



## Show Notes 2 May 2025

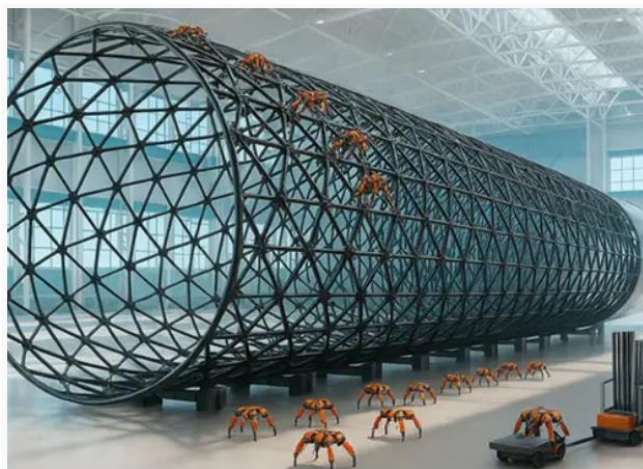
### Story 1: US to unleash robot swarms to build smart aircraft with speed, precision, safety

Source: Interesting Engineering

Story by Jijo Malayil

Link: [https://interestingengineering.com/innovation/robot-swarms-to-build-smart-aircraft?group=test\\_a](https://interestingengineering.com/innovation/robot-swarms-to-build-smart-aircraft?group=test_a)

See also: <https://www.globenewswire.com/news-release/2025/04/03/3055273/0/en/H2-Clipper-Transforms-Aviation-and-Aerospace-Manufacturing-with-Patented-Swarm-Robotics-Innovation.html>



Visualization of a future-state aerospace manufacturing facility powered by swarm robotics.

H2 Clipper

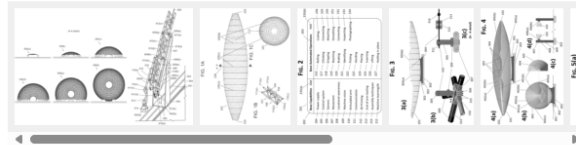
- [H2 Clipper](https://www.globenewswire.com/news-release/2025/04/03/3055273/0/en/H2-Clipper-Transforms-Aviation-and-Aerospace-Manufacturing-with-Patented-Swarm-Robotics-Innovation.html), a company specializing in hydrogen-based transportation and infrastructure, has secured a patent for a breakthrough in aerospace manufacturing. **Note** – read/see the patent here: <https://patents.google.com/patent/US11851214B2/en>

## System, method and apparatus for airship manufacture using robotics

### Abstract

A system, method and apparatus are proposed to assist in assembling the frame, attaching the skin, and performing other tasks in manufacturing an airship and constructing other structures that are otherwise challenging, inefficient, or unsuitable for humans to perform, and/or that traditionally require significant investments in capital intensive manufacturing facilities. Several embodiments are proposed in which these and other recurring manufacturing tasks can be performed safely and efficiently with the assistance of autonomous, semi-autonomous, and/or human-directed robots, acting independently and in robot swarms.

### Images (10)

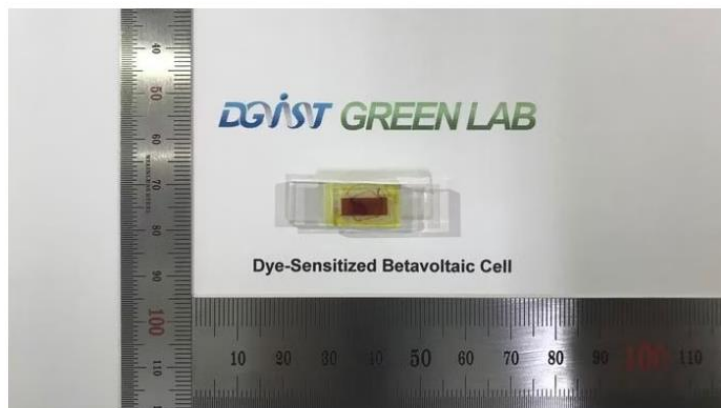


- The newly granted patent covers the use of autonomous and semi-autonomous robotic swarms in large-scale aircraft and aerospace production for faster, more precise, and cost-effective manufacturing, marking a significant step forward in autonomous aerospace technologies.
- H2 Clipper's newly patented system uses a swarm of smart robots to build large aerospace structures faster, more safely, and with less space needed. These robots work together like a team, each one handling different tasks such as assembling the aircraft frame, attaching the outer shell, installing parts inside, and checking the quality of the work as they go.
- The system is powered by artificial intelligence (AI) and machine learning, which help the robots improve their work overtime, reduce mistakes, and stay on schedule. The robots can also adjust their actions automatically to make sure everything fits perfectly.
- According to the firm, safety is a big focus of the design. The robots use sensors and AI to avoid bumping into each other and to carry out risky tasks that would otherwise put human workers in danger, like working at high places.
- Another key feature is the integration of heavy-lift robots, which can move and position large parts during the building process. This means entire aircraft structures can be built in place, either upright or flat, reducing the need for large manufacturing facilities.
- Conservative estimates suggest this approach can reduce total manufacturing costs by 40 percent or more and cut production timeframes by up to 60 percent.

