FingerVision

Unlocking the full potential of humans working in tandem with robots to elicit transformative changes in society

FingerVision: Robotics startup with core technologies in tactile sensors and robotic hands

CEO Yuki Nono

- Former BCG consultant: engaged in transformation, global go-to-market strategy, M&A, and organizational design across industrial goods, technology, and digital sectors.
- Previous roles: Digital system development (NTT DATA) and business concept/marketing development (DENTSU CONSULTING).
- Former CPA: passed the exam in 2011.

CTO Akihiko Yamaguchi, PhD

- Developed the vision-based tactile sensor "FingerVision" during research at Carnegie Mellon University.
- Possesses deep expertise: Covers machine learning Reinforcement learning, image processing, deep learning motion planning, robot control, tactile sensing
- Education: Bachelor’s degree in Electrical and Electronic Engineering from Kyoto University.

Solution: Vision-based Tactile Sensors Integrated Robot Hand

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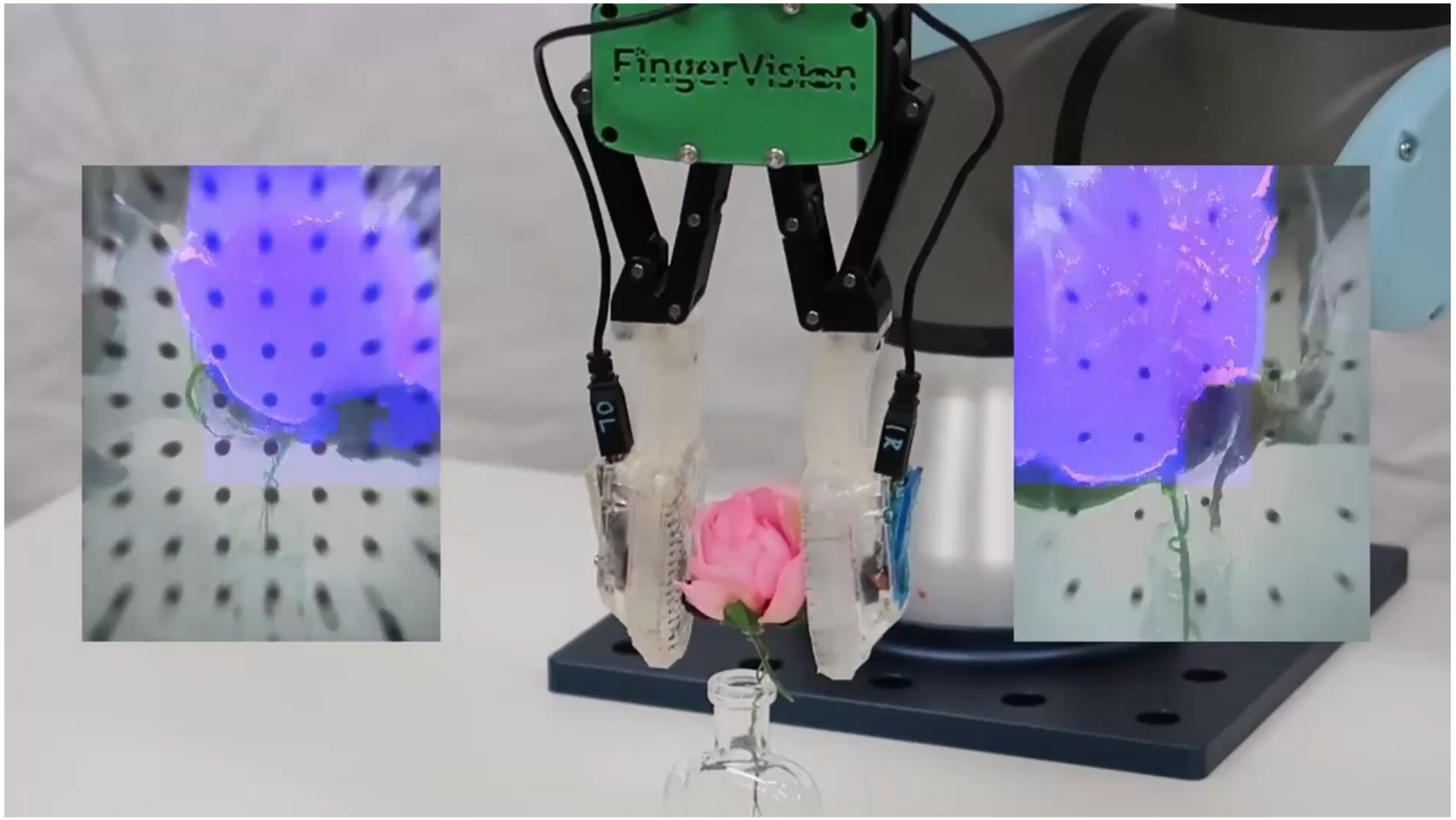
Replicating sense of touch (force, slip, stiffness, etc.) through image processing



