TROY TECHNICAL

DRONES & ROBOTICS

WEEKLY REPORT

October 24 - October 30, 2026 | Issue 2026-W43

Safe autonomy, task economics, fleet operations and regulatory access

13	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-10-30 | English edition | fixed approved cover artwork



Drones & Robotics: the boundary moved from isolated claims to qualification evidence

13 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | SENSING & AI

Citrus Harvesting Robot: Passive Stem Centering for Table-Grade Cuts

Researchers at California State University, Fresno, developed a robotic harvester using a V-shaped guide and choreographed arm movements to achieve precise stem cuts.

SIGNAL 02 | ROBOT PLATFORM

SAE J3016 Standard: South Korea-led 2026 revision for autonomous driving

South Korea's Ministry of Science and ICT and ETRI have led the revision of the SAE J3016 international standard for autonomous driving levels.

SIGNAL 03 | TASK EXECUTION

Kajima Corporation: Automated Dam Foundation Treatment Technology

Kajima Corporation has developed an automated foundation treatment system for dams that enables 24-hour continuous operation. The technology increases daily construction volume by 50% and reduces the required personnel per cycle by up to 70%.

SIGNAL 04 | FLEET OPERATIONS

Reach Power: Wireless Power Beaming for 10-Hour Drone Flight

Reach Power has demonstrated a 10-hour autonomous drone flight using wireless power beaming, extending the flight time of a standard quadcopter from 90 seconds to 10 hours.

DECISION

Focus this week's management attention on safe autonomy, task economics, fleet operations and regulatory access. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics.
2. Suppliers: provide sensors, actuators, compute and service evidence under real operating conditions.
3. Executives: track intervention, safety, uptime, liability, regulation, fleet scale and cost.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Five numbers or evidence anchors that require conditions

100%
A12

SOURCE-BOUND CONDITION
In field trials of 100 navel oranges, the system achieved a 100% detachment success rate with 92% of fruit meeting the <10 mm residual stem length quality threshold.

50%
A10

SOURCE-BOUND CONDITION
The technology increases daily construction volume by 50% and reduces the required personnel per cycle by up to 70%.

10 hours
A05

SOURCE-BOUND CONDITION
Reach Power has demonstrated a 10-hour autonomous drone flight using wireless power beaming, extending the flight time of a standard quadcopter from 90 seconds to 10 hours.

0.5mm
A09

SOURCE-BOUND CONDITION
The system achieves a median position error of 0.5mm and improves power efficiency by approximately three times compared to existing EMF gloves.

17.31 million
A08

SOURCE-BOUND CONDITION
By combining clamping, pulling, and lateral bending, the device avoids damaging fruits and stems, addressing a critical labor cost issue in a sector where China produced 17.31 million tons of peppers in 2024.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Sensing & AI

P01/P06

Researchers at California State University, Fresno, developed a robotic harvester using a V-shaped guide and choreographed.

2

Robot platform

P02/P07

South Korea's Ministry of Science and ICT and ETRI have led the revision of the SAE J3016 international standard for.

3

Task execution

P03/P08

Kajima Corporation has developed an automated foundation treatment system for dams that enables 24-hour continuous operation.

4

Fleet operations

P04/P09

Reach Power has demonstrated a 10-hour autonomous drone flight using wireless power beaming, extending the flight time of a.

5

Regulation & service

P05/P10

Researchers at the Hong Kong University of Science and Technology (HKUST) have developed EmArm, a robotic arm featuring an.

EVIDENCE REQUIRED AT EACH HANDOFF

Sensing & AI to Robot platform	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck intervention, safety, uptime, liability, regulation, fleet scale and cost.
Robot platform to Task execution	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck intervention, safety, uptime, liability, regulation, fleet scale and cost.
Task execution to Fleet operations	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck intervention, safety, uptime, liability, regulation, fleet scale and cost.
Fleet operations to Regulation & service	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck intervention, safety, uptime, liability, regulation, fleet scale and cost.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented intervention, safety, uptime, liability, regulation, fleet scale and cost.

Priority map: maturity and next decision locus



P01	Citrus Harvesting Robot: Passive Stem Centering for Table-Grade Cuts System / adoption | cue: system
P02	SAE J3016 Standard: South Korea-led 2026 revision for autonomous driving Business / rules | cue: SAE
P03	Kajima Corporation: Automated Dam Foundation Treatment Technology System / adoption | cue: system
P04	Reach Power: Wireless Power Beaming for 10-Hour Drone Flight Business / rules | cue: standard
P05	EmArm: HKUST Robotic Arm with Human-Like Tactile Sensing System / adoption | cue: integrated
P06	ContactGlove3 Pro: Murata and MELT's Robot Training Specs System / adoption | cue: system
P07	Artificial Skin: High-Speed Tactile Sensing for Robotic Fingers System / adoption | cue: system
P08	BeetleBot: LCE artificial muscles and bidirectional feedback specs System / adoption | cue: system
P09	One-Shot Robot Harvesting: Single-Image Target Learning Specs System / adoption | cue: system
P10	Chili Pepper Robotic Harvester: Biomimetic End Effector Specs Tech / process | cue: no system/business cue

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01 Citrus Harvesting Robot: Passive Stem Centering for Table-Grade Cuts