**Story 2: This little nuclear battery could mean never needing to charge your phone again** - *The prototype uses carbon-14, an unstable and radioactive form of carbon.*

Source: Industrial Equipment News    Announcement from American Chemical Society

Link: <https://www.iem.com/product-development/news/22937027/this-little-nuclear-battery-could-mean-never-needing-to-charge-your-phone-again>



A small dye-sensitized betavoltaic cell has radiocarbon on both the cathode and anode, which increases its energy-conversion efficiency.  
Source: Su-II In

- This article introduces a new prototype nuclear battery that could revolutionize how we power everyday devices.
- Researchers at the Daegu Gyeongbuk Institute of Science & Technology in South Korea have developed a betavoltaic cell that uses radiocarbon (carbon-14) on both its cathode and anode to convert beta radiation into electricity.
  - **Side note** - A betavoltaic cell, also known as a betavoltaic battery, is a type of nuclear battery that generates electricity from beta particles emitted during the radioactive decay of certain isotopes, such as tritium or nickel-63. These beta particles interact with a semiconductor material, creating electron-hole pairs that produce an electric current.
- This design offers a potential alternative to conventional lithium-ion batteries, which are prone to degradation after repeated charging cycles and raise environmental concerns due to intensive mining and disposal issues .

- Unlike lithium-ion batteries that typically last only hours or days between charges, the nuclear battery's use of radiocarbon, which degrades very slowly, could allow it to run for decades or even millennia without needing a recharge.
- The system leverages the safe emission of beta particles—which can be effectively shielded with materials such as aluminum—to generate power steadily in a compact form factor.
- These attributes make betavoltaic batteries a promising candidate for powering not only smartphones but also devices like remote sensors and drones where long-lasting, maintenance-free energy sources are critical.

### Story 3: Wheel-less helical ring-based soft robot can move reliably in all directions

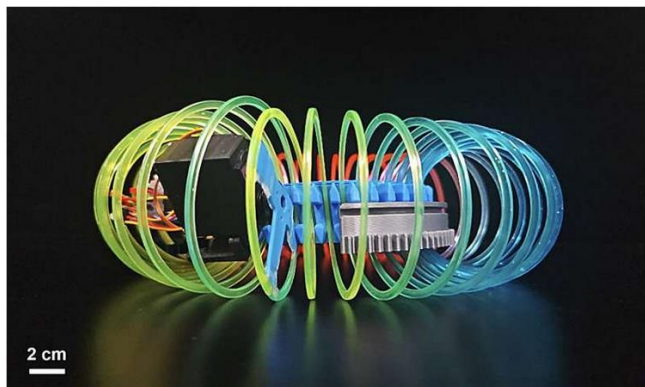
Source: TechXplore.com

Story by Ingrid Fadelli

Link: <https://techxplore.com/news/2025-03-wheel-helical-based-soft-robot.html>

See video here: [https://www.youtube.com/watch?v=iDLADT\\_S6Ks](https://www.youtube.com/watch?v=iDLADT_S6Ks)

Another good video here: <https://www.youtube.com/watch?v=dE9lcvv0ddg>



Side view of the WHERE-Bot turning inside-out (everting) and moving toward the heavier si...

- This article details the design and capabilities of WHERE-Bot—a novel wheel-less, helical ring-based soft robot developed by researchers at Tsinghua University.
- Inspired by the playful idea of connecting a Slinky toy's ends to allow continuous inside-out turning (a process they refer to as "everting"), the team engineered a robot capable of omnidirectional locomotion without relying on traditional sensors or cameras.
- At its core, WHERE-Bot employs a helical ring that rotates via a motor along the ring's circumference. When this structure contacts the ground, the robot's unbalanced mass distribution creates an asymmetrical friction profile that naturally drives the robot toward its heavier side.
- This results in a self-generated, orbiting movement along a circular path, enabling the robot to adaptively navigate unstructured and unpredictable environments, whether that's on flat ground, over pipes, underwater, on sand, or even mid-air obstacles.
- The research represents a significant step forward in soft robotics by demonstrating how simple structures can achieve complex, sensor-free navigation.