https://www.youtube.com/watch?v=6SbpfN5ed38

Multi-functional yet robust and inexpensive = Highly practical

Tactile Sensors Integrated Robot Hand

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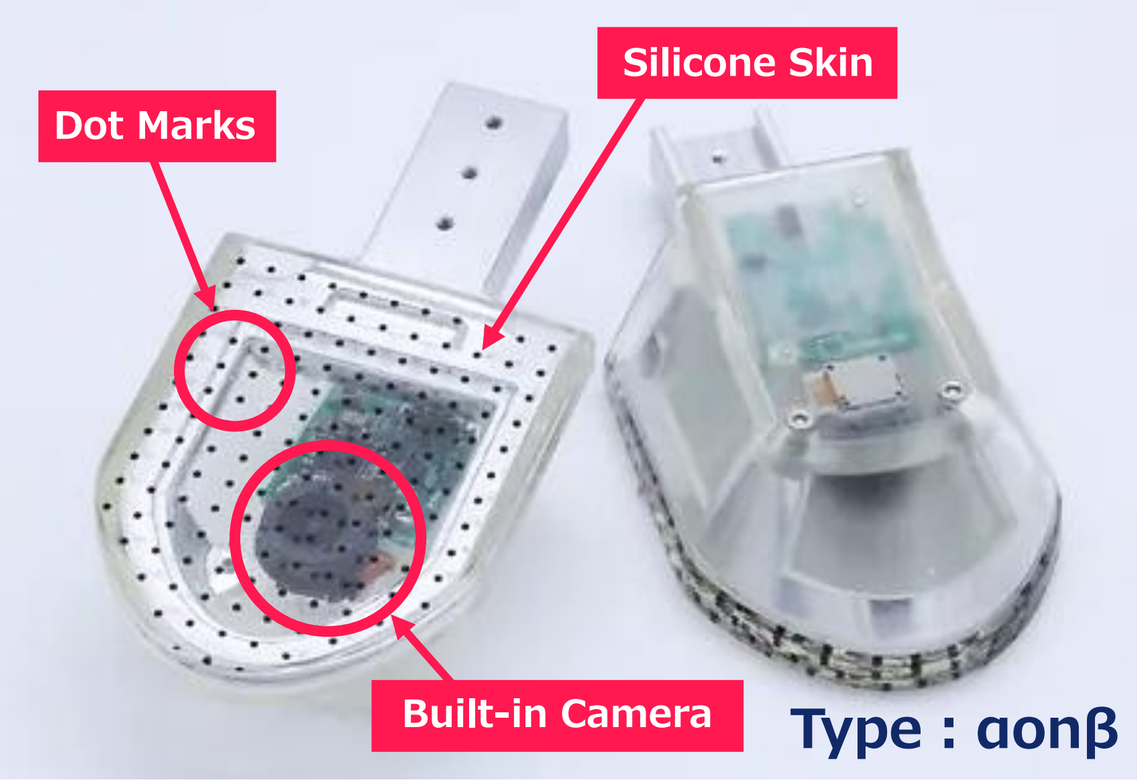
Vision-Based Tactile Sensors Integrated Robot Hand

The robot hand utilized built-in camera image processing (**vision**)
to simulate human **tactile** sensation.



Feature ①:

Slip Detection

- Detects object using its built-in camera
- Monitors changes in the object's position
- Identifies the changes as "slippage"
- The hand automatically closes slightly to re-secure its grip

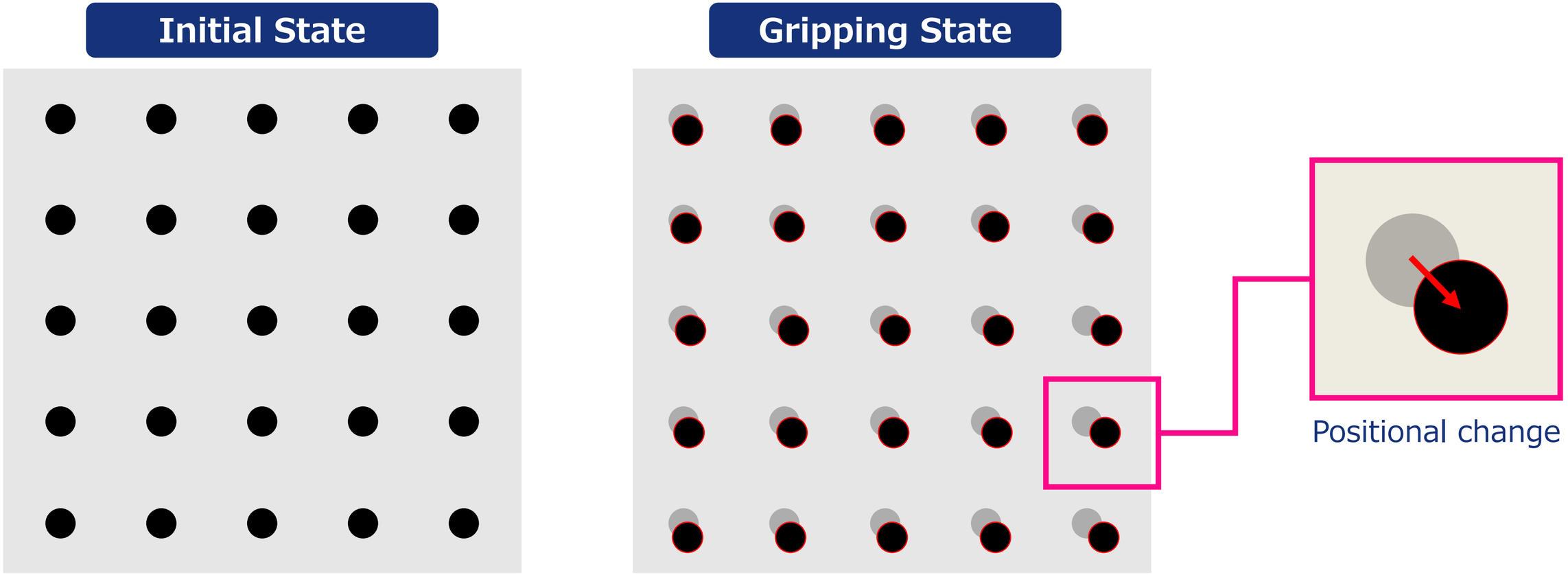
Feature ②:

Force Detection

- Detects the dot marks using its built-in camera
- When the skin deforms, the dots shifts
- Identifies the amount of displacement as distribution of force
- Quantifies the position, direction, and intensity of the applied force

Force Detection

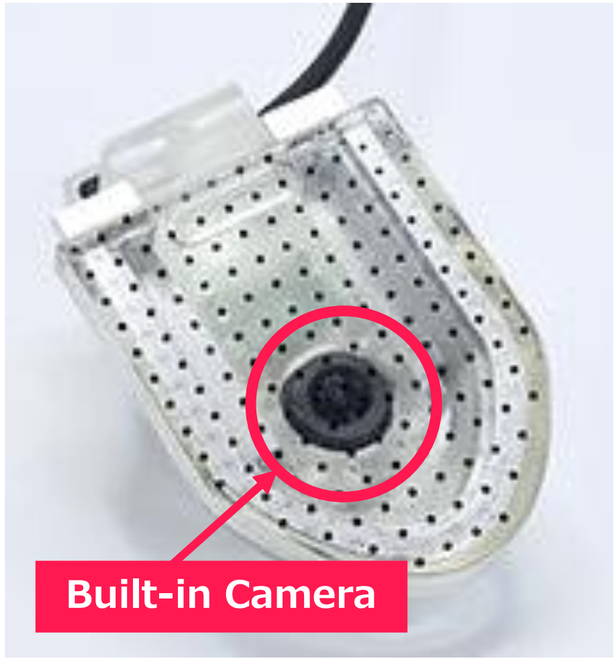
The system recognized the position of the black dot markers.
From the amount of their movement, direction, and magnitude, the system estimates the distribution of force.

