Captures hand pose, force and intent where cameras cannot.

Kavana™ sensing technology | Wearable Devices Ltd. (Nasdaq: WLDS)

ABOUT KAVANA

Kavana is the physical AI unit of Wearable Devices Ltd., an autonomous business unit built on 12 years of company knowledge, know-how and patents. Our interdisciplinary team of data scientists and electronic, biomedical and industrial engineers builds the Mudra™ neuromuscular sensing wristband to understand the human hand and unlock its dynamic characteristics.

Vision. To enable humanoid dexterous hands to work as flawlessly as human experts in fine-grained manipulation tasks, creating a world where physical AI seamlessly executes complex human skills.

> **Our purpose: to build a world where machines intuitively understand human intention, enabling seamless coexistence across HCI and Physical AI.**

13 **Patents**
7 granted + 6 pending

12+ **Years of EMG R&D**
Wearable Devices Ltd.

4 **Product generations**
Consumer-proven

THE PROBLEM: *THE DATA, NOT THE AI*

- **Incomplete data.** Vision-based data lacks the accuracy needed for five-finger hand manipulation.
- **Camera blind spots.** Cameras cannot observe fingertip pressure and degrade with occlusions, reflections and more.
- **Heavy and costly.** Endless hours and expensive setups.
- **Complicated to process.** Messy data wastes engineering time.

HOW KAVANA HELPS: *BETTER PHYSICAL-AI DATA*

- **High quality and precision.** Ultra-accurate data for five-finger hand pose estimation, without hindering the hand.
- **Neuromuscular sensing.** Surface EMG, IMU and PPG sensors.
- **Fast, scalable collection.** Far faster than teleoperation; augments camera-only setups with neuromuscular data.
- **Simplified processing.** Clean, lightweight, synchronized data.



3 EMG CHANNELS · LAUNCHED MAY 2026

Mudra Pro

Core 3-channel version: ergonomic and quick to fit. Built for research labs, academic groups, and exploration.

EMG	3 ch · 200–6400 Hz · 24-bit
Streaming	USB-C + BLE · optional SD



8 EMG CHANNELS · RESEARCH-GRADE

Mudra Ultimate

Full-hand neural coverage. Wi-Fi streaming and multi-sensor sync out of the box. Built for physical-AI companies and advanced R&D labs collecting data at scale.

EMG	8 ch · 500–4000 Hz · 24-bit
Streaming	USB-C + BLE / Wi-Fi · optional SD

Both bands: surface EMG, IMU and PPG sensors · Python and C++ SDK · LSL · Windows, macOS, Linux · no gloves or rigs.

WHAT IT CAPTURES

Hand pose and joint angles
Precise finger kinematics, fused with any camera.

Grip force
Real-time force measured in newtons.

Contact and release timing
Touch, hold and release, with intent detected ahead of the action.

Where cameras can't see
Tracking through occlusion, glare, low light and fast motion.

WHO IT SERVES

Humanoid companies
Robots that handle everyday tools like humans do.

Industrial manufacturers
Assembly and QA with five-finger robotic hands.

Data acquisition companies
Higher-quality hand data, in far less time.

Academia and research labs
Next-generation physical-AI and dexterity research.

HOW TO CREDIT US

Enhanced via Kavana's sensing technology | Wearable Devices Ltd. (Nasdaq: WLDS)

Short forms: Kavana™ | Wearable Devices Ltd. (Nasdaq: WLDS) · Kavana™ sensing technology | Wearable Devices Ltd. · Enhanced by Kavana™ · Kavana™ sensing technology

Contact support@kavana.tech
kavana.tech · github.com/kavana-tech/Indriya

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PRODUCT DESCRIPTION

Mudra Pro and Mudra Ultimate

The Mudra Pro and Mudra Ultimate wristbands collect non-visual hand data from the wrist: biopotential neural signals (surface EMG), IMU motion data and PPG data. They work as a complementary layer to vision-based camera setups.

