SONY

Isaac×ROS aibo シミュレーション環境

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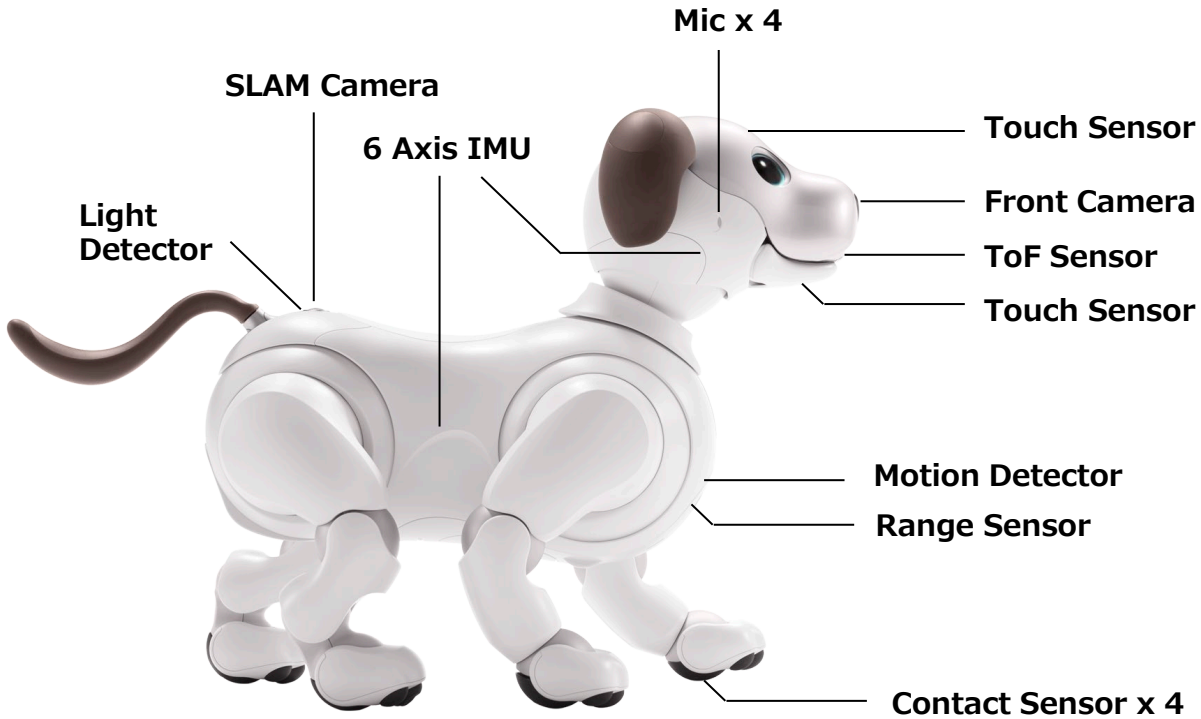
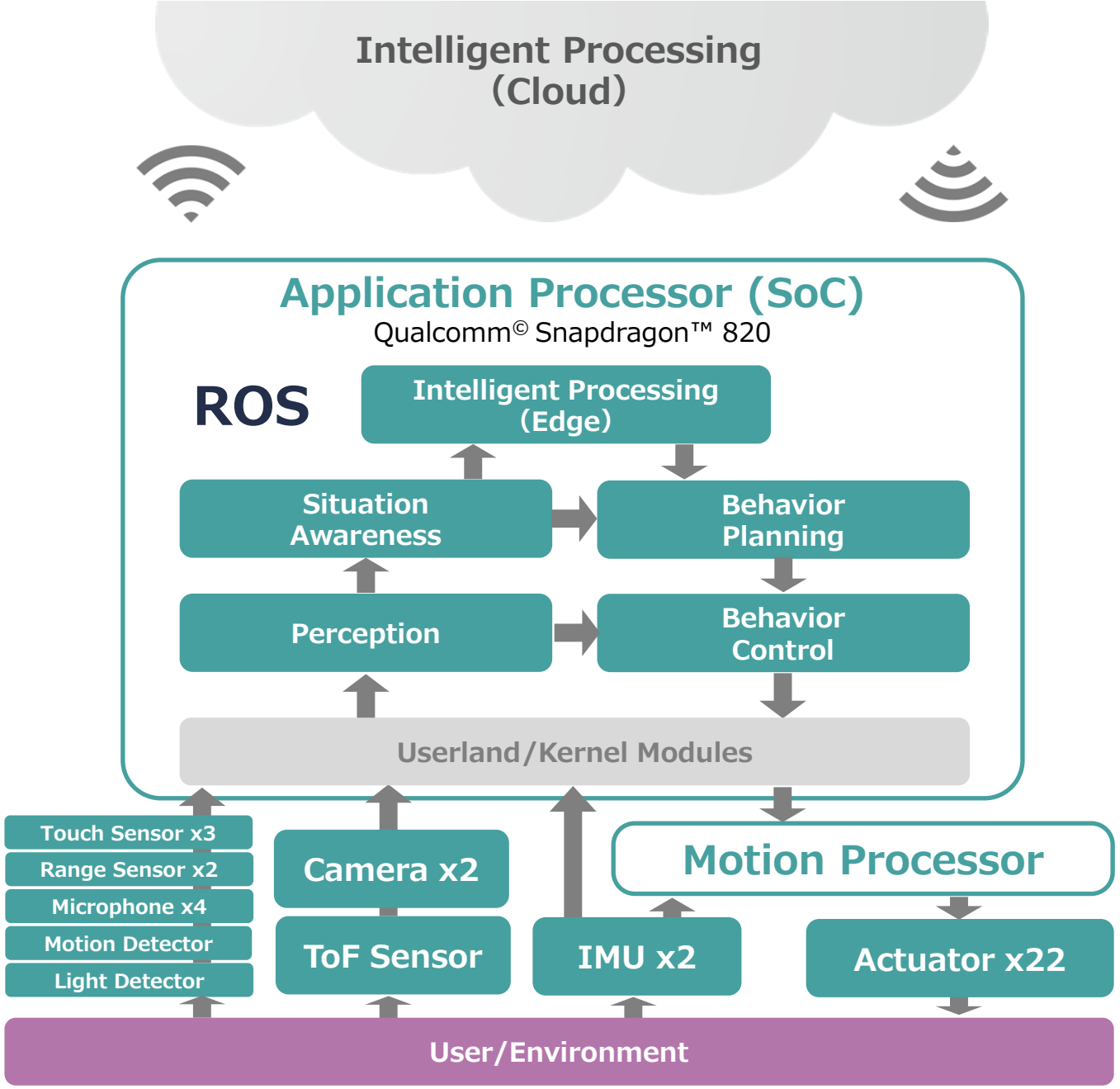
aibo