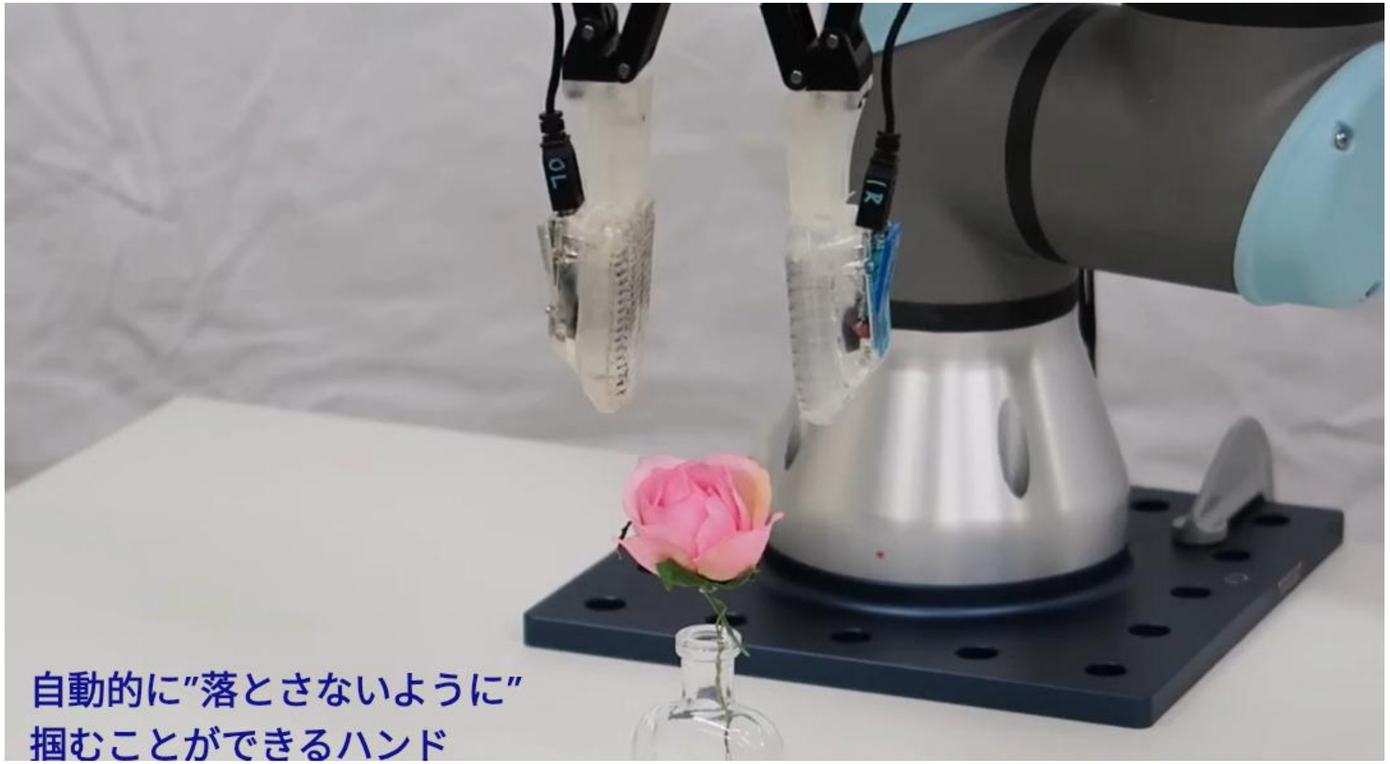


Tactile Sensors Integrated Robot Hand

Slip Detection

By recognizing workpieces using color information from its built-in camera, our system detects any positional misalignment.
This allows for minute adjustments to the gripping force, enabling flexible grasping with the bare minimum force required to prevent slipping.

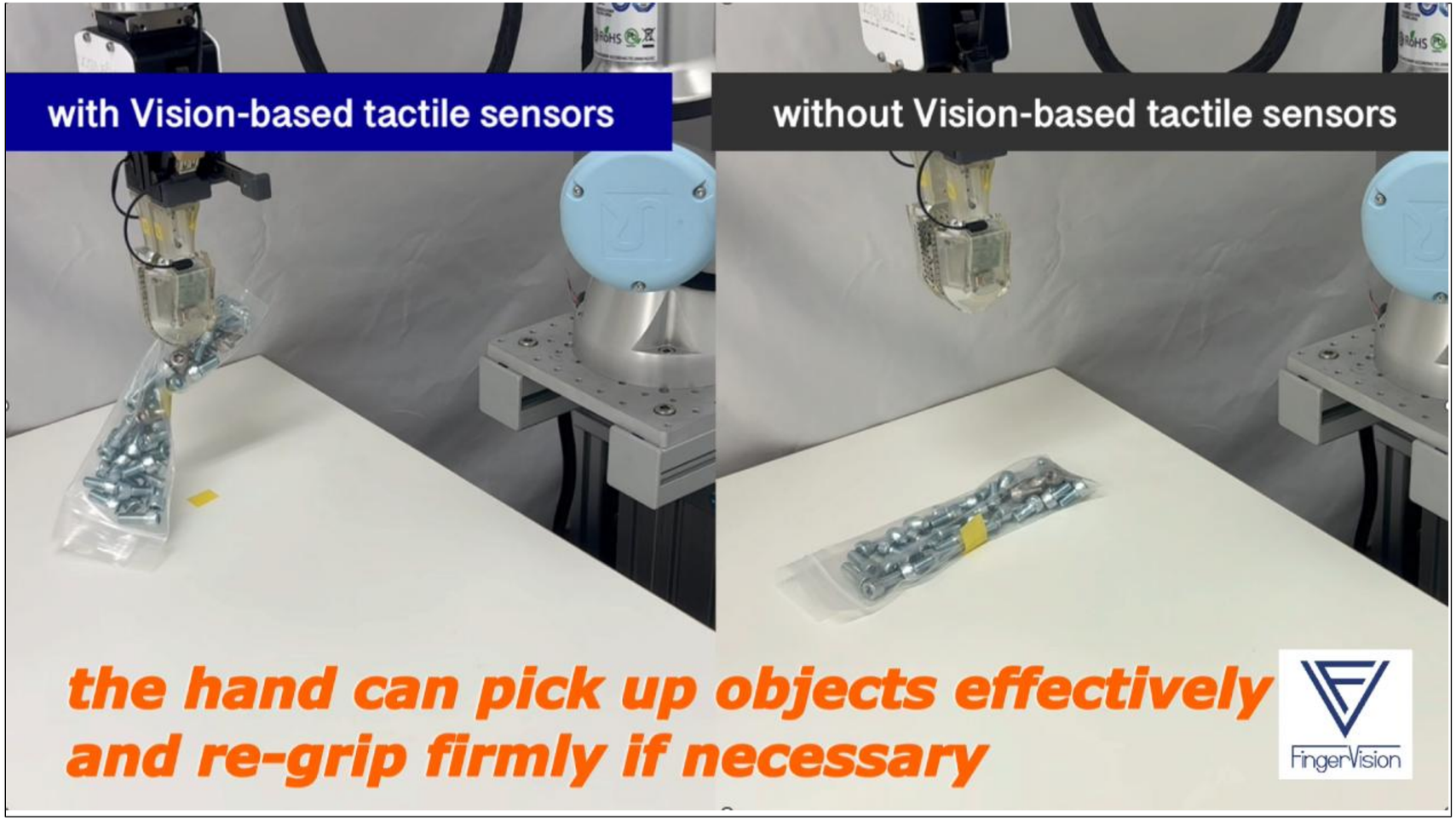




Examples of Smart Handing

https://www.youtube.com/watch?v=rXMTu7NKOIs

- Dealing with uneven load
- Handling irregular brittle workpiece
- Handling soft, smooth surface (breads)
- Handling objects in the packaging film
- Grasping the edges of a dress shirt
- Picking cables
- Picking business cards
- Picking thin glass



Many Sectors are in need of Smart Handling

FingerVision making the impossible possible across industries.

