Show Notes 2 January 2026

Story 1: Real-world helper exoskeletons come closer to reality with AI training

Source: TechXplore.com Story by Robert Egan

Link: https://techxplore.com/news/2025-11-real-world-helper-exoskeletons-closer.html

See research paper here: https://www.science.org/doi/10.1126/scirobotics.ads8652

With a new AI tool, Georgia Tech researchers can create fully functional exoskeleton control…

- Georgia Tech researchers have developed an AI tool that can train exoskeleton controllers without requiring extensive human data collection in specialized labs.

- Traditionally, building and improving exoskeletons requires massive amounts of time, money, and human trials. Each design change meant starting over with new data collection.

- How the Georgia Tech AI tool works:

- The system uses **CycleGAN**, an AI originally designed to translate satellite images into ground-level views.
    - **Side note** - CycleGAN is a type of Generative Adversarial Network (GAN) designed to transform images from one style or domain to another (like turning a photo of a horse into a zebra, or a summer landscape into a winter one) without needing matching pairs of training images.
- Instead of working with images, the Georgia Tech AI maps large datasets of human movement without exoskeletons to predict how people would move with them.
- It then estimates joint torque and provides real-time assistance at the hip and knee, boosting effort by up to 20%.
- This approach eliminates the need for repeated retraining when devices are updated, making exoskeleton development far more practical and scalable.
- Startup companies and labs without specialized equipment can now more easily deploy wearable robotic devices.

- **Broader Implications**
    - The AI acts like a translator, converting cheap, large-scale biomechanics data into usable exoskeleton control signals.
    - This breakthrough could accelerate innovation across robotics, prosthetics, and rehabilitation technologies, opening doors for wider industry collaboration.

Story 2: New Augmented Reality Tech Can Turn Any Surface into Keyboard

Source: University of Texas at Dallas Story by Kim Horner

Link: https://news.utdallas.edu/science-technology/augmented-reality-tech-keyboard-2025/

Augmented Reality, Haptics, Human-Computer Interaction

- Researchers at the University of Texas at Dallas have created PropType, a patent pending augmented reality system that overlays a virtual keyboard onto physical objects—everything from bottles and cans to books and mugs.

- The goal is to solve one of AR's biggest pain points: [virtual] typing in mid air, which is slow, inaccurate, and physically tiring.

- How PropType Works

    - PropType uses an AR headset, fingertip sensors for each hand, and a sensor attached to any curved, flat or irregular surface object a user is holding, such as a water bottle, coffee cup, thick book, you name it, to project a virtual keyboard on its surface.

    - The system adapts to flat or curved surfaces, letting users type on objects that feel natural in the hand.

    - The system can adapt for multiple curved or irregular surfaces, such as water bottles, coffee cups, and thick books.

    - And users can design their own layouts, adjusting size, spacing, and visual effects for comfort and accessibility.

    - It provides real tactile feedback, unlike floating AR keyboards, which improves speed and accuracy.

    - The system maps finger taps with high precision, effectively turning any handheld item into a portable, ergonomic typing surface.

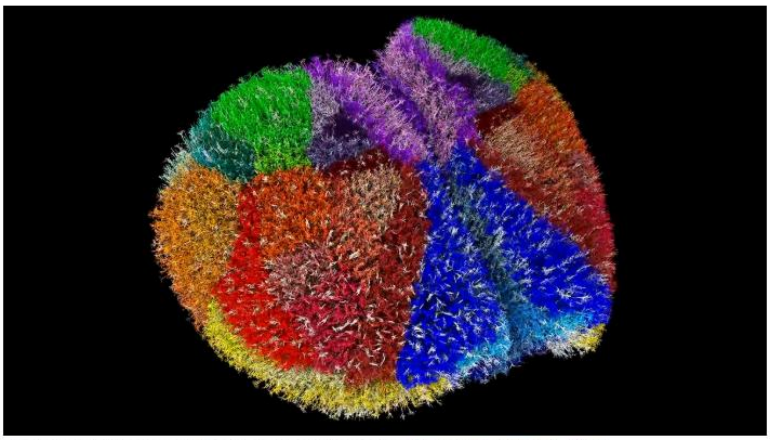
Story 3: Supercomputer Creates One of the Most Realistic Virtual Brains Ever Seen

