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EXCEED YOUR VISION

Making a "Skilled" Robot

[EPIC – Photonics for Robotics Session]

SEIKO EPSON CORPORATION

2021/02/01

TORONTO, CANADA (In Summer…)

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SEIKO EPSON OVERVIEW

EPSON
EXCEED YOUR VISION

Based in Japan, Seiko Epson has about 80,000 employees world-wide, producing numerous innovative consumer and commercial products.

INKJET INNOVATION

VISUAL INNOVATION

ROBOTICS INNOVATION

Force sensor

6-axis robots

SCARA robots

Four areas of innovation

| Inkjet innovation | Visual innovation | Wearables innovation | Robotics innovation |

Business domains

Printing | Visual communications | Wearables | Robotics | Micro-devices | New

Business infrastructure

Human Resources
Technology
Manufacturing
Sales & Support
Environment

Inkjet innovation
Refine Micro Piezo technology, and expand into high-productivity segments. Improve environmental performance and create a sustainable printing ecosystem.

Visual innovation
Refine original microdisplay and projection technologies, and create outstanding visual experiences and a natural visual communications environment for every aspect of business and lifestyles.

Wearables innovation
Leverage our watchmaking heritage, refine leading technology, and offer a sense of status and fashion
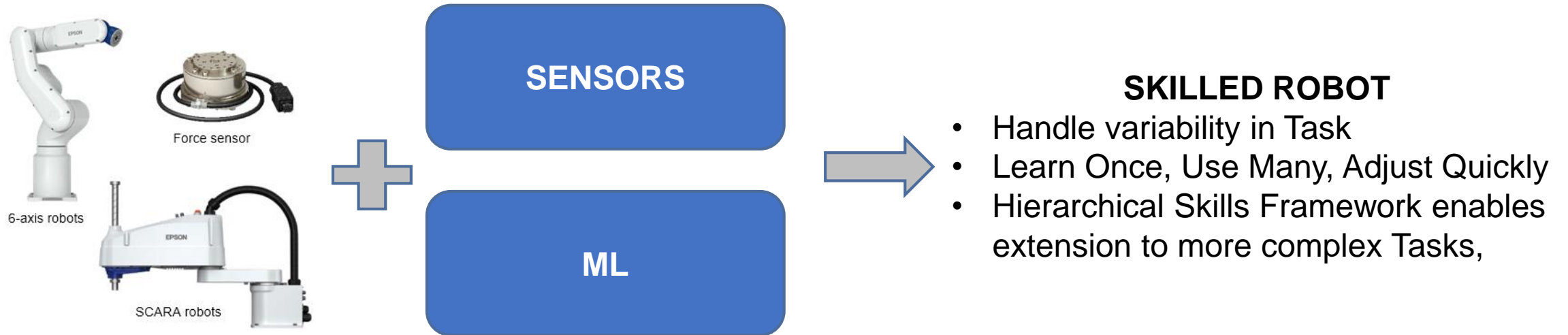
Robotics innovation
Combine our core technologies with sensing and smart technologies in manufacturing, expand applications, and create a future in which robots support people in a wide variety of situations.

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R&D IN TORONTO

Developing Software core technologies to support Epson's next generation of products.

In robotics, use sensors + machine learning to enable Robot to learn "skills" which enable it to handle desired tasks. A skilled Robot should be able to handle common instances of a task without further training – and learn less common task variants quickly.
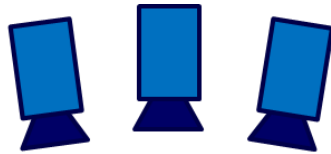
Force sensor

6-axis robots

SCARA robots

SENSORS

ML

SKILLED ROBOT
- Handle variability in Task
- Learn Once, Use Many, Adjust Quickly
- Hierarchical Skills Framework enables extension to more complex Tasks,

Fast, Flexible and Accurate SENSORS are KEY

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Currently use a variety of cameras – RGB, RGB-D – on the robot arm, or statically mounted. Variety of potential conditions leads to high bar of flexibility and control required.

FIXED SENSORS (1 or More..)

MOBILE SENSOR

OBJECTS VIEWED FROM DIFFERENT ANGLES

OBJECTS COULD BE DIFFERENT SIZE AND MATERIALS

CONTROL
- Multiple RGB Light Sources
- Full control of projected pattern

ACCURACY
- 3D Shape preservation – smoothness, 2D/3D Edge continuity
- Fine Detail preservation – holes, complex shape

SPEED
- Onboard H/W support for ML policies

INTERFACE
- Auto-Tune based on Target Features

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