#### **Story 4: “Wearable tech detects silent heart issues”: Over 90% accuracy achieved in breakthrough that could save millions without warning signs**

Source: Sustainability Times

Story by Hina Dinoo

Link: [https://www.sustainability-times.com/featured/wearable-tech-detects-silent-heart-issues-over-90-accuracy-achieved-in-breakthrough-that-could-save-millions-without-warning-signs/#google\\_vignette](https://www.sustainability-times.com/featured/wearable-tech-detects-silent-heart-issues-over-90-accuracy-achieved-in-breakthrough-that-could-save-millions-without-warning-signs/#google_vignette)



- This article reports on a groundbreaking development by researchers at the University of Missouri who have created a starfish-shaped wearable device designed for continuous heart monitoring.
- This innovative device leverages advanced AI technology combined with multiple sensors—strategically positioned on its five starfish-like arms—to capture both electrical and mechanical signals from the heart.
- This dual-signal approach enables the device to detect silent heart issues with over 90% accuracy.
- The design plays a crucial role in its performance. The starfish shape ensures increased stability and close contact with the skin near the heart, allowing for precise data collection even while the wearer is in motion.
- Additionally, the device features wireless charging, which supports uninterrupted use by eliminating the need for frequent removal for charging.
- Future iterations are set to improve comfort further by incorporating breathable, skin-friendly materials, thereby enhancing their suitability for long-term wear.
- By providing real-time, at-home monitoring, this wearable technology is poised to revolutionize preventive cardiac care. Its ability to detect previously silent heart conditions could potentially save millions of lives by prompting early intervention before the onset of more obvious warning signs.





## Honorable Mentions

### Story: Scientists Create Smart Insole That Turns Every Step into Health Data

Source: Study Finds

Story by “staff”

Link: <https://studyfinds.org/new-smart-insole-health-data/>



What if your shoes could monitor your health? (PeopleImages.com - Yuri A/Shutterstock)

- This article describes a breakthrough smart insole system developed by an international research team that can monitor your every step—literally—by converting foot pressure and movement data into useful health information. Here are the key points:
  - **Self-Powered and Accurate:** The insole is entirely wireless and self-powered. It incorporates built-in sensors and harvests solar energy, meaning it requires no external battery. Just six minutes of sunlight can sustain an hour of operation, making it practical for everyday use.
  - **Advanced Sensing Capabilities:** Using machine learning, the insole is capable of accurately detecting eight distinct motion states—such as walking, running, sitting, and squatting. This granular data can help in understanding your gait and physical activity in real time.
  - **Durability and Engineering Excellence:** The design smartly addresses common issues found in previous smart insoles. By employing a nonlinear synergistic strategy in its pressure sensor, the device shows impressive linearity and enduring durability (withstanding over 180,000 compression cycles), ensuring it remains reliable even after extensive daily use.
  - **Potential Health Applications:** Beyond daily activity tracking, the system holds promise for medical and rehabilitative uses. It may be employed to

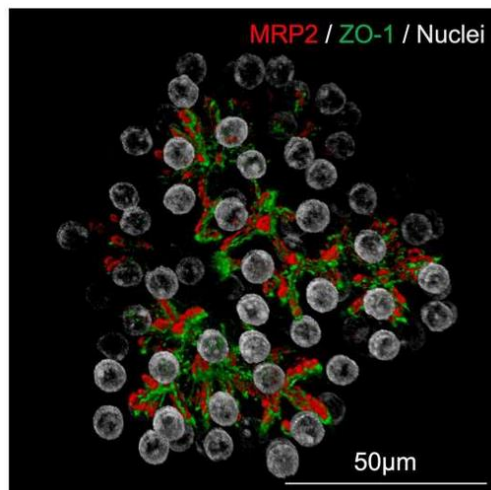
monitor conditions like diabetic foot ulcers by detecting abnormal pressure distributions before they become serious issues. Additionally, it could assist in managing movement disorders like Parkinson's disease or help assess gait abnormalities for stroke rehabilitation.

- This innovation not only heralds a new era in personal health monitoring but could also pave the way for more integrated, non-intrusive wearable technologies that assist with early diagnosis and continuous health assessment .

**Story:** Scientists achieve record-breaking growth in miniature, functional liver models

Source: Keio University School of Medicine

Link: <https://www.keio.ac.jp/en/press-releases/2025/Apr/17/49-166303/>



- This article reports a breakthrough by researchers at Keio University School of Medicine in growing miniature, functional liver models—known as hepatocyte organoids—in the laboratory.
- By harnessing a novel method, the team achieved a million-fold proliferation of these 3D liver models in just three to four weeks.
- Previously, organoids could only be maintained for one to two weeks before losing key liver functions, but the new technique enables them to not only multiply drastically but also sustain vital liver activities. This is done by starting with cryopreserved human adult hepatocytes taken directly from patients and



treating them with oncostatin M, a protein involved in inflammatory signaling, which drives their robust growth .