A12 | Sensing & AI | Joint evaluation

Date not stated

FACT

Researchers at California State University, Fresno, developed a robotic harvester using a V-shaped guide and choreographed arm movements to achieve precise stem cuts. In field trials of 100 navel oranges, the system achieved a 100% detachment success rate with 92% of fruit meeting the <10 mm residual stem length quality threshold. This approach reduces hardware complexity and weight, enabling the harvesting of high-value fresh-market citrus.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 20/25 | MATURITY 3/5 | DECISION LOCUS: SYSTEM / ADOPTION

P02 SAE J3016 Standard: South Korea-led 2026 revision for autonomous driving

A13 | Robot platform | Research

Date not stated

FACT

South Korea's Ministry of Science and ICT and ETRI have led the revision of the SAE J3016 international standard for autonomous driving levels. The 2026 edition clarifies the specific roles of drivers versus vehicles across levels 0 to 5 to prevent misinterpretation of driver assistance functions.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03 Kajima Corporation: Automated Dam Foundation Treatment Technology

A10 | Task execution | Pilot

Date not stated

FACT

Kajima Corporation has developed an automated foundation treatment system for dams that enables 24-hour continuous operation. The technology increases daily construction volume by 50% and reduces the required personnel per cycle by up to 70%.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P04 Reach Power: Wireless Power Beaming for 10-Hour Drone Flight

A05 | Fleet operations | Research

Date not stated

FACT

Reach Power has demonstrated a 10-hour autonomous drone flight using wireless power beaming, extending the flight time of a standard quadcopter from 90 seconds to 10 hours. The system enables autonomous energy management and on-demand power requests without GPS or external tracking, significantly reducing logistical burdens for persistent ISR and surveillance missions.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05 EmArm: HKUST Robotic Arm with Human-Like Tactile Sensing

A04 | Regulation & service | Pilot

Date not stated

FACT

Researchers at the Hong Kong University of Science and Technology (HKUST) have developed EmArm, a robotic arm featuring an integrated soft optical tactile skin. The system achieves a spatial resolution of 0.085 millimeters and maintains 97.9 percent sensing accuracy under environmental interference, enabling adaptive manipulation and real-time obstacle avoidance.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06 ContactGlove3 Pro: Murata and MELT's Robot Training Specs

A09 | Sensing & AI | Pilot

Date not stated

FACT

Murata Manufacturing and MELT Interface Technologies have developed the ContactGlove3 Pro, an EMF-sensing hand-tracking glove designed to generate high-precision data for physical AI and robotics training. The system achieves a median position error of 0.5mm and improves power efficiency by approximately three times compared to existing EMF gloves.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07 Artificial Skin: High-Speed Tactile Sensing for Robotic Fingers

A03 | Robot platform | Pilot

Date not stated

FACT

Researchers at Southern University of Science and Technology in China have developed an artificial skin system capable of processing touch signals in approximately 23 milliseconds. By utilizing flexible electrodes and a soft gel, the system enables robotic fingers to handle fragile objects like 0.2 millimetre solder wire with high precision.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 BeetleBot: LCE artificial muscles and bidirectional feedback specs

A01 | Task execution | Pilot

Date not stated

FACT

Researchers at KAIST have developed BeetleBot, a robotic beetle utilizing 3D-printed liquid crystal elastomer (LCE) artificial muscles for natural movement. The system features a finger-worn sensor patch for control and a bidirectional feedback loop integrating camera data and pressure sensors. This technology enables agile navigation and object manipulation for potential use in space exploration and search-and-rescue operations.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09 One-Shot Robot Harvesting: Single-Image Target Learning Specs

A11 | Fleet operations | Pilot

Date not stated

FACT

Researchers led by Junyu Hao developed a one-shot object detection method allowing harvesting robots to identify new fruit targets from a single user-clicked image. The system achieved 57.78 mAP in cross-fruit detection, outperforming the fully supervised YOLO11n baseline by 4.00 percentage points. This eliminates the need for collecting thousands of images and manual annotation when deploying robots in unfamiliar orchards.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P10 Chili Pepper Robotic Harvester: Biomimetic End Effector Specs

A08 | Regulation & service | Pilot

Date not stated

FACT

Engineers in China have developed a robotic end effector that mimics human picking motions to harvest chili peppers with a 100 percent success rate in laboratory tests. By combining clamping, pulling, and lateral bending, the device avoids damaging fruits and stems, addressing a critical labor cost issue in a sector where China produced 17.31 million tons of peppers in 2024.

WHY IT MATTERS

The decision relevance is safe autonomy, task economics, fleet operations and regulatory access. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, provide sensors, actuators, compute and service evidence under real operating conditions.

ACTION

Within 30 days, compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: intervention, safety, uptime, liability, regulation, fleet scale and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	compare humanoids, drones and robotaxis by task success, intervention rate, safety and unit economics	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	provide sensors, actuators, compute and service evidence under real operating conditions	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map intervention, safety, uptime, liability, regulation, fleet scale and cost.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW | 0-30 DAYS
Evidence ledger
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
Risk screen
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
Joint qualification
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
Commercial gate
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
Platform strategy
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
Service layer
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	**Quality**	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	**R&D**	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	**Business**	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	**Operations**	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-13