- ✓ 22 DoF
  Legs (12), Neck, Head (3), Mouth, Ear (2), Waist, Tail (2)

- ✓ Many Sensors, Cameras and Microphones

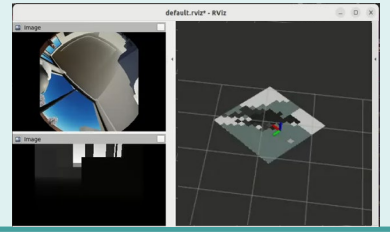




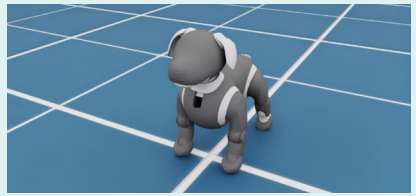
aibo

Development Workflow with Sim

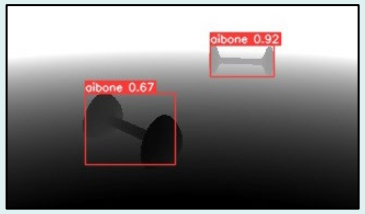
Intelligent Planning
➡Visualize using Rviz



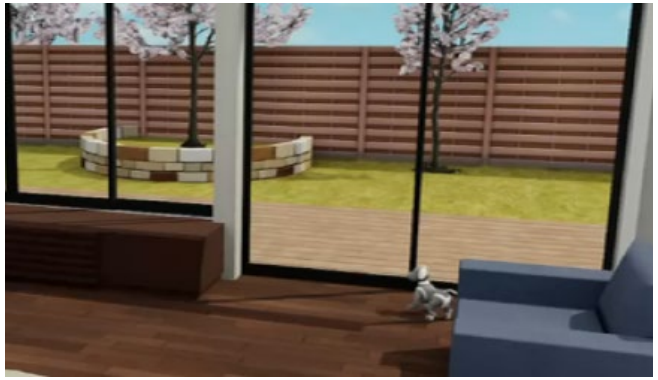
Motion Control
➡Test on Physics Sim



Sensing・Perception
➡Data Collection on Sim



Integration Test on Sim

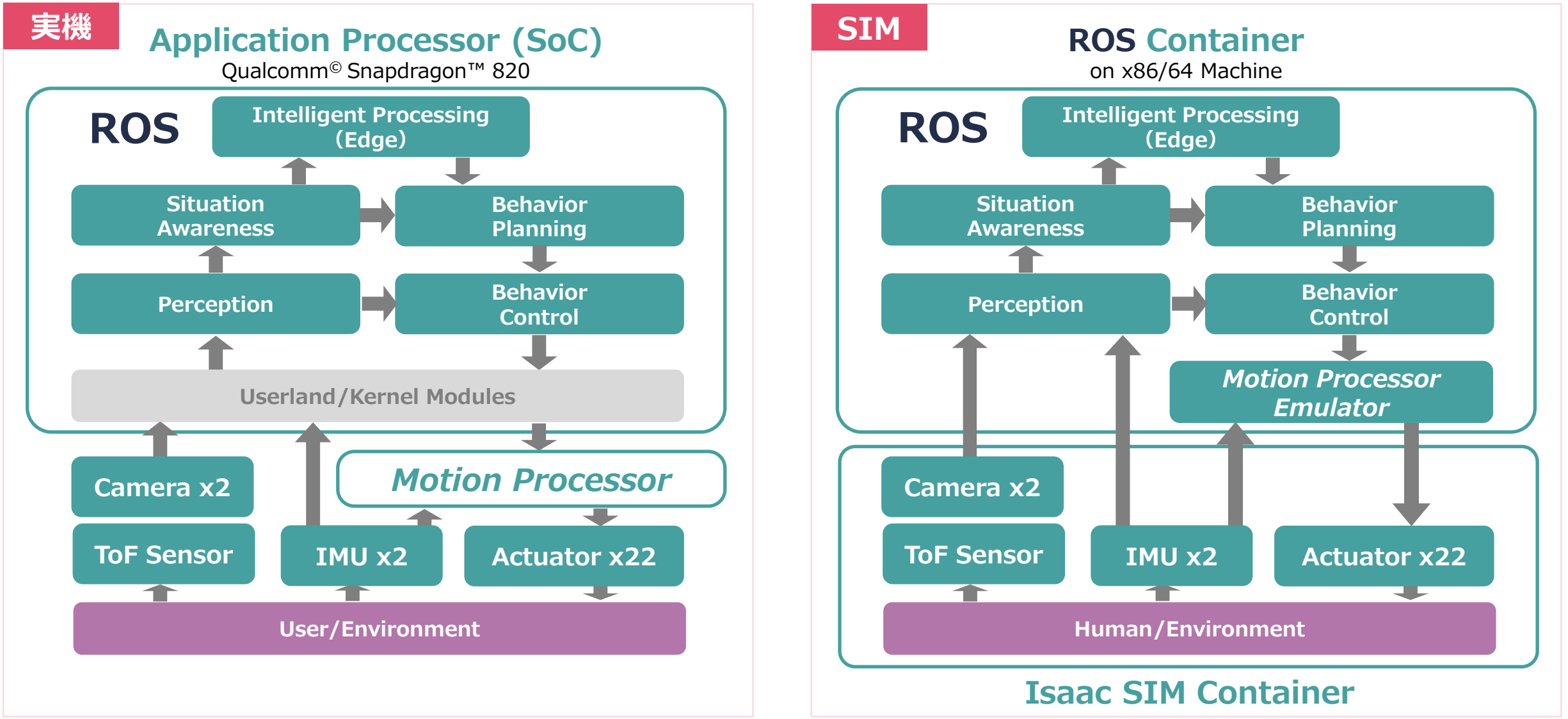


Integration Test using 実機

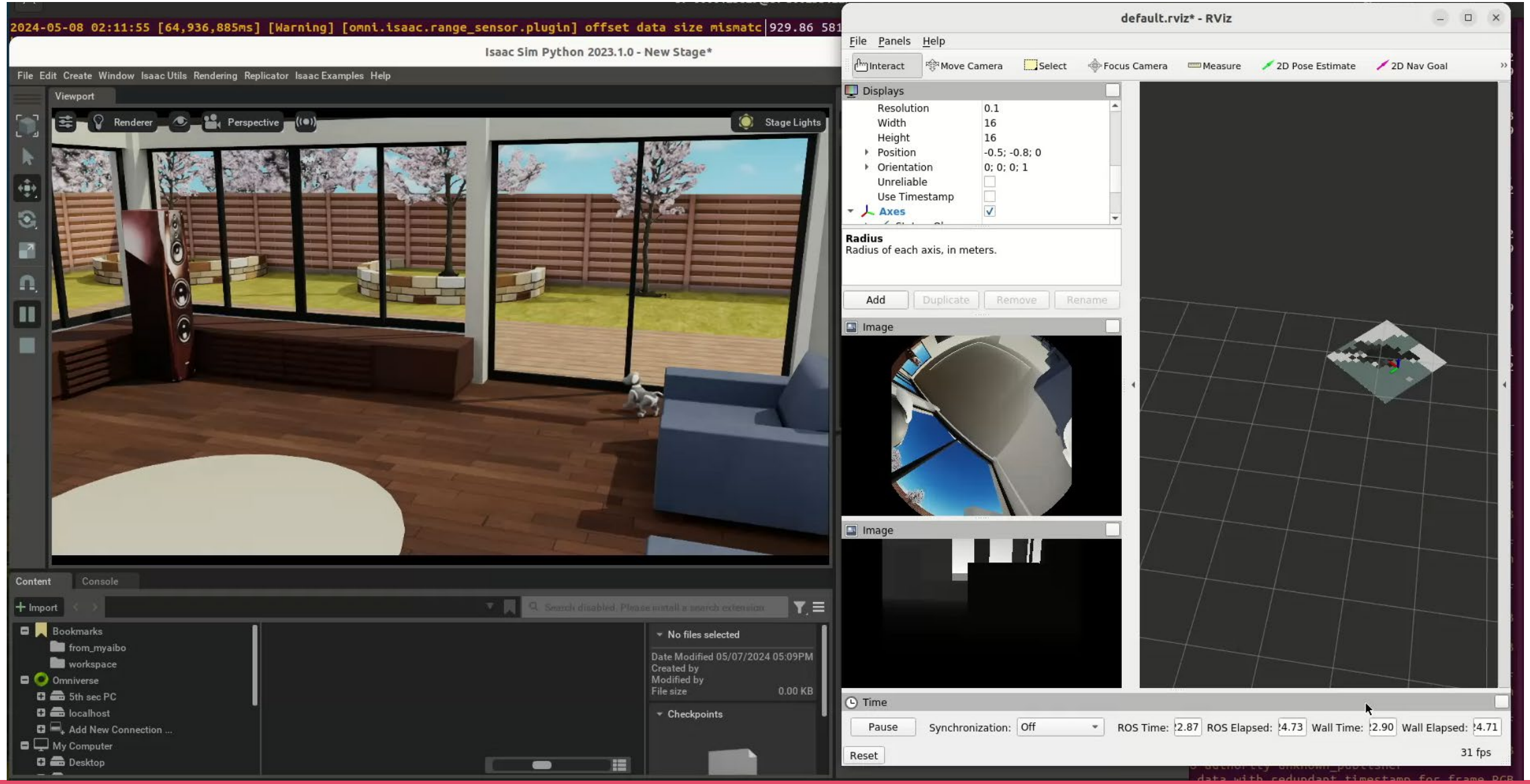
NVIDIA Isaac Sim

👍Realtime Physics Simulation using GPU
👍Photorealistic Rendering with Ray Tracing

