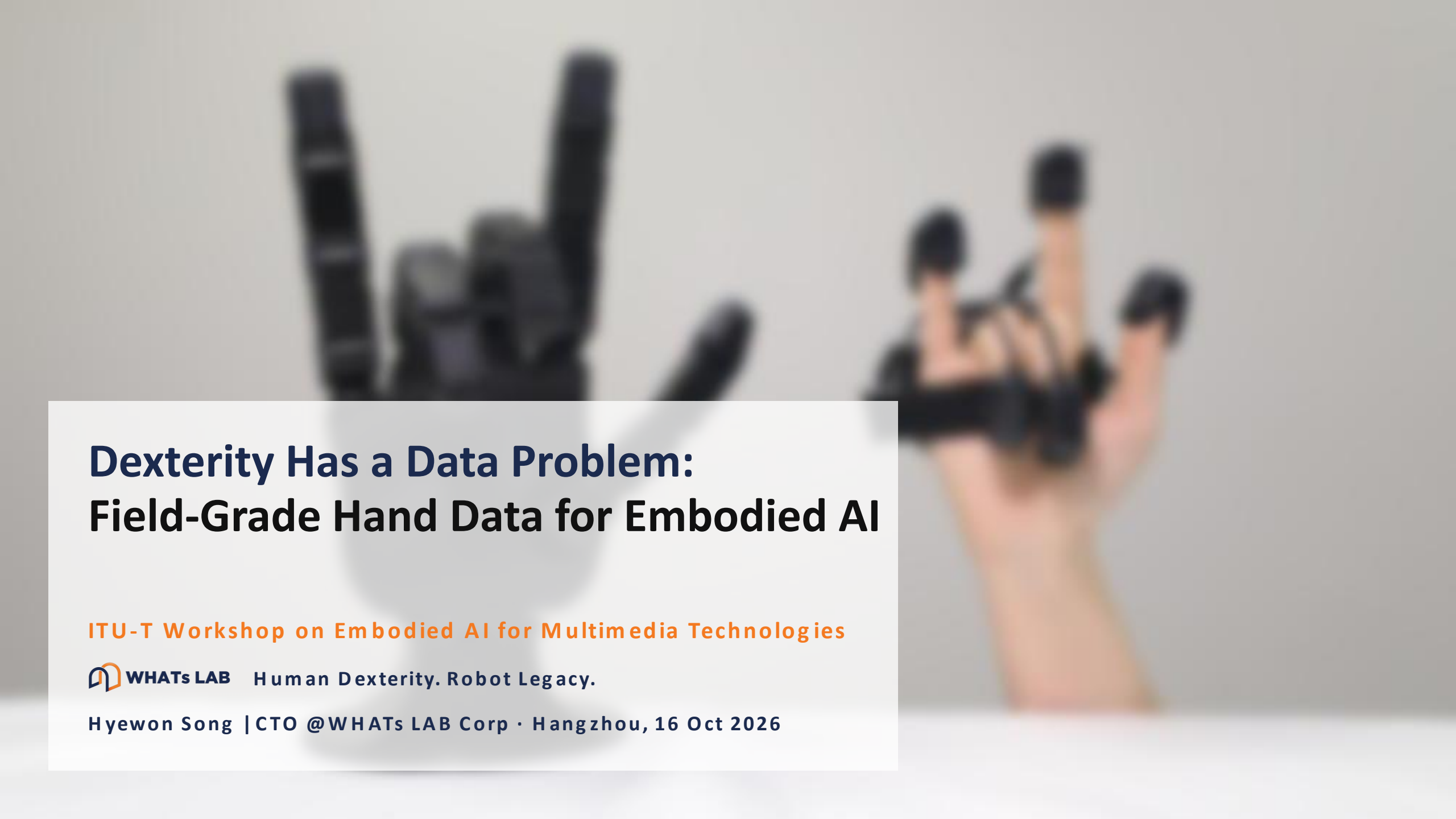


Dexterity Has a Data Problem:
Field-Grade Hand Data for Embodied AI

ITU-T Workshop on Embodied AI for Multimedia Technologies

WHATs LAB Human Dexterity. Robot Legacy.