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	BeetleBot: LCE artificial muscles and bidirectional feedback specs	https://newatlas.com/robotics/beetlebot-robotic-beetle/
A02	eLuminator: NUS electronic skin for instant touch visualization	https://newatlas.com/robotics/eluminator-electronic-skin-displays-touch-as-light/
A03	Artificial Skin: High-Speed Tactile Sensing for Robotic Fingers	https://www.electronicsforu.com/news/artificial-skin-gives-robotic-fingers-a-sense-of-touch
A04	EmArm: HKUST Robotic Arm with Human-Like Tactile Sensing	https://ana.ir/en/news/11291/chinese-scientists-develop-a-robotic-arm-with-human-like-tactile-sensing
A05	Reach Power: Wireless Power Beaming for 10-Hour Drone Flight	https://drone.jp/news/20261030150149130275.html
A06	MIT Biohybrid Robot: Muscle-Powered Swimming Specs and Design	https://www.techexplorist.com/mit-paper-thin-robot-swims-power-living-cells/105888/
A07	Feather Star Robot: Mechanical Intelligence for 3D Maneuverability	https://newatlas.com/robotics/feather-star-underwater-robot/
A08	Chili Pepper Robotic Harvester: Biomimetic End Effector Specs	https://bioengineer.org/robot-hand-mimics-human-fingers-to-pick-chili-peppers-without-damage/
A09	ContactGlove3 Pro: Murata and MELT's Robot Training Specs	https://jp.ubergizmo.com/2026/10/25/27185/
A10	Kajima Corporation: Automated Dam Foundation Treatment Technology	https://built.itmedia.co.jp/bt/articles/2610/28/news072.html
A11	One-Shot Robot Harvesting: Single-Image Target Learning Specs	https://bioengineer.org/one-click-picks-the-fruit-robot-harvesting-learns-new-targets-from-a-single-image/
A12	Citrus Harvesting Robot: Passive Stem Centering for Table-Grade Cuts	https://bioengineer.org/robot-passively-centers-citrus-stems-for-precise-cuts-with-simpler-hardware/
A13	SAE J3016 Standard: South Korea-led 2026 revision for autonomous driving	https://www.mt.co.kr/index.php/en/tech/2026/10/29/2026102909515047023

Drones_Robotics — Selected Articles

Date: 2026-10-31

Articles: 13

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#01 BeetleBot: LCE artificial muscles and bidirectional feedback specs

Published October 25, 2026 New Atlas USA

OVERVIEW

Researchers at KAIST have developed BeetleBot, a robotic beetle utilizing 3D-printed liquid crystal elastomer (LCE) artificial muscles for natural movement. The system features a finger-worn sensor patch for control and a bidirectional feedback loop integrating camera data and pressure sensors. This technology enables agile navigation and object manipulation for potential use in space exploration and search-and-rescue operations.

IN DEPTH

Key Findings

BeetleBot is a bio-inspired robot capable of navigating turns, gripping objects, and transporting them to different locations. The system is characterized by its use of artificial muscles and a bidirectional feedback mechanism that links robot-detected information to the operator's subsequent actions in real time.

Technical Details

The robot's artificial muscles are 3D-printed from liquid crystal elastomer (LCE), a material that contracts and shortens by 45% when heated and returns to its original shape upon cooling. To achieve contraction, the LCE muscles must reach 110 °C (230 °F), which is generated by passing an electric current through integrated wires. However, the energy required to generate this heat remains a primary technical challenge.

Control is managed via a flexible sensor patch worn on the operator's finger. Bending the finger changes the patch's electrical resistance, triggering one of four commands: move forward, turn left, turn right, or grip an object. The gripping mechanism, inspired by beetle mandibles, utilizes LCE muscles and a pressure sensor to determine the force applied to an object.

Background & Context

The design of BeetleBot is based on the *Mecynorrhina torquata*, a large beetle native to Cameroon, Uganda, and the Congo. Researchers studied the positioning and function of the insect's leg muscles and joints to replicate these principles in the robot. This approach provides an alternative to creating cyborgs from real insects, avoiding associated ethical concerns.

Significance & Outlook

The integration of a camera and pressure sensors allows for a continuous exchange of information between the human operator and the robot. Future development goals include improving energy efficiency and response speed. The research team intends to eventually transition BeetleBot into a fully soft-bodied robot to increase its versatility across various operational environments, such as industrial equipment inspection and space exploration.

Source: https://newatlas.com/robotics/beetlebot-robotic-beetle/

Collected: October 31, 2026 | Automated Research System (AI)

#02 eLuminator: NUS electronic skin for instant touch visualization

Published October 27, 2026 New Atlas Singapore

OVERVIEW

Researchers at the National University of Singapore (NUS) have developed eLuminator, an ultrathin electronic skin that converts physical pressure directly into visible light. Measuring 70 micrometers thick with a resolution of 847 dpi, the device integrates sensing and visualization to eliminate the need for separate displays or complex signal processing.

IN DEPTH

Key Findings

The eLuminator is a flexible electronic skin that instantly displays the shape and distribution of contact as light. Unlike traditional tactile sensors, it combines pressure sensing, measurement, and visualization within a single device. The artificial skin features a thickness of 70 micrometers and achieves a resolution of 847 dots per inch (dpi), which is sufficient to detail individual fingerprint ridges.

Technical Details

The device consists of three primary layers: an upper pressure-sensitive layer with thousands of microscopic dome-shaped structures, a middle light-emitting layer containing copper-doped zinc sulfide particles, and a bottom transparent electrode. Its operation is based on the following mechanism:

- An alternating electrical voltage creates an initial electric field that is too weak to trigger light emission.
- Physical pressure compresses the microscopic domes, increasing contact with the light-emitting layer and reducing the distance between electrodes.
- This strengthens the electric field, exciting the particles to emit visible light; higher pressure results in brighter illumination.
- Simultaneously, the compression changes the device's electrical capacitance, allowing for quantitative electronic pressure measurements when connected to readout electronics.