Piece picking

Wide variety of items

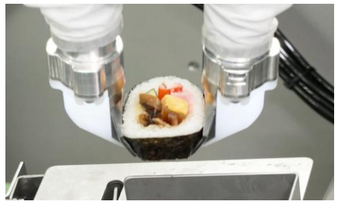


No fixed shape or size, making universal handling difficult

Pick-and-place

Soft and irregular objects

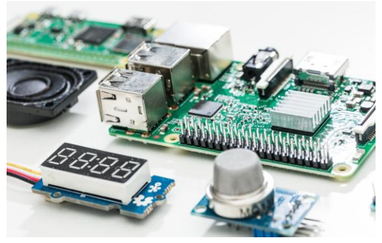
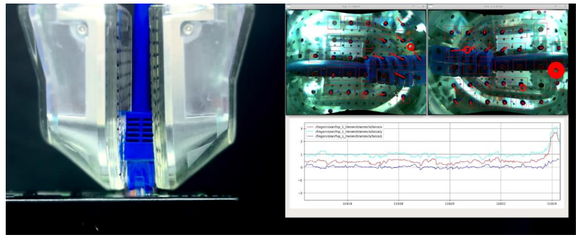




Too much force breaks them, too little force drops them. Requires extremely delicate balance to handle properly.

Assembly & Insertion

Small components (connectors, cables)

The position cannot be fixed depending on the orientation of the components. Completion of the task cannot be visually confirmed.

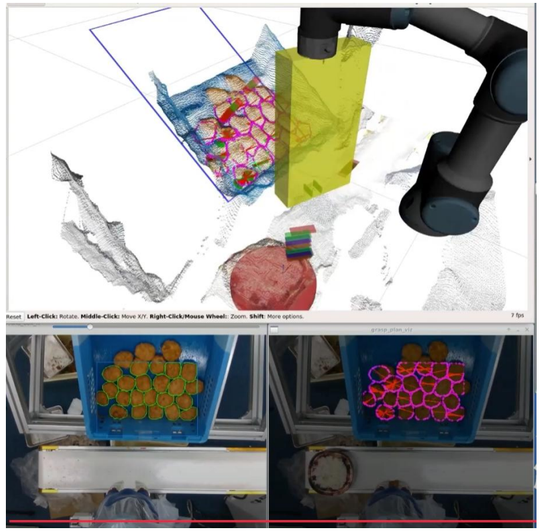
Pick-and-wash

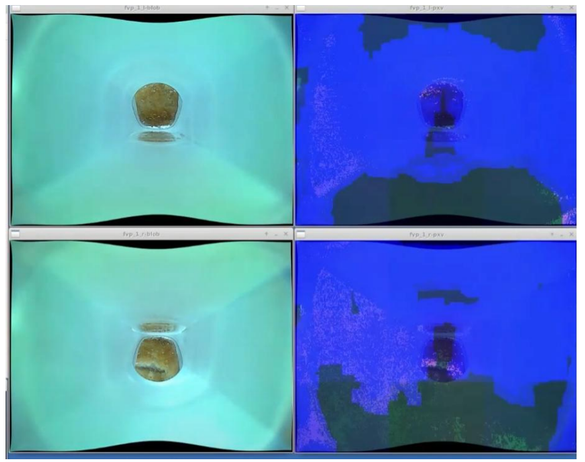
Slippery, diverse items (dishes)

Generic handling is challenging. Items are slippery and visibility is poor.