Source: ScienceAlert.com Story by David Nield

Link: https://www.sciencealert.com/supercomputer-creates-one-of-the-most-realistic-virtual-brains-ever-seen

See video here: https://www.facebook.com/watch/?v=1531823138015033

Longer video segment here: https://www.youtube.com/watch?v=w5Xcx0dDwGQ



The brain simulation goes to the detail of individual neurons. (Barry Israelewitz et al., 2025)

- Getting a better understanding of how the brain works is tricky, as living brains aren't easily prodded and analyzed. Scientists now have a new simulation of a mouse's brain to refer to – one of the most comprehensive that's ever been put together.

- The creation was led by a team from the Allen Institute in the US and the University of Electro-Communications in Japan, and it may allow diseases such as Alzheimer's to be modeled and studied in greater detail.

- The simulation models an entire mouse cortex. While this isn't nearly as large or as intricate as a human brain, which contains billions of neurons, there are similarities between human and rodent brains – so this could be a useful study tool.

- The numbers are impressive: the virtual mouse brain contains 9 million neurons, as well as 26 billion synapses (neuron connectors). There are 86 interconnected regions in the brain simulation, and it can process quadrillions of calculations every second.

- To put that in perspective, the real and full mouse brain contains roughly 70 million neurons in a space about the size of an almond.

- The complexity of the simulation means that researchers can watch as models of cognition, consciousness, and disease spread through the brain. It's a three-dimensional, moving map that shows individual neurons firing and connecting.

- Some of the ways this could be used, according to the researchers, are to test hypotheses on how seizures spread in the brain, or how brain waves contribute to focus – without any need for repeated, invasive, physical brain scans.

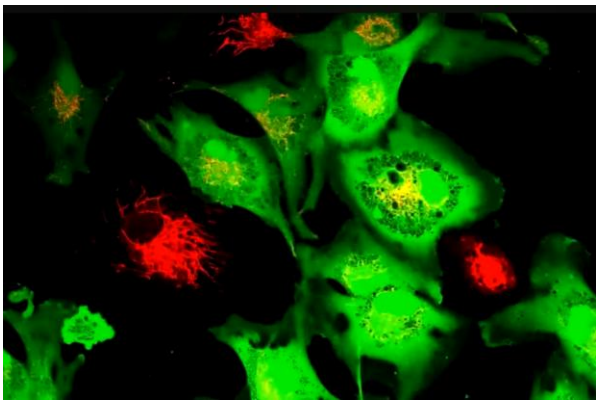
Story 4: Scientists Discover a Way to 'Recharge' Aging Human Cells

Source: ScienceAlert.com Story by David Nield

Link: https://www.sciencealert.com/scientists-discover-a-way-to-recharge-aging-human-cells

See research paper here: https://www.pnas.org/doi/10.1073/pnas.2505237122

See video here: https://www.youtube.com/watch?v=NHbSqcemBW8 [no narration but shows recipient cells (green) receive new mitochondria (red) from healthy stem cells.]



- Scientists at Texas A&M University found a way to “recharge” aging human cells by boosting their mitochondria (the cell’s energy powerhouses).

    - **Side note** - A mitochondrion (plural: mitochondria) is a double-membrane-bound organelle present in animals, plants, fungi, and most other organisms whose cells contain a true, membrane-bound nucleus and other specialized organelles. Often called the “powerhouse of the cell” because they generate most of the cell’s usable energy.

- New research by Texas A&M University shows how human cells can be effectively 'recharged' by replacing their internal batteries – microscopic power stations called mitochondria – and the discovery could have wide-ranging benefits across healthcare and medical treatments.