Hyewon Song | CTO @WHATs LAB Corp · Hangzhou, 16 Oct 2026

WHATs LAB

The bottleneck has moved from hardware to field data

STAGE 1

Hardware

Motors · arms · mobile platforms

→

STAGE 2

Foundation models

VLA · policies · world models

→

NOW

Field data

Worker, process and contact context in micro-scale processes







Robots are deployed. The last mile still runs on human hands, and on site-specific data.

Sources: IFR 2025; Google DeepMind 2025 · Images: Figure AI, Hankyoreh, Naver Blog

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Hands carry the task information, yet they are the hardest part to observe



Even large ego-view hand datasets keep occluded segments. In our captures (ego-view video plus glove), occlusion during work was than we expected.

1 Occlusion

Behind equipment or out of view, trajectories break and errors spike. errors spike.

2 Tactile

Contact, slip and force cannot be recovered from video and joint and joint angles.

Field-grade hand data = wearable sensing + synchronized task

Images: figure.ai/news/introducing-index · LinkedIn (A. Akhtar)

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Field data must be designed for task × environment × embodiment



Our field data collection, heavy-industry site

Task Process steps; telling skilled from unskilled demonstrations

Environment Network, magnetic fields, temperature, dust

Embodiment Target end effector, its DoF and actuation

Every deployment re-asks three questions:

Which views? Ego, side, top, wrist, conveyor…
Which data schema? Per-joint channels, frame rate, wrist pose
How to evaluate? Which tasks, which metric, which industries

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What it took to get field-grade hand data



1 Capture in the field

Open-band, one-size wearable with a 9-DoF AHRS at each fingertip; works and low light.

2 Collect without a robot

Teleoperation, and human trajectories recorded during normal work on the line.

3 Reuse across robot hands

One dataset retargeted to 7 hands via SDK and ROS 2: Orca, LEAP, ROBOTIS, Allegro, Allegro, SCHUNK, Tesollo, our own.

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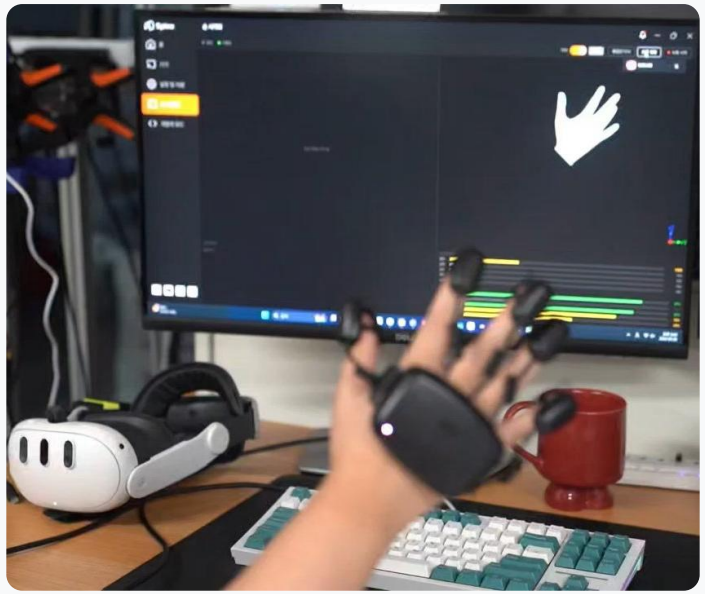
Evidence from the lab and the factory floor

−60%

Collection time per task: 4 min vs 10 vision-based hand tracking

90%

Teleoperation success rate, vs 80% with based tracking



Low light, occlusion, out of view



Active manufacturing floor

Comparison: Meta Quest 3 hand tracking vs Air Glove Atlas as teleoperation device, grasping 5 objects · WHATs LAB internal evaluation

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Three gaps that block reuse of dexterity data

01 **Fragmented formats**
Frames, rates and channels differ by device; old data fit new models.