Assorted side dishes robotic system

https://youtu.be/n41J_ckyq7Y?si=Hh60G8BzZcH0jW2y



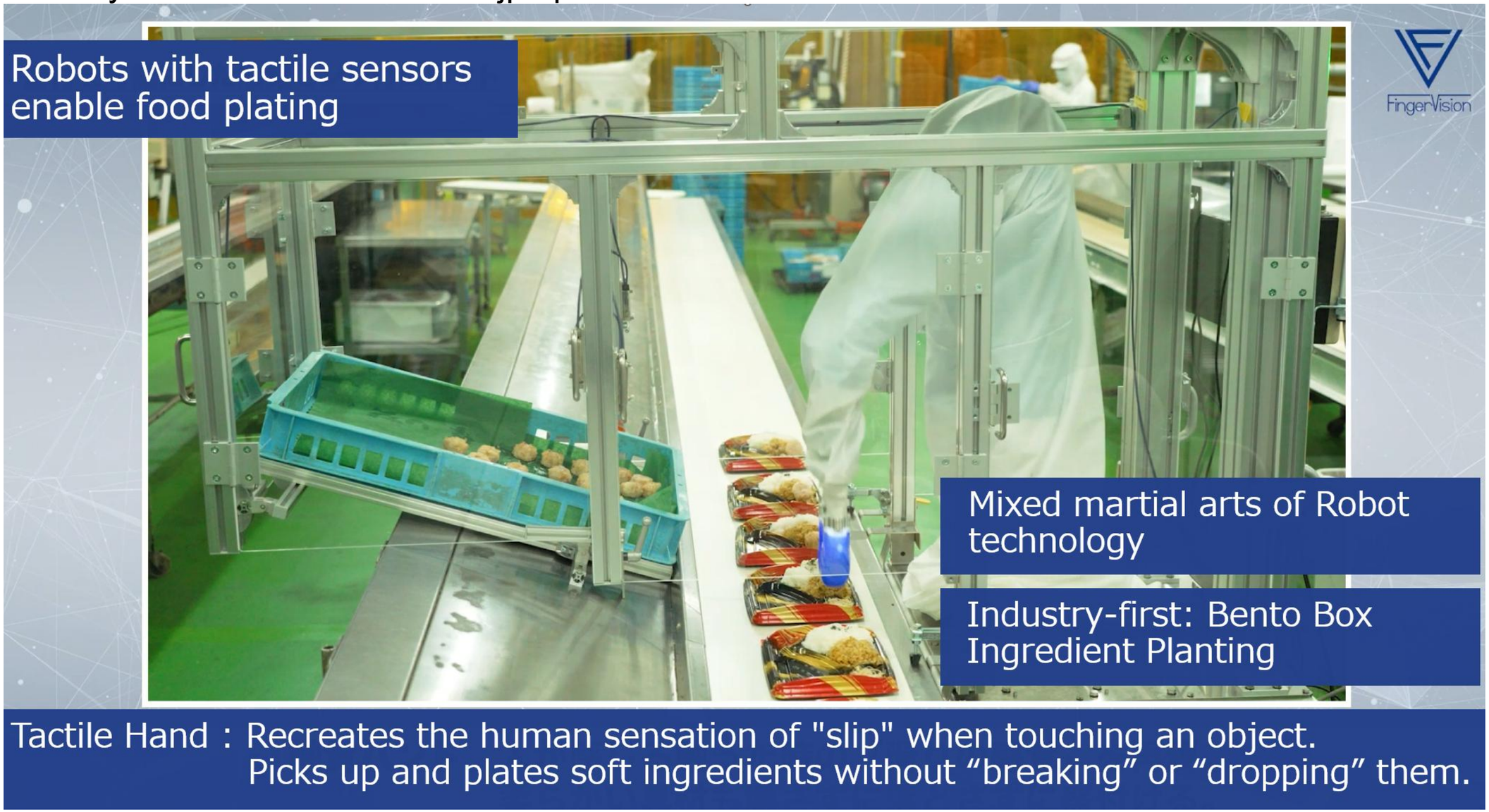


Tactile Hand:
Recreates the human sensation of "slip" when touching an object.
Picks up and plates soft ingredients without “breaking” or “dropping” them.

Based on the ingredient's position identified by the camera, the system detects tactile 'slip' sensations to achieve a delicate grip without dropping the object.