- The stacks of mitochondria in most of our cells naturally decline in numbers, slow down, and wear out with age. Once they start operating below peak capacity, they can contribute to multiple diseases everywhere from the heart to the brain.

- In this latest study, researchers from Texas A&M University used special flower-shaped particles called nanoflowers to scavenge damaging oxygen molecules, triggering genes that increase the number of mitochondria in human stem cells.

- Here’s the key breakthrough -- those energy-boosted stem cells could then share their mitochondria with old and damaged neighboring cells. It's more of a battery swap than a recharge, but it means existing cells that have stopped functioning can get back to work.

    - This new research can help aging or damaged cells regain their vitality – without any genetic modification or drugs.

    - **Potential Benefits -** Since mitochondria decline with age, this breakthrough could help combat diseases linked to aging, including those affecting the heart and brain.

Honorable Mentions

Story: CES product announcement: world's first sonic toothbrush equipped with SmartNose, an integrated connected sensor designed to analyze breath biomarkers in real time

Source: US-based company Autobrush CES announcement today

Link: **https://tryautobrush.com/**

- Y-Brush Halo introduces a breakthrough in personal health technology: the Y-Brush Halo analyzes breath biomarkers during daily oral care to identify subtle metabolic and inflammatory signals.

- Using a network of advanced sensors combined with AI, it detects specific volatile organic compounds associated with over 300 health conditions, including early-stage diabetes, gum disease, and liver disorders.

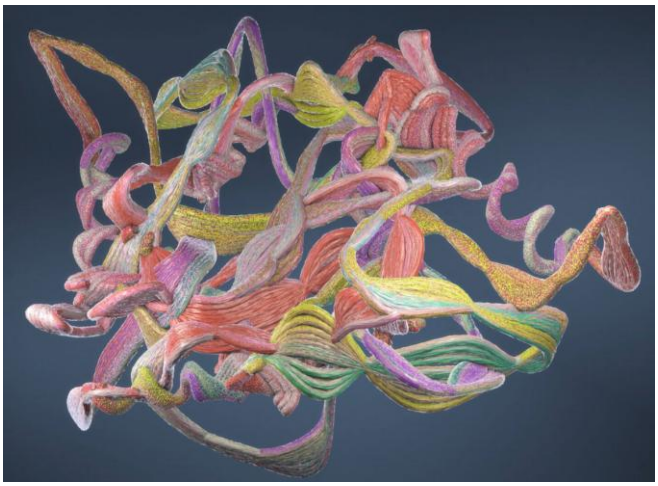
- This non-invasive approach enables frequent, effortless monitoring, helping reveal potential health issues long before clinical symptoms appear — all without blood tests or changes to daily habits.

Story: AI trained on bacterial genomes produces never-before-seen proteins

Source: ArsTechnica.com Story by John Timmer

Link: https://arstechnica.com/science/2025/11/generative-ai-meets-the-genome/

See research paper here: https://www.nature.com/articles/s41586-025-09749-7



Credit: CHRISTOPH BURGSTEDT/SCIENCE PHOTO LIBRARY

- Researchers at Stanford have developed a generative AI model called **Evo**, trained on bacterial genomes that can produce **novel, functional proteins** never seen before. This breakthrough suggests AI can design biological molecules directly from DNA-level patterns, opening new possibilities in biotechnology and synthetic biology.

- Previous AI systems in biology focused on predicting protein structures or designing proteins from amino acid sequences. Evo instead works at the **genomic DNA level**, where evolution naturally operates.

- **Training method**: Evo was trained like a large language model (LLM) but on **bacterial genomes**, learning to predict the next DNA base in a sequence. Because bacterial genes often cluster by function, Evo could infer relationships between genes and pathways.

- **Novel protein generation**:

    - When prompted with bacterial toxin genes, Evo generated **new antitoxins**. Some restored bacterial growth despite having only ~25% similarity to known proteins.

