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VEDAVYASA INSTITUTE OF TECHNOLOGY

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# TECH NEWS

RECENT UPDATES ON TECHNOLOGY

Prepared By S2 Students under the Guidance of DSH (Department of Science and Humanities)

## BUILDING ARTIFICIAL NERVE CELLS

On connecting to the carnivorous Venus flytrap, the electrical pulses from the artificial nerve cell can cause the plant's leaves to close, although no fly has entered the trap. Organic semiconductors can conduct both electrons and ions, thus helping mimic the ion-based mechanism of pulse (action potential) generation in plants. In this case, the small electric pulse of less than 0.6 V can induce action potentials in the plant, which in turn causes the leaves to close. The Venus flytrap so we could clearly show how we can steer the biological system with the artificial organic system and get them to communicate in the same language. In 2018 the research group at Linköping University became the first to develop complementary and printable organic electrochemical circuits that is, with both n-type and p-type polymers, which conduct negative and positive charges. This made it possible to build printed complimentary organic electrochemical transistors. The group has subsequently optimized the organic transistors to be manufactured in printing presses on thin plastic foil. Thousands of transistors can be printed on a single plastic substrate. Together with researchers in Lund and Gothenburg, the group has used the printed transistors to emulate the neurons and synapses of the biological system. The results have been published in the journal Nature Communications. UYF or the first time, we're using the transistor's ability to switch based on ion concentration to modulate the spiking frequency. The connection between the neuron and the synapse has a learning behaviour, called Hebbian learning. Information is stored in the synapse, which makes the signalling more and more effective. The application of artificial nerve cells is limitless. The hope is that artificial nerve cells can be used for sensitive human prostheses, implantable systems for relieving neurological diseases, and soft intelligent robotics. Ion-based neurons, similar to our own, can be connected to biological systems. Organic semiconductors have numerous advantages they're biocompatible, biodegradable, soft, and formable. They only require low voltage to operate, which is entirely harmless to both plants and vertebrates.

For more details:

https://www.sciencedaily.com/releases/2022/02/220222121302.htm

ANURAG

## TALENTS

AVINASH, S1

## INTERNET OF BEHAVIORS

The Internet of Behaviors (IoB) is an area of research and development (R&D) that seeks to understand how, when, and why humans use technology to make purchasing decisions. IoB combines three fields of study: behavioral science, edge analytics, and the Internet of Things (IoT). IoB platforms are designed to gather, aggregate and analyze data generated from a wide variety of sources, including household digital devices, wearable computers, and human online activities. The data is then analyzed in terms of behavioral psychology to look for patterns that can be used by marketing and sales teams to influence future consumer behavior. An important goal of the IoB is to help marketers understand and monetize the massive amount of data produced by network nodes in the Internet of Things. The Internet of Behaviors is expected to play an important role in e-commerce, health care, customer experience management (CXM), and search engine optimization (SEO). Potential IoB use cases include: Reducing insurance premiums for drivers whose vehicles consistently report desired brake and acceleration patterns. Analyzing a specific user's grocery purchases in order to personalize menu suggestions. Using location services and buying history to customize a shopper's point-of-sale (PoS) promotions in real-time. Sending an alert when a fitness activity tracker's data indicates the wearer's blood pressure is too high or too low. The term IoB is credited to the tech research firm Gartner and is explained in Gartner's" Top Strategic Technology Trends for 2021." Gartner credits the concept of using IoT data to influence behavior to Göte Nymanof, a psychology professor at the University of Helsinki. The research firm points out that local laws will play an important role in how data can be used by public and private organizations to influence behaviour. Gartner also says that unless IoB initiatives are designed to provide consumers with added value, the entire concept risks rejection. Concerns about privacy and the possible invasiveness of an IoB have been raised in some circles and will likely need to be addressed in order for it to be embraced on a larger scale.

For more details:

https://www.techopedia.com/definition/34552/internet-of-behaviors-iob#:~:text=The%20Internet%20of%20Behaviors%20

SHADA

## PUZZLE

There are 8 batteries, but only 4 of them work. You have to use them for a flashlight which needs only 2 working batteries. To guarantee that the flashlight is turned on, what is the minimum number of battery pairs you need to test?


SOLUTION: To solve this problem, the first step involves naming the batteries, for instance, A, B, C, D, E, F, G, and H. In this problem, you can't compare 2 items directly. If a combination of two batteries fail to turn the light on, it means either one or both the batteries aren't working. The candidate has to approach the puzzle in a circular manner. The batteries are put test consecutively in the order AB, BC, and AC. At most, one of the three batteries between A, B, And C is working, only if none of the pairs work. This also implies that at least three batteries between D, E, F, G, and H must be functional. DE combination is tried next. If they don't work, at least 2 out of F, G, and H must work. Similarly, try the combinations FG, GH, and FH to positively asset which batteries really work.