Side Dish Robot at Hirai

https://www.youtube.com/watch?v=7SjpMpa5W30



Sushi Bento With Side Integrated Robot at Home Delica

https://youtu.be/fOnU69HKQNU?si=kEC0FMfS5G3CIYjV

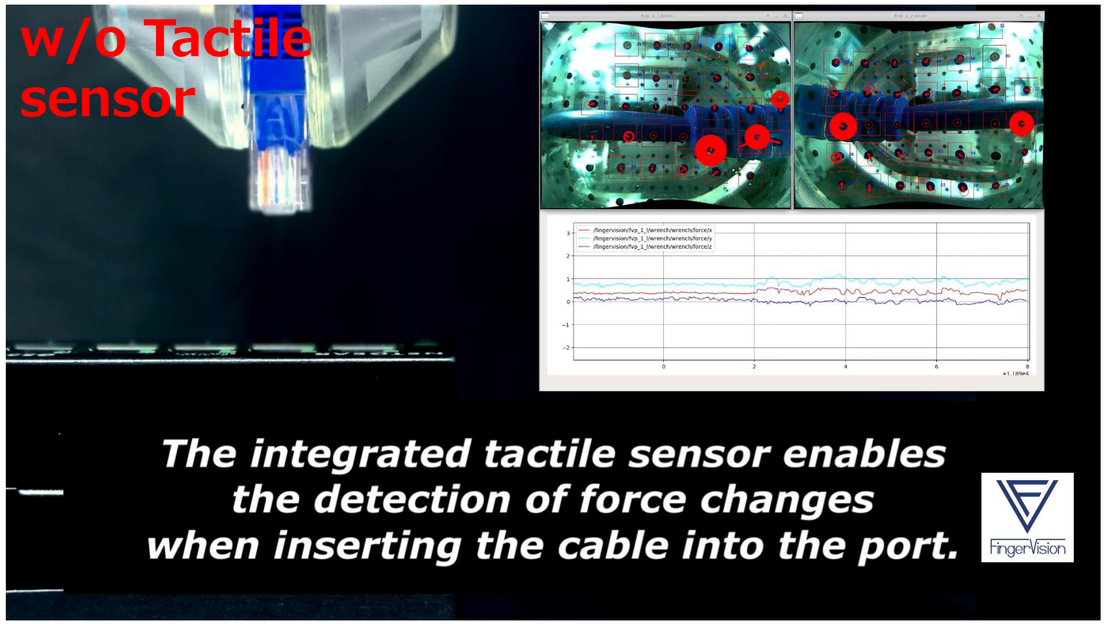
事例）フライ投入ロボットシステム × 株式会社ジャンボリア様

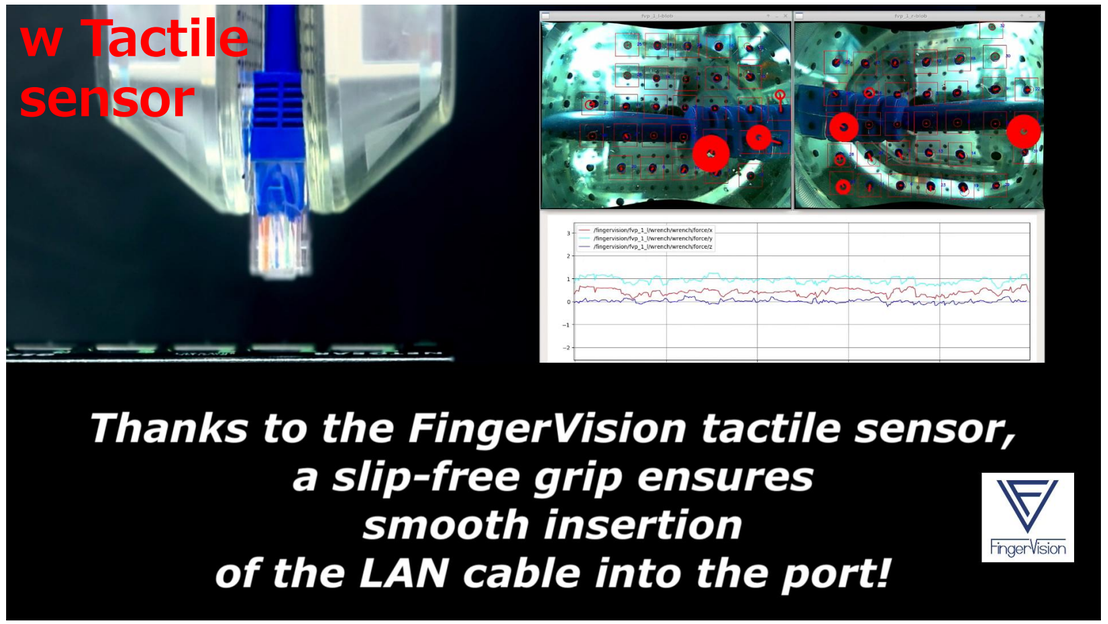
https://www.youtube.com/watch?v=_2M2FVD1fR0

Application: Automatic Confirmation of Mating

Cable Insertion

Problem: Humans can feel the "click" when a LAN cable is fully inserted. Robots can't.





Solution : A tactile sensor allows the robot to "feel" the final click (e.g. reaction force), ensuring perfect cable insertion.

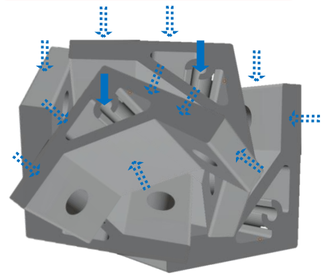
Bulk Picking Robot System

Usefulness of built-in Vision-Based sensors

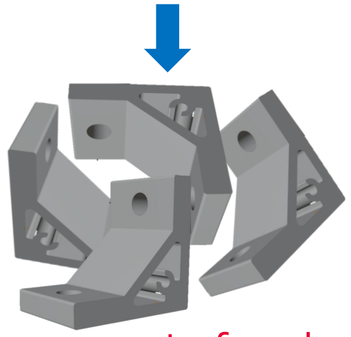
The same hand can realize picking for multiple types of products.
Since multiple gripping points including those other than the center of gravity can be set, alignment is not required, contributing to the improvement of the cutting ratio.

https://www.youtube.com/watch?v=iDcGBO_FBVw

No tactile

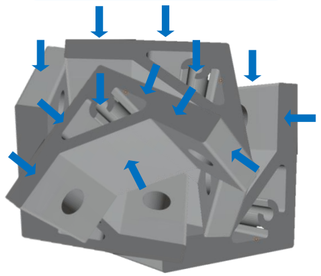


Few grasp points for the center of gravity

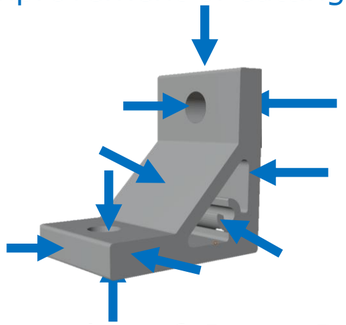


Arrangement of packages by vibration mechanism, etc., is required.

Tactile



Since there are many candidates for the grasping point, the alignment process is unnecessary.
→ Shortening of tact time and improvement of cutting rate



Examples of Grasp Points

Example of Takt Time Improvement: No Need to Decelerate to Prevent Dropping

Handling a bottle Without Dropping Due to Inertial Force

Problem: Off-center or suction-based gripping prevents speed increases, hindering takt time improvement.

Solution to Inertial Force:

Even if an object starts to slip due to inertial force, the hand "grips until it stops slipping," allowing for improved takt time.