    - Evo also produced **RNA-based inhibitors** and **CRISPR inhibitors**, with 17% of outputs showing functional activity. Two proteins had **no similarity to any known proteins** and even confused structure-prediction software.

- **Scale of output**: Researchers prompted Evo with 1.7 million bacterial and viral genes, generating **120 billion base pairs of synthetic DNA**, containing both known and potentially novel genes.

- **Limitations**: Evo's success relies on bacterial genome organization. More complex organisms (like humans) lack such clustering, making it unclear if the approach will scale to higher life forms.

- **Significance**: Evo demonstrates that **AI can create entirely new proteins** without relying on existing structural knowledge, potentially revolutionizing drug discovery, biotechnology, and synthetic biology.

- **Biotech innovation**: Evo could accelerate discovery of new enzymes, antibiotics, or CRISPR inhibitors.

- **Evolutionary insight**: It mimics how nature evolves proteins at the DNA level.

- **Synthetic biology**: Offers a massive dataset of AI-generated DNA for experimental exploration.

Story: Department of Energy, PNNL Partner to Power the Nation's Bioeconomy

Source: Pacific Northwest National Laboratory Story by Tom Rickey

Link: https://www.pnnl.gov/news-media/department-energy-pnnl-partner-power-nations-bioeconomy

- The U.S. Department of Energy (DOE) and Pacific Northwest National Laboratory (PNNL) have launched a groundbreaking autonomous science facility—the **Anaerobic Microbial Phenotyping Platform (AMP2)**—to accelerate biotechnology discovery and strengthen the nation's bioeconomy.

- **Key Highlights**
  - **Launch Event:** AMP2 was commissioned on **December 4, 2025**, during a visit by DOE Secretary Chris Wright to PNNL's campus in Richland, Washington.
  - **Purpose:** AMP2 is designed to **redefine biological science in the U.S.**, focusing on microbes and AI-driven science to speed up discovery.
  - **Capabilities:**
    - Provides **unprecedented speed and scale** for microbial research.
    - Uses **autonomous systems and artificial intelligence** to analyze anaerobic microbes, which are critical for producing biofuels, bioplastics, and other bioproducts.
  - **Impact on Bioeconomy:**
    - Strengthens U.S. leadership in biotechnology.
    - Supports the DOE's mission to expand the **bioeconomy**, which includes renewable energy, sustainable materials, and industrial bioprocesses.
    - Helps reduce reliance on fossil fuels by enabling new bioproducts and processes.

- Why It Matters
  - Scientific Innovation: AMP2 represents a first-of-its-kind facility that integrates automation and AI into biological discovery.
  - Economic Growth: By accelerating bioproduct development, it supports industries ranging from energy to healthcare.
  - Sustainability: Advances in microbial research can lead to cleaner fuels, reduced waste, and more sustainable materials, aligning with national climate and energy goals.

- In short: AMP2 is a major step forward in autonomous biological research, giving the U.S. a competitive edge in the global bioeconomy by harnessing microbes and AI to drive sustainable innovation.

[redacted]

Story: Astro Mechanica teams with UK SME Helix to build hybrid-electric engines for the next generation of supersonic aircraft

Source: Aerospace Global News Story by Jay Menon

Link: https://aerospaceglobalnews.com/news/astro-mechanica-helix-supersonic-engines-electric-motors/

- UK company Helix (electric powertrains, Milton Keynes) has teamed up with US aerospace startup Astro Mechanica (California) to develop a hybrid-electric propulsion system called Duality™.

- Capabilities:
  - Designed for Mach-3 supersonic flight (three times the speed of sound).
  - Focus on long-range travel while keeping costs commercially viable.

- Technology:
  - Uses a combined-cycle propulsion system integrating electric motors for efficiency.

- Vision: Enable affordable supersonic travel for the next generation of aviation.