aibo Simulator

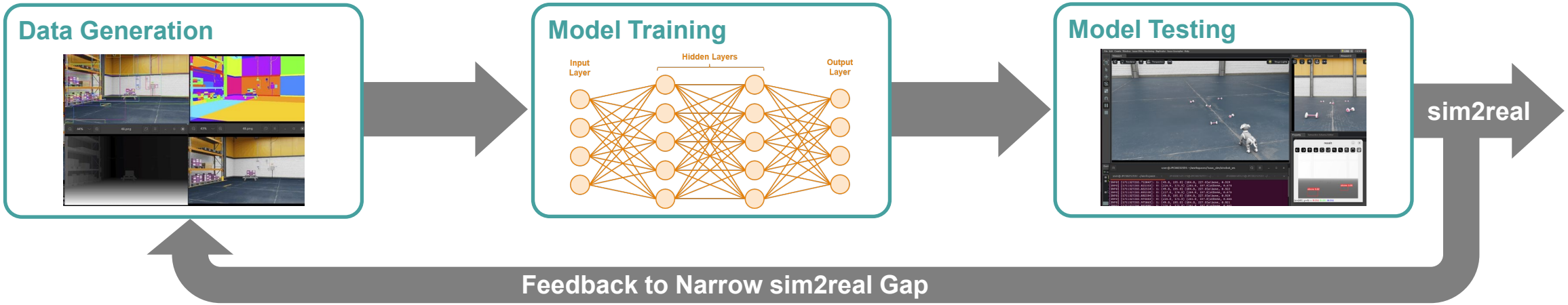


aibo Simulator

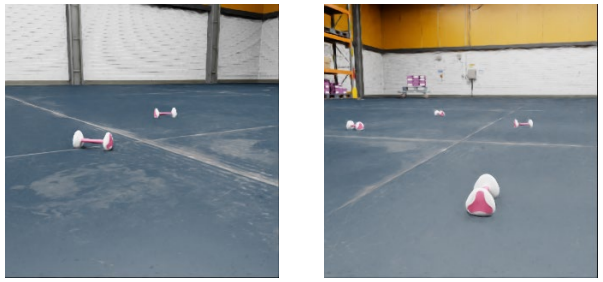


Recognizer Training with Sim

Recognizer Training with Sim

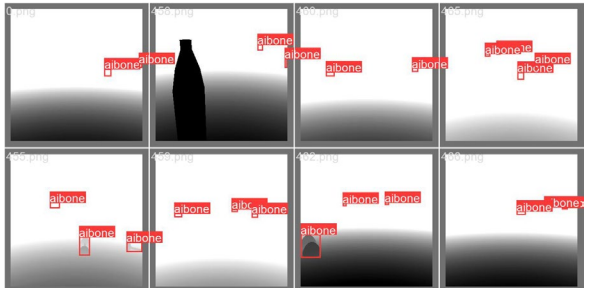


Data without Distractors

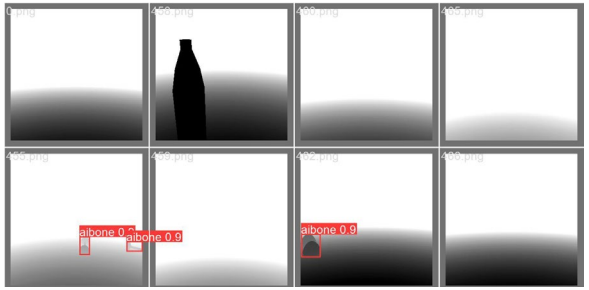


Data with Distractors

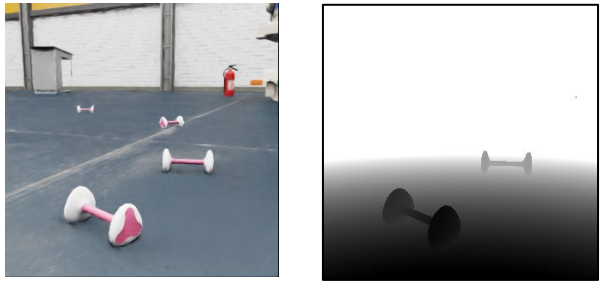
Valid Data Labels



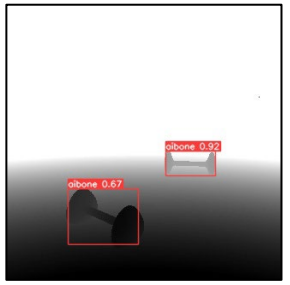