Functionality

- **Primary design.** Captures non-visual hand data at the wrist, alongside the cameras you already use.
- **Core purpose.** Resolves camera limitations during severe occlusions and self-occlusions, in low light or high glare, for out-of-frame movement, and for ultra-fast or subtle finger manipulation.
- **Benefit.** Complete, uninterrupted hand-tracking fidelity, so models receive reliable ground-truth data regardless of visual interference.

Features

- **Hand pose and joint angles.** Superior finger kinematics and joint-angle data, boosting visual tracking accuracy and 3D simulation fidelity.
- **Grip force.** Real-time force applied by the hand, measured directly in newtons for force-aware AI models.
- **Contact and release timing.** Touch, hold and release timestamps, detecting intent ahead of the physical action.

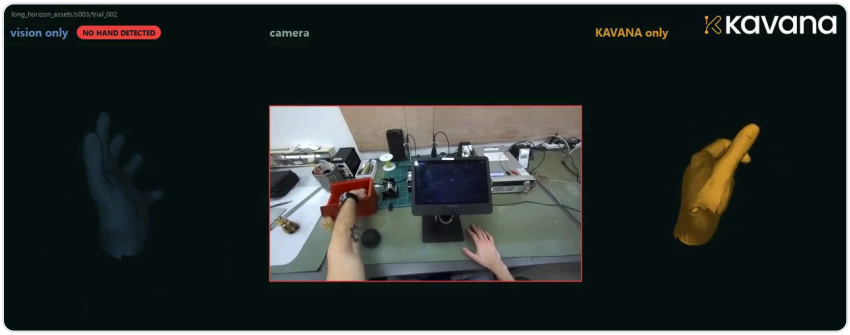
Attributes

- **Free-hand design.** No bulky gloves or hand-mounted rigs, so natural movement and dexterity are unhindered during capture.
- **Smartwatch form factor.** Lightweight, unobtrusive and comfortable, like a standard wearable.
- **Adjustable fit** for diverse wrist sizes.
- **Infrastructure savings.** Far less reliance on complex multi-camera setups and fragile wearable gear.

CAMERA + WRISTBAND

How EMG improves hand tracking

Cameras perceive hand motion. Surface EMG measures the muscle activity that drives it. Pair Kavana with any camera stack, adding a neural layer from the wrist (surface EMG, IMU, and PPG) that fuses seamlessly with egocentric or fixed cameras, indoors or out.



Occlusion test. Left: vision-only tracking reports “no hand detected” during occlusion. Right: Kavana keeps tracking finger motion from the wrist signal alone.

THREE OUTPUTS A CAMERA ALONE CAN’T PRODUCE

Hand pose and joint angles
Glove-grade finger kinematics from wrist sEMG fused with any camera, without the glove.

Pressure and force
Fingertip and grip force that cameras cannot see.

Point of no return
The neural command fires before contact is visible, so intent itself is timestamped.

CAMERA LIMITATION	HOW EMG IMPROVES IT
Occlusions Tools, objects, and hand self-occlusion break visual tracking; a closed grip hides the fingers.	EMG reads the forearm muscles that drive the fingers, so tracking continues when the view does not.
Reflections, glare and low light Reflective surfaces and poor lighting degrade tracking.	EMG is an electrical measurement at the skin, so it does not depend on lighting or the scene.
Force No camera measures newtons.	Adds a grip-force and pressure channel, measured at the wrist and time-aligned with video.
Fast motion Vision registers a movement only once it exists.	Wearable modalities such as the IMU are sampled at much higher frequencies than hand motion, sensing both subtle and quick motion without artifacts.
Out of the field of view Hands leave the frame while reaching and turning.	The wristband keeps recording when the hand exits the field of view, so trajectories stay complete.
Hardware overhead More coverage means more cameras, mounts and calibration.	One wristband completes the dataset and synchronizes over Lab Streaming Layer (LSL) alongside your existing stack.

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