- Moreover, the researchers developed a hormone-based differentiation protocol that guides the organoids to fully mature and replicate the complex functions of the liver.
- Once differentiated, the organoids begin to perform all major liver tasks: they produce essential compounds such as glucose, urea, bile acid, cholesterol, and triglycerides, and even secrete albumin at levels comparable to that in human tissue.
- This advancement not only provides a laboratory model that closely mimics the human liver's multifaceted roles but also holds tremendous promise for accelerating drug development and advancing regenerative therapies, especially for liver diseases like metabolic dysfunction-associated steatotic liver disease (MASLD), which affects a significant portion of the global population .
- This breakthrough opens up exciting possibilities for personalized medicine, offering a reliable platform for drug screening and testing regenerative therapies. It could transform approaches to treating liver disease and help bridge the gap between traditional cell-culture systems and the complex functionality of human organs.

### **Story: Seabird modelling tool could transform offshore wind planning, study shows**

Source: The Independent

Story by Nick Forbes

Link: <https://www.msn.com/en-us/travel/news/seabird-modelling-tool-could-transform-offshore-wind-planning-study-shows/ar-AA1BZOPQ>



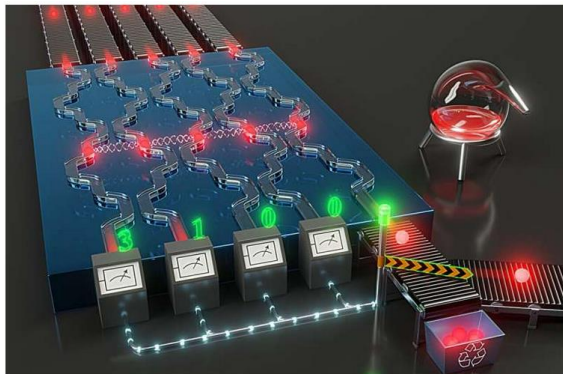
- This article discusses a new seabird modeling tool developed by researchers at the University of Glasgow, which could significantly enhance offshore wind farm planning. Here are the main points:
- **Improved Accuracy:** The tool predicts seabird "home ranges" (areas they fly and forage) with 73% accuracy, significantly better than existing methods, which range from 31% to 41% accuracy.
- **Impact on Offshore Wind Planning:** Accurate mapping of seabird populations is crucial for planning wind farms, as these installations can impact seabird populations. The tool could prevent the placement of wind farms in high-density bird areas or avoid unnecessary rejection of plans due to overestimated seabird presence.
- **Independence from GPS Tracking:** This is the first tool to predict seabird ranges accurately without relying on GPS data. It's particularly beneficial for studying seabird colonies in remote areas where GPS tracking is challenging.
- The study's lead researchers emphasize that the tool can lead to better-informed decisions, balancing renewable energy development with environmental protection.

**Story:** Error correction method reduces photon requirements for quantum computing

Source: Phys.org

Story by K.W. Wesselink

Link: <https://phys.org/news/2025-04-error-method-photon-requirements-quantum.html>



Artist's impression of photon distillation. Credit: arXiv. DOI: 10.48550/arxiv.2404.14262

- This article explains a breakthrough in photonic quantum computing where researchers at the University of Twente have developed an innovative error correction method that dramatically reduces the number of photons needed to build a reliable quantum computer.
  - Key points include:
    - **Quality Over Quantity:** Quantum computers have long suffered from the dilemma of needing both a large number of qubits and high-quality ones. Traditional methods required hundreds of physical photons to generate a single error-free qubit, significantly increasing complexity and cost. The new method instead focuses on improving the quality of photons from the start, reducing the need for such extensive error correction.
    - **Photon Distillation via Optical Circuits:** The team engineered a novel optical circuit composed of programmable light guides and detectors. This setup leverages quantum properties to create a state reminiscent of Schrödinger's cat, where photons are driven to favor the "good" (high-quality) state over the "bad" (error-prone) one. Instead of correcting errors after they occur, the technique filters out imperfections early in the process. Although this involves sacrificing several imperfect photons to extract a single, high-quality one, overall, it drastically cuts down the photon requirement needed for reliable quantum logic.
    - **Implications for Quantum Computing:** By reducing the number of photons needed while enhancing qubit reliability, this method not only makes photonic quantum computers cheaper and more practical but also paves the way for broader applications. These advancements could accelerate progress in areas like medicine, the development of new materials, and secure communication systems.
- This development is seen as a significant step forward in addressing one of the two crucial challenges in quantum computing—ensuring high-quality qubits—thereby bringing the promise of powerful, next-generation quantum computers closer to reality .