Valid Data Predictions



Realtime ROS Image from Isaac Sim

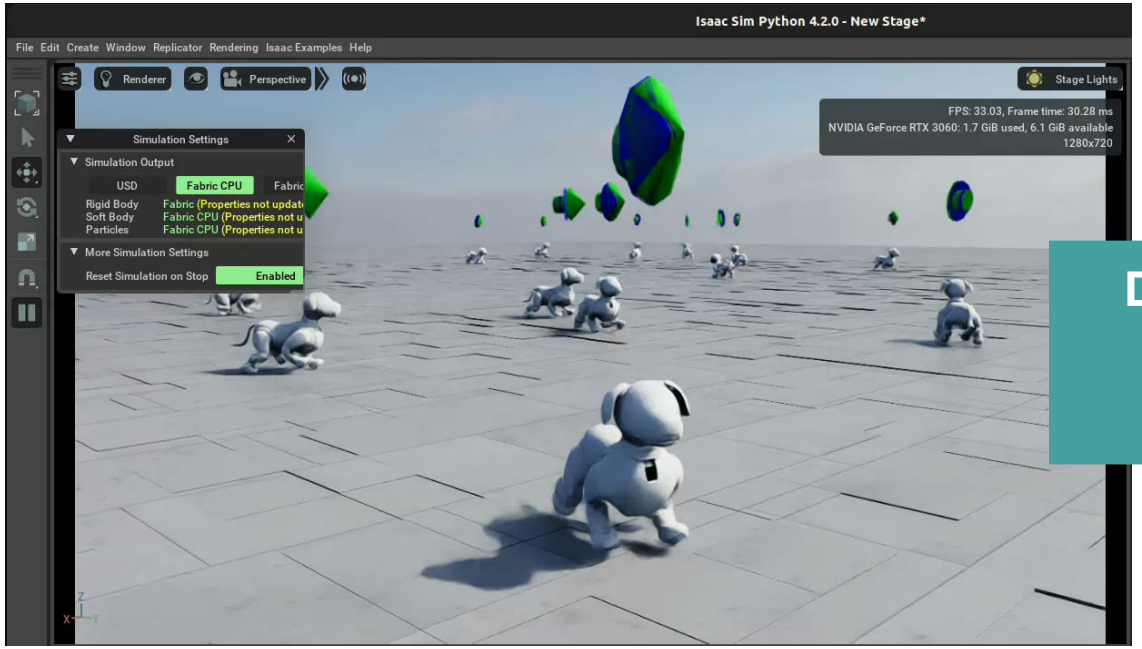


Realtime Inference Result



Motion Reinforcement Learning

Reinforcement Learning on Isaac Lab



4096 aibo robots are learning to walk in Isaac Lab.

Deploy to 実機

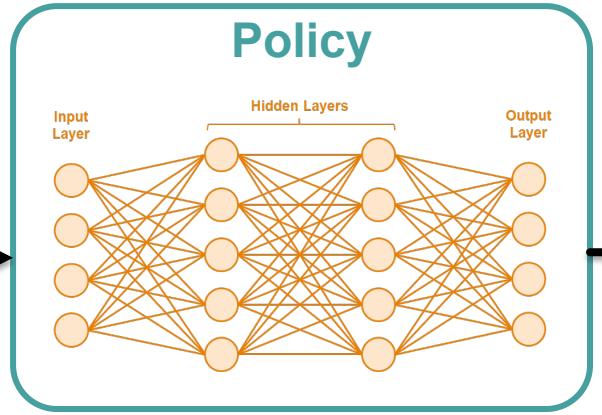
Inference on 実機

Policies trained in Isaac Lab can be directly deployed on the real robot, without any additional tuning.