Background & Context

Conventional electronic skins typically rely on arrays of tiny sensors that convert force into electrical signals, which must then be processed by a computer and displayed on a separate screen or delivered via haptic feedback. Examples include an inflatable prosthetic hand from MIT using a tactile matrix and a Johns Hopkins University device using an electromyography (EMG) link. These systems often suffer from bulk, complexity, and resolution limits due to the wiring required for individual sensing points.

Significance & Outlook

By integrating the sensing and display functions into a continuous pressure-sensitive structure, eLuminator removes the need for separate signal-processing circuits and external displays. This reduction in complexity and bulk makes the technology suitable for integration into robotic sensing, surgical instruments, and wearable healthcare devices.

Source: https://newatlas.com/robotics/eluminator-electronic-skin-displays-touch-as-light/

Collected: October 31, 2026 | Automated Research System (AI)

#03 Artificial Skin: High-Speed Tactile Sensing for Robotic Fingers

Published October 28, 2026 Electronics For You China

OVERVIEW

Researchers at Southern University of Science and Technology in China have developed an artificial skin system capable of processing touch signals in approximately 23 milliseconds. By utilizing flexible electrodes and a soft gel, the system enables robotic fingers to handle fragile objects like 0.2 millimetre solder wire with high precision.

IN DEPTH

Key Findings

The developed artificial skin allows robotic hands to sense and process tactile signals with high speed and accuracy. The system can read more than 10,000 sensing elements 100 times per second, achieving a full sequence from sensing to interpretation in about 23 milliseconds. In practical tests, a robotic finger equipped with this skin successfully handled soft solder wire only 0.2 millimetres thick and adjusted its grip dynamically as wire thickness changed. Additionally, the system can distinguish between 10 everyday object categories with 98.2% accuracy, even after a 268-fold reduction in data.

Technical Details

To overcome common response delays associated with high-density sensing points, the researchers combined flexible electrodes with a soft gel containing electrically charged particles. Pressure changes alter the electrical response at the interface of the gel and electrodes, which the system measures to determine touch signals.

The system manages high-density data through the following methods:

- **Frequency Multiplexing:** Different signal frequencies are assigned to sensing points within each sensor bundle, allowing signals to be separated even when arriving simultaneously.
- **Signal Interpretation:** Signal frequency identifies the specific sensing point, while signal strength indicates the level of pressure.
- **Data Compression:** The circuitry avoids interference between neighboring sensors and compresses raw signals to reduce the volume of data sent for analysis.

Background and Context

Many existing artificial skins struggle with processing delays when scaling to thousands of sensing points. This research addresses the latency and accuracy trade-off. To ensure hardware longevity, the team also integrated an artificial "pain signal" that alerts the robot to potential damage to the skin covering.

Significance and Outlook

The ability to handle fragile items, such as pencil lead, and react to sharp objects like needles before puncture demonstrates a significant leap in robotic dexterity. While the current electronic processing circuits occupy considerable space, the researchers suggest that migrating these circuits to custom-made chips could bring the interpretation hardware closer to the flexible sensing layer.

Source: https://www.electronicsforu.com/news/artificial-skin-gives-robotic-fingers-a-sense-of-touch

Collected: October 31, 2026 | Automated Research System (AI)

#04 EmArm: HKUST Robotic Arm with Human-Like Tactile Sensing

Published October 23, 2026 ANA News Agency China

OVERVIEW

Researchers at the Hong Kong University of Science and Technology (HKUST) have developed EmArm, a robotic arm featuring an integrated soft optical tactile skin. The system achieves a spatial resolution of 0.085 millimeters and maintains 97.9 percent sensing accuracy under environmental interference, enabling adaptive manipulation and real-time obstacle avoidance.

IN DEPTH

Key Findings

The Hong Kong University of Science and Technology (HKUST) has developed EmArm, an integrated sensorimotor robotic arm capable of human-like tactile perception. By integrating a soft optical tactile skin onto a rigid mechanical skeleton, the system can analyze contact information across the upper arm and forearm. This allows the robot to distinguish between different tactile interactions, such as gentle tapping and tickling, and respond in real time to avoid obstacles.

Technical Details

EmArm's architecture is inspired by the human bone-muscle-skin structure. The technical specifications include:

- **Coverage:** More than 71,000 square millimeters of soft tactile skin covering the upper arm and forearm.
- **Sensing Mechanism:** Internal submillimeter-scale cameras that analyze force distribution.
- **Resolution:** A spatial resolution of 0.085 millimeters and a two-point discrimination threshold of 18.2 millimeters, which outperforms the typical 30–50 millimeter range of human arm skin.
- **Robustness:** The optical approach is resistant to thermal, acoustic, humidity-related, optical, and electromagnetic interference, maintaining 97.9 percent accuracy across five types of interference.

The system maintains positioning repeatability comparable to conventional robotic arms and shows no appreciable adverse effect on performance under heavy loads.

Background & Context

To move beyond simple sensing, the team implemented a perception-action loop. This framework integrates proprioceptive input (joint-angle data) with exteroceptive input (tactile information) in real time. The system extracts data on contact position, force, contact area, and the number of contact points, feeding this information directly into the motion-control system for autonomous decision-making.

Significance & Outlook

EmArm marks a shift from visual dominance toward multimodal integration and intrinsic intelligence. The researchers indicate that this technology can be extended to other body parts, such as torsos and legs. Potential applications include humanoid robots for medical assistance, industrial environments, and domestic services, as well as advancements in embodied artificial intelligence where AI learns from physical interaction with the real world.