FingerVision

Product Line Up (Fingers)

Achieve versatile product handling for diverse product lines,
offering high mix capability and flexibility to securely grip unstable or amorphous objects

Cyl1

SS2

αonβ

M6

?

Custom

Camera Types

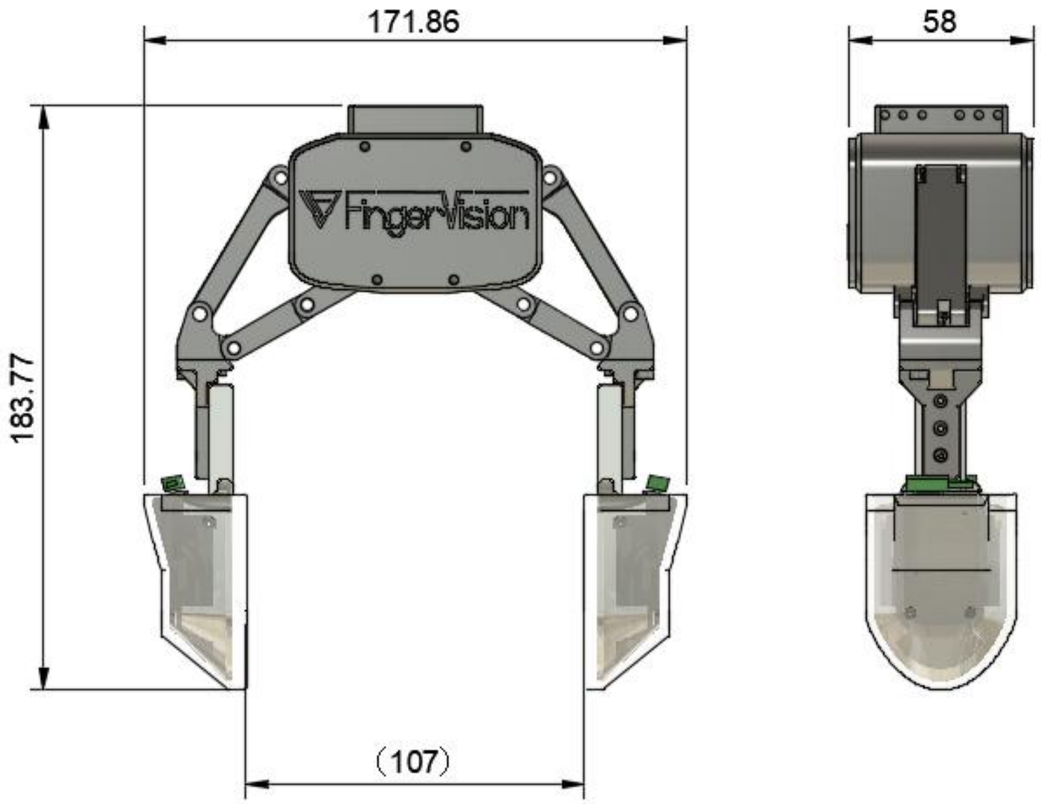
Parallel

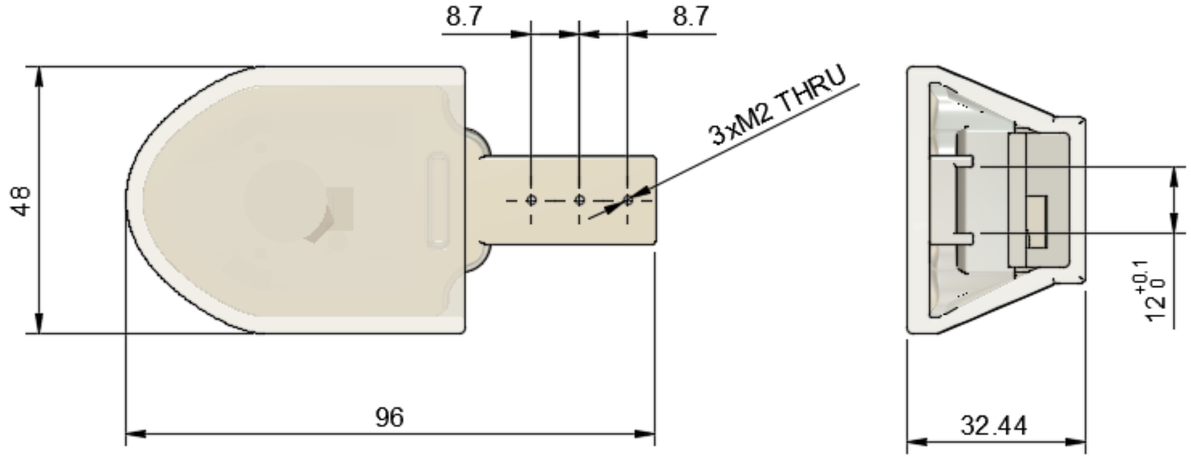
High-definition image quality

Angle

High functionality,
Mirror-reflection structure

Exterior





Type : αonβ

▼Total Weight
Approx. 0.7kg~0.9kg
（Gripper0.5kg / Finger 0.1~0.2kg）

▼Camera Specifications
307,200 pixels 640(H)×480(V)