Motion Reinforcement Learning

Observation

- Joint Encoder
- IMU Sensor
- Foot Contact Switch



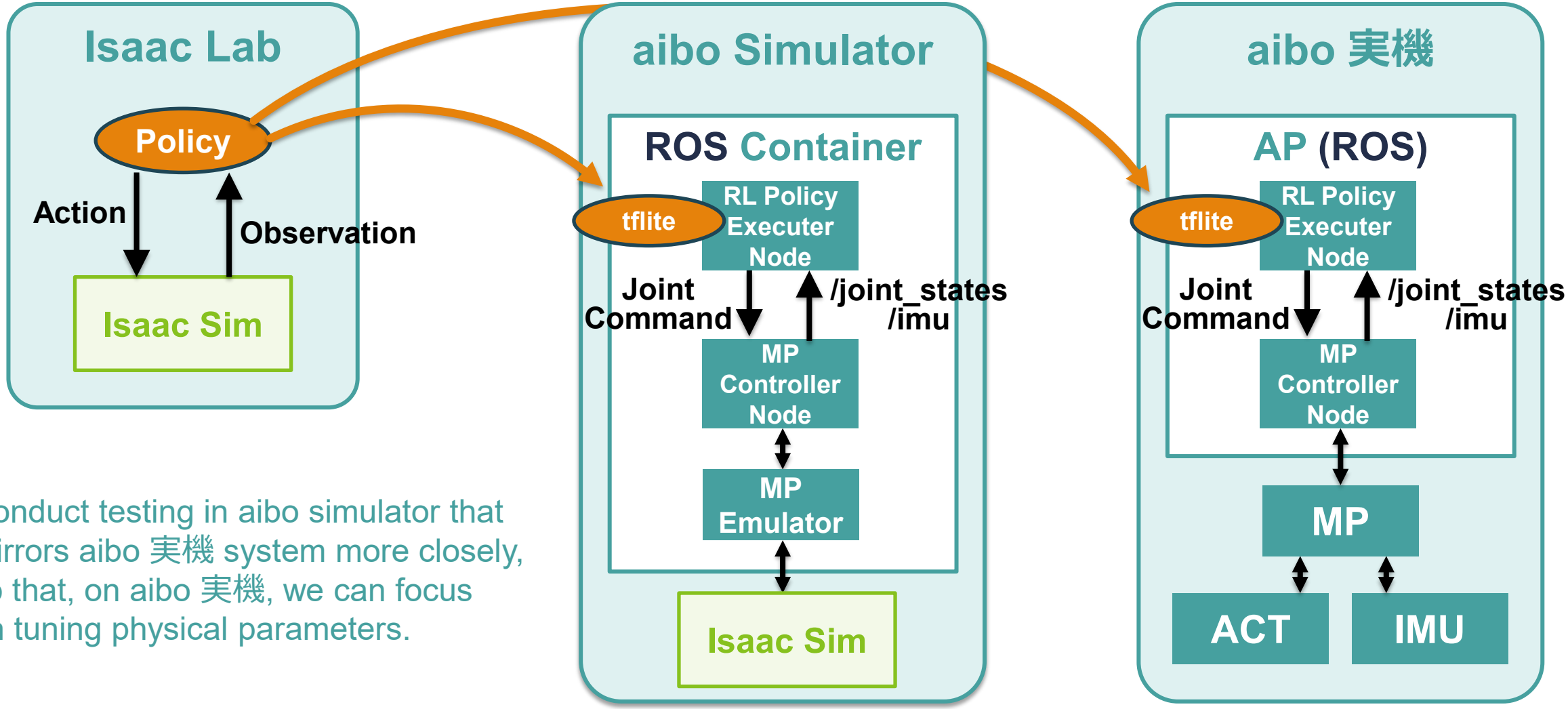
Action

- Target Joint Position
- Target Joint PD Gain[1]

[1] R. Watanabe et al., "Learning Quiet Walking for a Small Home Robot," in *Proc. of ICRA 2025*, 2025.

Motion Reinforcement Learning

Motion Reinforcement Learning



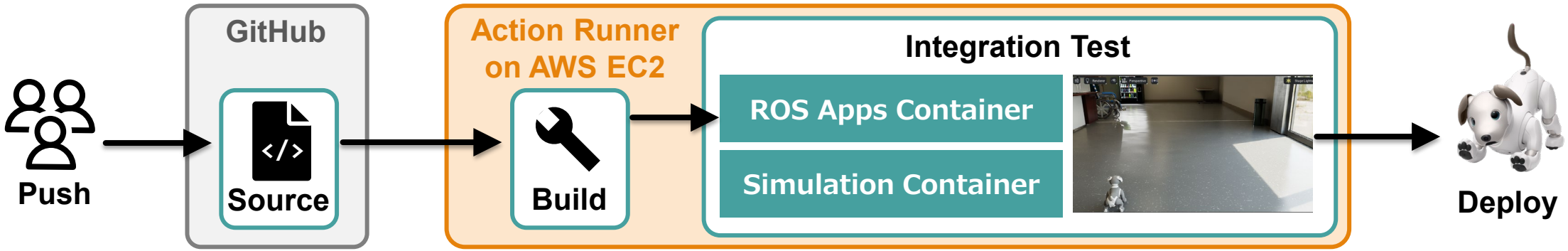
Conduct testing in aibo simulator that mirrors aibo 実機 system more closely, so that, on aibo 実機, we can focus on tuning physical parameters.

Conclusion

- Thanks to high-quality rendering and physics simulation, Isaac Sim enables end-to-end simulation, from perception through motion control.

- Isaac Sim is highly compatible with Python and ROS,
  and is well-suited for simulation of existing ROS robot applications.

- With support for container environments, it integrates well with cloud computing and CI/CD pipelines.



Let’s explore what’s next with aibo.

Bring your research or ideas to life with aibo.

SONY