Source: https://ana.ir/en/news/11291/chinese-scientists-develop-a-robotic-arm-with-human-like-tactile-sensing

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#05 Reach Power: Wireless Power Beaming for 10-Hour Drone Flight

Published October 30, 2026 DRONE USA

OVERVIEW

Reach Power has demonstrated a 10-hour autonomous drone flight using wireless power beaming, extending the flight time of a standard quadcopter from 90 seconds to 10 hours. The system enables autonomous energy management and on-demand power requests without GPS or external tracking, significantly reducing logistical burdens for persistent ISR and surveillance missions.

IN DEPTH

Key Findings

Reach Power has successfully completed a demonstration of a 10-hour autonomous drone flight powered by wireless power beaming. This achievement extended the flight duration of the test quadcopter by approximately 400 times compared to its baseline battery-only flight time of 90 seconds. The flight was conducted on September 22 at the Virginia Tech Advanced Computing Institute as part of the "2026 Energy Sentry" event by Operational Energy Innovation (OE-I).

Technical Details

The system integrates on-board visual navigation, autonomous energy management, and on-demand remote power delivery. Notably, the flight was achieved without the use of GPS, external flight tracking sensors, physical tethers, or manual flight control. The technical implementation includes:

- **Autonomous Energy Management:** The drone's internal processor monitors battery levels in real-time. It autonomously disconnects from the power beam upon reaching full charge and returns to the charging position to request power once a programmed threshold is met.
- **M2M Communication:** The drone and transmitter handle all power cycles via machine-to-machine (M2M) communication without operator intervention.
- **Dynamic RF Beam Steering:** Software-defined electronics direct energy toward the receiver without requiring mechanical movement of the transmitter.
- **Hardware Compliance:** The system utilizes NDAA-compliant components and a primary drone system manufactured in the U.S. by ModalAI.

Background & Context

The demonstration was live-streamed to participants from the Pentagon. Reach Power is funded through the Operational Energy Capability Improvement Fund (OECIF) managed by OE-I. This project addresses the critical limitation of small unmanned aircraft systems (sUAS), which typically require battery replacement or recharging every 30 to 40 minutes.

Significance & Outlook

By eliminating the need for charging infrastructure and manual battery swaps, this technology reduces the personnel required for continuous operations. While developed with defense applications in mind—specifically for intelligence, surveillance, and reconnaissance (ISR) and communication relay—Reach Power indicates the technology is applicable to industrial robotics, infrastructure inspection, and public safety markets.

Source: https://drone.jp/news/20261030150149130275.html

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#06 MIT Biohybrid Robot: Muscle-Powered Swimming Specs and Design

Published October 24, 2026 Tech Explorist USA

OVERVIEW

Engineers at MIT have developed a paper-thin, two-dimensional biohybrid robot propelled by genetically engineered living muscle cells. The device can navigate underwater mazes at a maximum speed of roughly 4 times its own length per minute, demonstrating that thin tissue layers can generate sufficient force for aquatic locomotion.

IN DEPTH

Key Findings

MIT researchers have demonstrated the first thin, two-dimensional biohybrid robot capable of swimming. The robot utilizes a single layer of living muscle tissue to propel itself through water, achieving a top speed of approximately 4 times its own length every minute. This performance is comparable to the average cruising speed of certain shark species.

Technical Details

The robot's chassis consists of a flexible gel film approximately half a millimeter thick, divided into two fin-like sections. Each fin is coated with a layer of living muscle cells thinner than a human hair. These cells are genetically engineered to contract in response to light, allowing researchers to control speed and direction by manipulating the light source.

To achieve the necessary force for aquatic movement, the team optimized the scaffold supporting the muscle cells:

- **Material:** The team transitioned to gelatin methacrylate (GelMA), utilizing stiffer versions to provide better support for organized muscle growth.
- **Geometry:** Square-bottomed grooves were etched into the gel surface to encourage more uniform alignment of muscle fibers compared to curved grooves.
- **Training:** The tissue underwent a "workout" via repeated flashes of light to increase strength before final installation.

Background & Context

Previous biohybrid designs typically relied on bulky, three-dimensional chunks of lab-grown skeletal muscle requiring millions of cells. Earlier work from Ritu Raman’s laboratory produced an iris-inspired system, but movements were limited to approximately 100 microns, which was insufficient for robotics applications. The current design reduces the amount of tissue required while significantly increasing force output.

Significance & Outlook

Living muscle offers advantages over traditional actuators, including energy efficiency, softness, environmental responsiveness, and the ability to self-repair. This proof-of-concept indicates that thin biohybrid machines can operate in demanding aquatic environments. Future applications include environmental monitoring and exploring fragile or unpredictable ecosystems. The team's next objective is to optimize the body design to increase swimming speed.

Source: https://www.techexplorist.com/mit-paper-thin-robot-swims-power-living-cells/105888/

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#07 Feather Star Robot: Mechanical Intelligence for 3D Maneuverability

Published October 24, 2026 New Atlas USA

OVERVIEW

Researchers at North Carolina State University have developed a biomimetic subaquatic robot that achieves three-dimensional movement using only two actuators. By leveraging mechanical intelligence through a structural design inspired by the feather star, the robot overcomes the maneuverability limitations common in aquatic robotics.

IN DEPTH

Key Findings

A research group at North Carolina State University has created a subaquatic robot capable of three-dimensional maneuverability using a minimal hardware configuration. While such range of motion typically requires at least six actuators, this robot achieves it with only two actuators and a few elastic limbs. This efficiency is attributed to "mechanical intelligence," where the physical structure of the robot performs part of the control work, reducing the need for complex electronic systems.