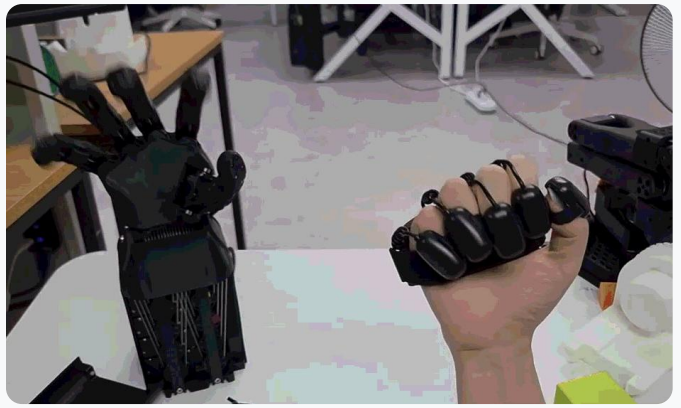
→ **Common schema**
Joint naming, timestamps,

02 **No hand interoperability**
Glove data from A does not drive hand B; DoF and are vendor-specific.

→ **Interface standard**
Input–output mapping

03 **No shared benchmarks**
No common basis to compare data quality or models.

→ **Benchmark standard**
Tasks, metrics, disclosure

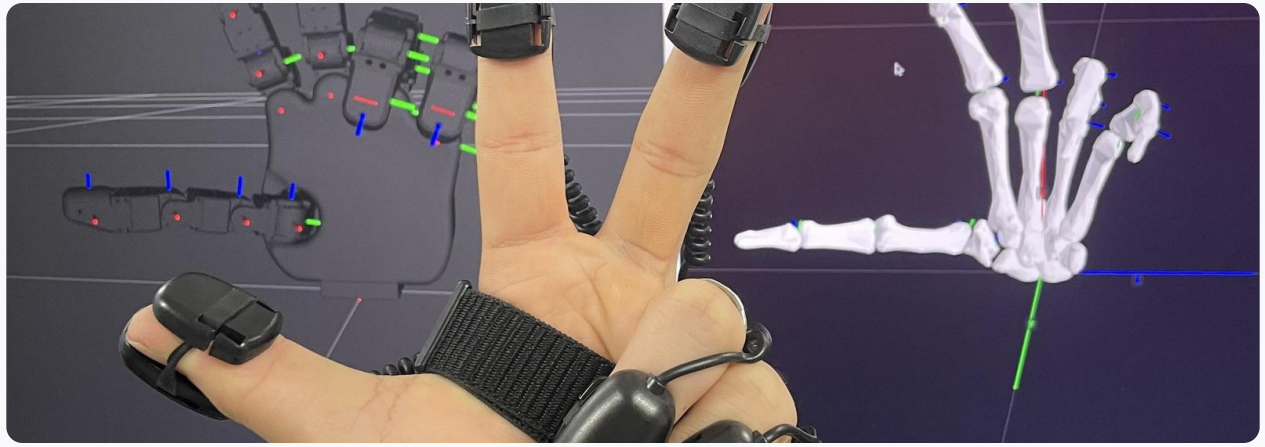


Each glove-to-hand pairing needs its own mapping today

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Standardize the interfaces, not the technology

Keeps changing (technology)	Should stay fixed (interface)
Sensing method	Output data schema
Robot-hand model	Command interface layer
AI model architecture	Benchmark task definitions



Human hand data

Motion and tactile signals from any capture device

↓

Common action space

Pinch, power grip, open hand, in-hand

↓

Per-hand retargeting

Commands for each hand’ s joints, DoF,

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What our field experience can offer standardization

Data acquisition

Hand-manipulation requirements

Synchronized hand pose, tactile and ego-view; occlusion handling; timestamp timestamp and joint-naming rules.

Industrial use cases

Field use cases

Fine-manipulation processes from our manufacturing data-ops task, environment and embodiment profiles.

Evaluation

Dexterity metrics

Teleoperation success rate, cross-embodiment retention, end-to-end collection time per episode.

Data governance

Worker data practices

De-identification of worker motion data, protection of process know-how, open know-how, open and restricted data tiers.

