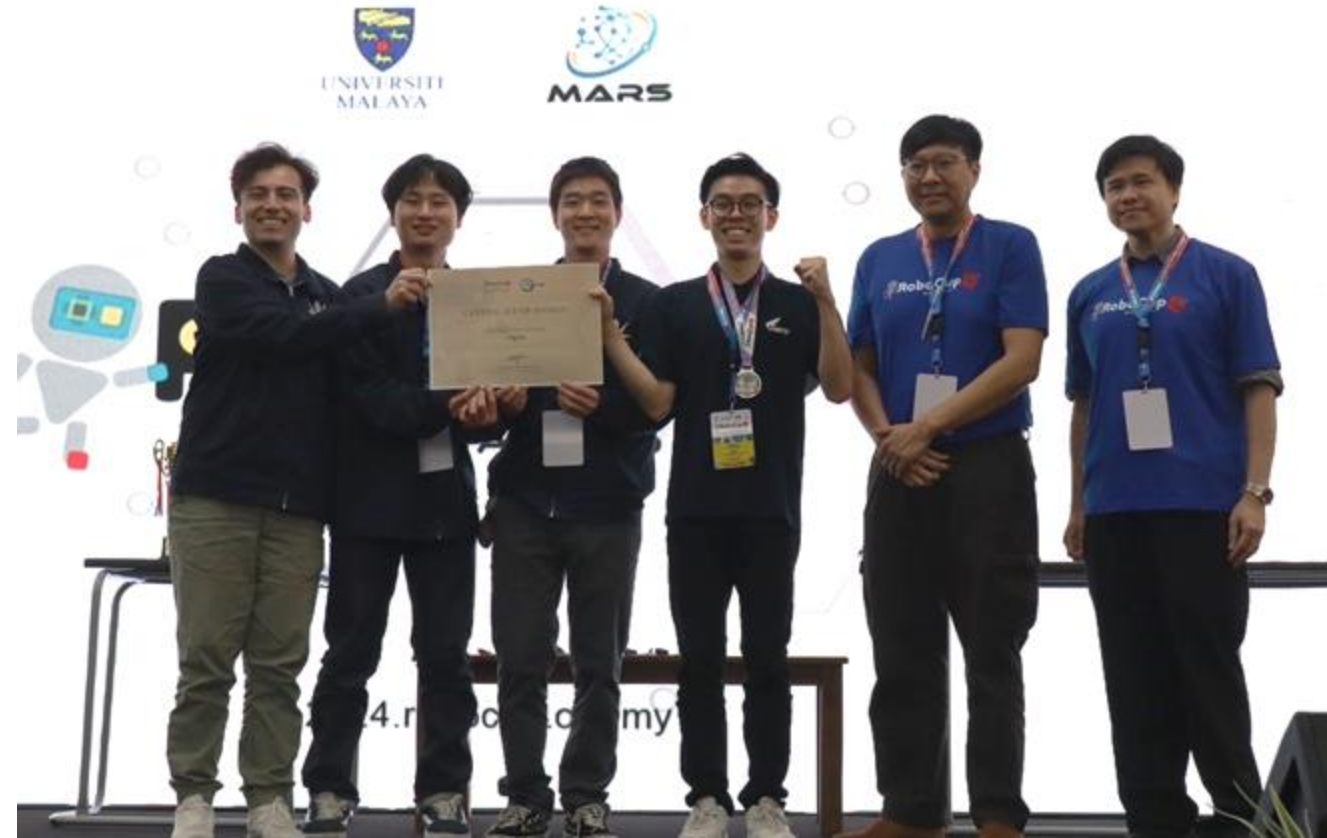· Opportunity to broaden your network and enhance your skills.

- **Date**   : April or May 2025
- **Location** : Shiga, Japan
- **Contact**   : Discord [link]

- **Date**   : May 2025
- **Location** : Perlis, Malaysia
- **Contact**   : Discord [link]

11

※ If you wish to participate in the next RoboCup, we can help you with the language barrier! Please, let us know.

創価大学

RoboCup JapanOpen 2024
(May)

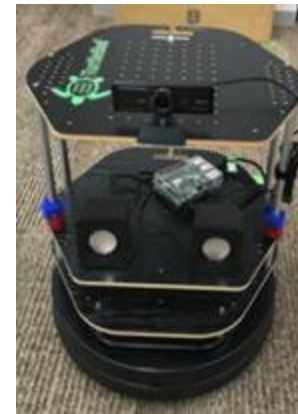**RoboCup Malaysia Open 2024**
(September)

Education Using a Programming Learning System for Beginners

We are in charge of all the classes for
Introduction to Project Studies

Robotics class where students with no previous knowledge in programming are able to complete an automated task with teamwork and motivation!

Block-based programing

Project Studies class final evaluation

Do you need to know more about us?

Let's create a wider robotics community together!!

Please, contact us if you want to know more about robotics.

👆 **SOBITS GitHub** 👆

We are also sharing our knowledge! Stay tuned for any updates.

Discover your potential

SOKA University
50th anniversary
Soka University