Technical Details

The robot utilizes monostable, feather-like wings that naturally return to their original shape after bending. By manipulating the two actuators, the robot operates in three distinct modes:

- **Jellyfish mode:** Both actuators activate to snap the wings downward, propelling the robot upward. As the wings recover, the robot descends. Adjusting the speed of this cycle allows the robot to either swim or hover in place.
- **Fish mode:** A single actuator is activated to create asymmetric movement, propelling the robot forward or backward.
- **Rotor mode:** The robot alternates inputs between the two actuators to rotate around its own axis and change orientation.

Background & Context

The project follows a previous effort by the same team to design a manta ray-inspired aquatic robot. Although the manta ray robot achieved impressive forward speed, it lacked the ability to move up and down, rotate in place, or change direction effectively. To solve this three-dimensional maneuverability challenge, the researchers turned to the feather star, a marine creature with flexible limbs that move in multiple directions with minimal apparent effort.

Significance & Outlook

This design demonstrates that increasing machine capability can be achieved through smarter structural engineering rather than adding more electronics or actuators. The researchers anticipate that this robot could expand possibilities for underwater exploration, with potential applications including lifting objects, carrying cameras, and collaborating with other aquatic robots.

Source: https://newatlas.com/robotics/feather-star-underwater-robot/

Collected: October 31, 2026 | Automated Research System (AI)

#08 Chili Pepper Robotic Harvester: Biomimetic End Effector Specs

Published October 30, 2026 BIOENGINEER China

OVERVIEW

Engineers in China have developed a robotic end effector that mimics human picking motions to harvest chili peppers with a 100 percent success rate in laboratory tests. By combining clamping, pulling, and lateral bending, the device avoids damaging fruits and stems, addressing a critical labor cost issue in a sector where China produced 17.31 million tons of peppers in 2024.

IN DEPTH

Key Findings

The developed robotic end effector achieved a 100 percent success rate in picking two different sizes of chili peppers during laboratory testing. The process took 3.5 seconds for smaller fruits and 4 seconds for larger ones. The system succeeds by replicating the human method of clamping the fruit, pulling along the stem, and folding it sideways to ensure the stem snaps cleanly at its natural break point.

Technical Details

The end effector measures 185 millimeters long and 80 millimeters wide. It utilizes soft silicone gripping fingers on two sides and a combined pulling-and-bending mechanism on the third. The device grips only one-quarter to one-third of the fruit's surface to minimize collisions with adjacent peppers. The operational sequence is as follows:

- A visual system locates the target fruit.
- A linear electric cylinder closes the silicone grippers on the lower part of the fruit.
- The effector pulls along the stem's axis while a motor-driven rotating disk bends the stem laterally.

The researchers used a multibody dynamics simulation to optimize this "clamp-pull-fold" action. The simulation modeled the fruit as an ellipsoid and the silicone pads as hyperelastic Mooney-Rivlin material. Results indicated that combined action is superior to pulling or bending alone, as it concentrates stress asymmetrically on the abscission layer without requiring the large swing angles that risk damaging neighboring branches.

Background & Context

Agricultural robotics for chili peppers is challenging because fruits grow in dense, upward-facing clusters. Previous designs had significant drawbacks: a tomato-specific device risked scratching fruits, a two-finger silicone gripper had a harvesting rate below 80 percent, and cutting devices risked spreading pathogens between plants. In China, where 38.6 percent of global pepper output was produced in 2024, labor costs account for over 60 percent of total production costs.

Significance & Outlook

By decomposing human picking into three kinematic stages—holding, pulling, and bending—the team created a compact tool capable of navigating dense clusters. While the current clamping force is a preset value, the researchers have already reserved space for tactile sensors on the fingertips for future iterations.

Source: https://bioengineer.org/robot-hand-mimics-human-fingers-to-pick-chili-peppers-without-damage/

Collected: October 31, 2026 | Automated Research System (AI)

#09 ContactGlove3 Pro: Murata and MELT's Robot Training Specs

Published October 25, 2026 Ubergizmo JAPAN Japan

OVERVIEW

Murata Manufacturing and MELT Interface Technologies have developed the ContactGlove3 Pro, an EMF-sensing hand-tracking glove designed to generate high-precision data for physical AI and robotics training. The system achieves a median position error of 0.5mm and improves power efficiency by approximately three times compared to existing EMF gloves.

IN DEPTH

Key Findings

The ContactGlove3 Pro, showcased at CEATEC 2026, enables the real-time capture of human finger movements to train robotic systems. The device received the "CEATEC AWARD 2026" Excellence Award for its ability to generate precise data for robotics and physical AI applications. The system allows human gestures to be converted into digital data to control both digital hands and physical robot arms.

Technical Details

Unlike camera-based systems, the glove utilizes electromagnetic field (EMF) sensing, eliminating the need for external cameras and avoiding issues with lighting or occlusion. The hardware integrates Murata's ultra-compact, high-sensitivity 3-axis low-frequency (LF) antennas in the fingertips, which Murata claims provide approximately three times the power efficiency of existing EMF gloves with the same battery capacity.

- **Accuracy:** Median position error of 0.5mm; maximum error of 1.5mm.
- **Performance:** 100Hz operating frequency with latency under 30 milliseconds.
- **Degrees of Freedom:** Measures 30 degrees of freedom (6 per finger), outputting 25 via a biomechanical model.
- **Stability:** Employs "zero-drift technology" to measure absolute position, preventing cumulative tracking errors.
- **Battery Life:** Up to 10 hours.