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Next: closing the remaining gaps in hand data



Air Glove Axis · Launched Q4 2026

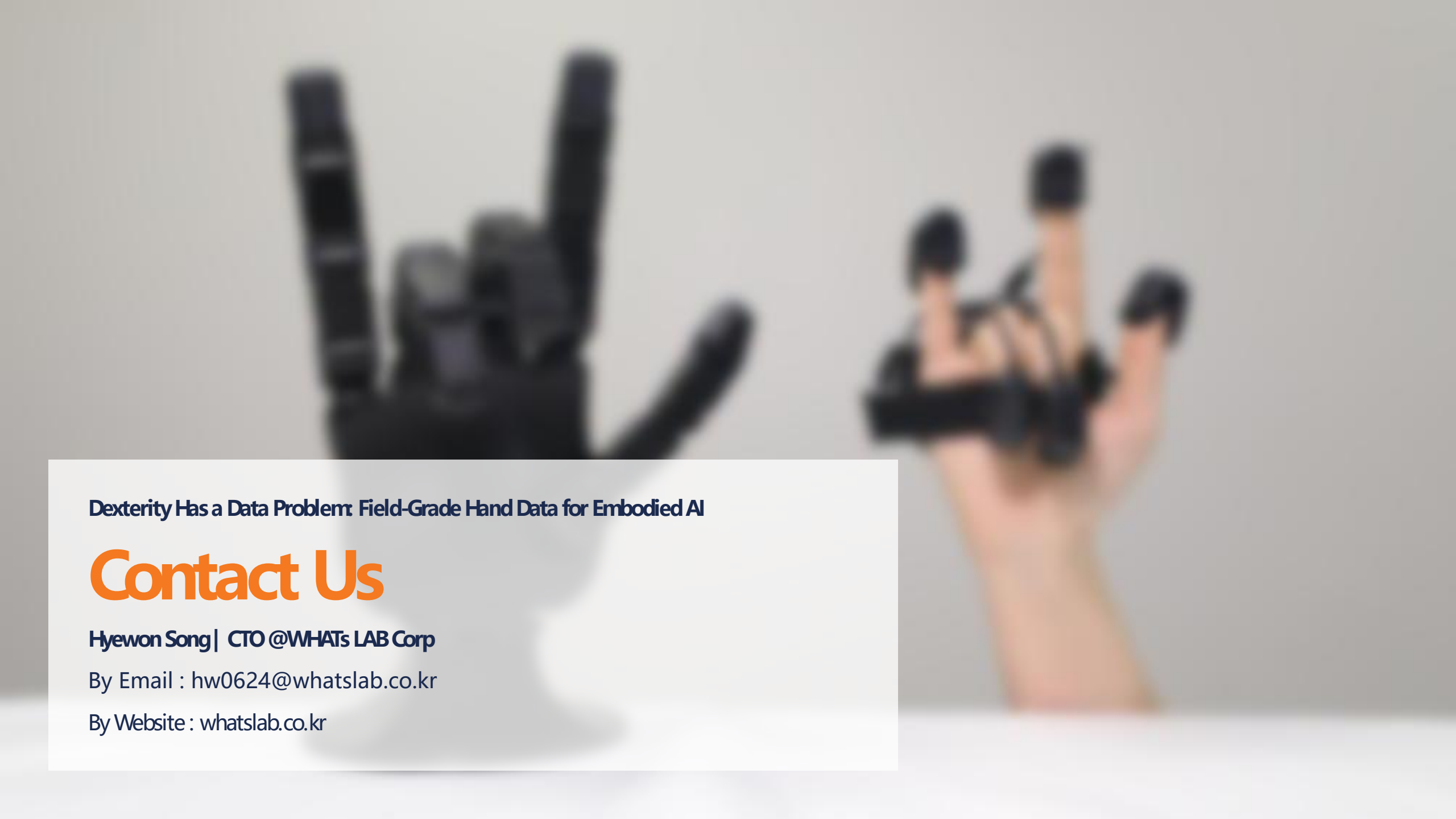
Smaller, lighter, more precise, with less skin contact.

Human Data Stack

Air Glove	Ego-view video	Tactile
Hand motion, any worker	Task, object and scene context	Contact and pressure (in development)

Synchronized, occlusion-free and quality-checked, then structured with task context.

Partners wanted: robot hands · robot learning · real-world manufacturing



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