The Pro version differs from the standard ContactGlove3 by moving tracking sensors from the second joint closer to the fingertips to better capture precise tasks like gripping tools or small object manipulation. To mitigate industrial interference, MELT implemented noise reduction technology that can reduce electromagnetic interference by up to 80%.

Background & Context

The glove supports ROS 2, C++, Python, Unity, Unreal Engine, and MotionBuilder. It is priced at 3,999 USD in the US, with availability planned for November 2026. While the glove records human dexterity, the source notes that current robot hands still face mechanical constraints, such as the inability to bend the palm.

Significance & Outlook

Murata and MELT entered a business alliance in September 2026. Beyond hand tracking, the partnership plans to explore other human-machine interfaces, including voice input devices utilizing Murata's piezoelectric technology.

Source: https://jp.ubergizmo.com/2026/10/25/27185/

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#10 Kajima Corporation: Automated Dam Foundation Treatment Technology

Published October 28, 2026　BUILT（ITmedia）　Japan

OVERVIEW

Kajima Corporation has developed an automated foundation treatment system for dams that enables 24-hour continuous operation. The technology increases daily construction volume by 50% and reduces the required personnel per cycle by up to 70%.

IN DEPTH

Key Findings

Kajima Corporation has developed a foundation treatment automation technology that automates boring and grouting operations for dam foundations. When applied to the Naruse Dam embankment construction in Akita Prefecture, the system increased daily construction volume by 50% and reduced the number of skilled workers required per cycle by up to 70% compared to conventional methods.

Technical Details

The system consists of two primary components developed through industry collaborations:

- **Automated Boring Machine:** Developed by Kajima Corporation, Chemical Grout, Nitto Construction, and Toa Ritone Boring. It automates the entire drilling process, including the attachment and detachment of boring rods, maintaining drilling speeds equivalent to or exceeding those of skilled technicians.
- **Automated Grouting System:** Developed by Kajima Corporation, Chemical Grout, and Nitto Construction. This system automates water pressure testing, cement milk mixture determination, production, injection instructions, operational management during injection, and the subsequent cleaning of plants and piping. It utilizes a management room, a central plant, a raw liquid dilution device for concentration adjustment, and a packer device.

Both components include safety features that trigger automatic equipment stops and alerts to site personnel upon detecting anomalies.

Background and Context

The development addresses labor constraints following the April 2024 overtime limit regulations, which reduced maximum shift hours in two-shift systems from 22 to 16 hours. Dam foundation work is difficult to interrupt; stopping boring risks hole wall collapse, while interrupting grouting can lead to quality issues due to cement milk solidification. Previously, the need to manually adjust cement milk concentrations and coordinate shifts around breaks limited continuous construction time and increased the burden on workers in confined spaces like inspection galleries.

Significance and Outlook

In the Naruse Dam project, the technology was applied to curtain grouting and auxiliary curtain grouting, covering over 5,500 meters of rock mass improvement with more than 1,000 automated injections. Because the system can operate without personnel during breaks and shift changes, it enables 24-hour continuous construction and allows for simultaneous operations across multiple locations.

Source: https://built.itmedia.co.jp/bt/articles/2610/28/news072.html

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#11 One-Shot Robot Harvesting: Single-Image Target Learning Specs

Published October 30, 2026 BIOENGINEER.ORG

OVERVIEW

Researchers led by Junyu Hao developed a one-shot object detection method allowing harvesting robots to identify new fruit targets from a single user-clicked image. The system achieved 57.78 mAP in cross-fruit detection, outperforming the fully supervised YOLO11n baseline by 4.00 percentage points. This eliminates the need for collecting thousands of images and manual annotation when deploying robots in unfamiliar orchards.

IN DEPTH

Key Findings

The proposed one-shot detection method achieved 29.93 mAP on the COCO benchmark, surpassing previous methods including Halluc, SFOT, and Norm-VAE. In real-world agricultural tests, the model achieved 57.78 mAP, 79.10 AP50, and 48.72 AP75 across datasets of kumquats, apples, cluster tomatoes, strawberries, and pears. Notably, the system outperformed the fully supervised YOLO11n baseline by 4.00, 7.07, and 2.53 percentage points respectively, despite being pretrained only on COCO without fine-tuning on fruit-specific data.

Technical Details

The workflow consists of four stages: information gathering, support object generation, candidate generation, and feature matching. The system utilizes a Segment Anything-style architecture to convert a single click into a segmentation mask. A deep Siamese network based on a ResNet-50 autoencoder encodes the support object and candidate regions into 1024-dimensional feature vectors, which are then compressed to 512, 256, and 128 dimensions via a multilayer perceptron. Candidates are accepted if the Euclidean distance between embedding pairs is below 0.71.

A separate refinement network predicts shifts in center coordinates, width, and height to produce precise bounding boxes. The system was tested on an NVIDIA RTX 4090 GPU, recording an average processing time of 34.42 milliseconds per image (29.06 fps) and peak GPU memory usage of 0.24 gigabytes.

Background & Context

Traditional harvesting robots require extensive datasets and retraining to recognize new crops. To test robustness, the team evaluated the system under four conditions: dense occlusion (51.87% mAP), shadows (57.46% mAP), motion blur (46.85% mAP), and small fruits (38.92% mAP). The latter proved the most challenging due to limited visual information.

Significance & Outlook

Deployment on integrated robots using UR5 and FR5 arms showed high recognition rates: 91.53% for kumquats (216 of 236 objects) and 96.33% for apples (105 of 109 objects). While effective for individual fruits, the authors note that recognizing entire clusters as single units remains difficult, and future work will focus on model compression for embedded deployment.

Source: https://bioengineer.org/one-click-picks-the-fruit-robot-harvesting-learns-new-targets-from-a-single-image/

Collected: October 31, 2026 | Automated Research System (AI)

#12 Citrus Harvesting Robot: Passive Stem Centering for Table-Grade Cuts

Published October 23, 2026 BIOENGINEER.ORG USA

OVERVIEW

Researchers at California State University, Fresno, developed a robotic harvester using a V-shaped guide and choreographed arm movements to achieve precise stem cuts. In field trials of 100 navel oranges, the system achieved a 100% detachment success rate with 92% of fruit meeting the <10 mm residual stem length quality threshold. This approach reduces hardware complexity and weight, enabling the harvesting of high-value fresh-market citrus.

IN DEPTH

Key Findings

The robotic system successfully detached 100 target navel oranges in California orchard trials without causing punctures, bruising, or peel abrasion. The average residual stem length was 3.10 ± 3.34 millimeters, with a median of 1.81 millimeters. Notably, 52% of the fruit satisfied the stringent quality requirement of less than 2 millimeters of remaining stem, while 92% met the standard fresh-market threshold of less than 10 millimeters.

Technical Details

The system replaces a motorized alignment stage with a passive mechanical centering mechanism. The end-effector consists of a compliant three-finger gripper printed from flexible thermoplastic polyurethane and a V-shaped guide capable of accommodating stems misaligned by up to 30 degrees. To align the stem, the robot executes a choreographed sequence: a 10-degree clockwise rotation, a 10-degree counterclockwise rotation about the tool axis, and a 5-to-10-degree downward rotation of the arm's fourth joint. Once settled in the V-guide, commercial citrus clippers with concave blades cut the stem flush with the peel.

The hardware is integrated into a platform featuring a Bonsai Robotics mobile rover, a Fairino FR3 six-degree-of-freedom manipulator, and an Intel RealSense D457 RGB-D camera. A YOLOv8 instance-segmentation network, trained on 2,790 images, handles detection. While the model achieved 95.5% mean average precision for oranges, it reached only 53.3% for thin stems, leaving final alignment to the passive guide.

Background & Context

Fresh-market citrus requires short stems to prevent neighboring fruit from being punctured during transport; otherwise, the produce is downgraded to juice-bound classification. Previous designs by the Fresno team used an active two-axis positioning stage that achieved high precision (0.81 ± 0.46 mm mean stem length) but increased weight and control complexity.

Significance & Outlook

The transition to a passive system reduced the end-effector weight from 1.5 kilograms to 0.5 kilograms and decreased the actuator count from four to two. By eliminating stepper motors, drivers, and limit switches, the operation time per cycle dropped from 10.79 seconds to approximately 9.1 seconds. This simplification provides a viable path toward the commercial robotic harvesting of table-grade citrus.

Source: https://bioengineer.org/robot-passively-centers-citrus-stems-for-precise-cuts-with-simpler-hardware/

Collected: October 31, 2026 | Automated Research System (AI)

#13 SAE J3016 Standard: South Korea-led 2026 revision for autonomous driving

Published October 29, 2026 MoneyToday South Korea

OVERVIEW

South Korea's Ministry of Science and ICT and ETRI have led the revision of the SAE J3016 international standard for autonomous driving levels. The 2026 edition clarifies the specific roles of drivers versus vehicles across levels 0 to 5 to prevent misinterpretation of driver assistance functions.

IN DEPTH

Key Findings

The Ministry of Science and ICT and the Electronics and Telecommunications Research Institute (ETRI) have successfully revised SAE J3016, the global international standard for autonomous driving levels. Officially published on September 20, 2026, this revision marks the first time that the standard—previously revised primarily by the United States—was led by South Korean researchers.

Technical Details

The SAE J3016 standard classifies automotive driver assistance and autonomous driving technology into six distinct stages, ranging from Level 0 to Level 5. The 2026 revision specifically focuses on the following:

- **Role Definition:** Clearer definitions of the mandatory roles that the driver and the automobile must perform at each stage.
- **Descriptive Text:** Updated language for existing autonomous driving levels to make the distinction between human and machine responsibilities more apparent.
- **Terminology:** Refinement of concepts and terminology to ensure a clearer understanding of the differences between the six levels.

Background and Context

The need for this reorganization arose from the proliferation of lane-keeping and speed-control functions, alongside the deployment of driverless "robotaxi services" in certain countries. Previous ambiguities in the standard led to risks where driver assistance functions were misinterpreted as "full autonomous driving," or where the roles of the driver and the vehicle were confused.

The revision process was spearheaded by a domestic research team led by Cha Hong-gi, head of ETRI's Intelligent Information Standards Research Lab, who worked on the project for three and a half years under the "Information, Communications and Broadcasting Standards Development Support Project."

Significance and Outlook

Since its establishment in 2014, SAE J3016 has served as the primary benchmark for automobile manufacturers, parts suppliers, international organizations, and governments when establishing regulations and developing technology. The revised standard will now be applied globally by autonomous driving companies and institutional investors during the development of vehicle functions and the design of safety systems.

Source: https://www.mt.co.kr/index.php/en/tech/2026/10/29/2026102909515047023

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