AMAZING FACTS:

There is no specific time zone at the South Pole.

## MAKING A 'COMPUTER' OUT OF LIQUID CRYSTALS

The research aimed to take a closer look at a type of material called a liquid crystal. The molecules in a liquid crystal tend to be elongated, and when packed together they adopt a structure that has some order, like the straight rows of atoms in a diamond crystal but instead of being stuck in place as in a solid, this structure can also shift around as a liquid does. Scientists are always looking for these kinds of oddities because they can utilize these unusual properties as the basis of new technologies; liquid crystals, for example, are in the LCD TV you may already have in your home or on the screen of your laptop. One consequence of this odd molecular order is that there are spots in all liquid crystals where the ordered regions bump up against each other and their orientations don't quite match, creating what scientists call "topological defects." These spots move around as the liquid crystal moves. Scientists are intrigued by these defects, wondering if they could be used to carry information similar to the functions that electrons serve in the circuits of your laptop or phone. But in order to make technology out of these defects, you'd need to be able to shepherd them around where you want them, and it's proved very difficult to control their behavior. "Normally, if you look through a microscope at an experiment with an active liquid crystal, you would see complete chaos defects shifting around all over the place. They showed that if they controlled where they put energy into the liquid crystal by shining light only on specific areas, they could guide the defects to move in specific directions. In a new paper, they took it a logical step further and determined that it should be theoretically possible to use these techniques to make a liquid crystal perform operations like a computer. These have many of the characteristics of electrons in a circuit we can move them long distances, amplify them, and shut or open their transport as in a transistor gate, which means we could use them for relatively sophisticated operations. Though calculations suggest these systems could be used for computations and can be used in the field of soft robotics, the scientists said. Researchers are interested in soft robots with bodies that aren't made out of hard metal or plastic, but rather stretchy and soft materials because their flexibility and gentle touch mean they can perform functions that hard-bodied robots cannot.

For more details:
https://www.sciencedaily.com/releases/2022/03/220302092732.htm

## ABOUT THE SCIENTISTS

### ARISTARCHUS

Aristarchus was born in about the year 310 BC, probably on the Greek island of Samos, the same island Pythagoras was born on 260 years earlier. We know very little about Aristarchus's life, but we know enough to be astounded by his science. We know:

- Aristarchus lived at about the same time as two of our other scientific heroes, Archimedes and Eratosthenes; he was 20 to 30 years older than them.
- His greatest work has been lost in the mists of time; we know about it because Archimedes mentions it in *The Sand Reckoner*, more of which soon.

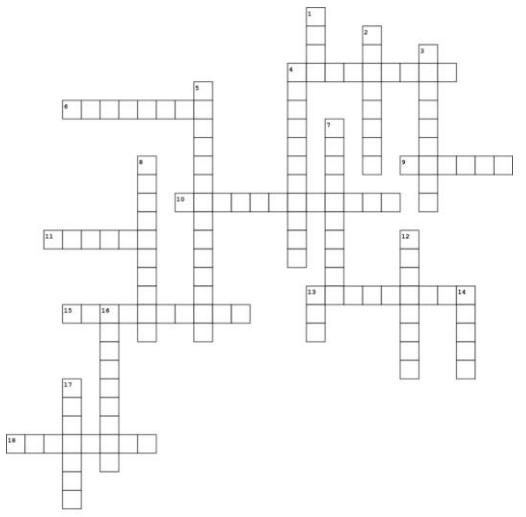
Aristarchus must have used the concept of parallax to show that the stars are a very large distance from Earth. In doing so, he expanded the size of the universe enormously. It would be marvelous if we could learn the details of Aristarchus's observations, calculations, and arguments, could read his notes and see his diagrams; but, unless a copy of his ancient book can be discovered in some forgotten, dusty corner of an ancient library, that is a pleasure we shall never have.

## FINGERTIP SENSITIVITY FOR ROBOTS

The thumb-shaped sensor is made of a softshell built around a lightweight stiff skeleton. This skeleton holds up the structure much like bones stabilize the soft finger tissue. The shell is made from an elastomer mixed with dark but reflective aluminium flakes, resulting in an opaque greyish colour that prevents any external light from finding its way in. Hidden inside this finger-sized cap is a tiny 160-degree fish-eye camera that records colourful images illuminated by a ring of LEDs. When any object touches the sensor's shell, the appearance of the colour pattern inside the sensor changes. The camera records images many times per second and feeds a deep neural network with this data. The algorithm detects even the smallest change in light in each pixel. Within a fraction of a second, the trained machine-learning model can map out where exactly the finger is contacting an object, determine how strong the forces are, and indicate the force direction. The model infers what scientists call a force map: it provides a force vector for every point in the three-dimensional fingertip. We achieved this excellent sensing performance through the innovative mechanical design of the shell, the tailored imaging system inside, automatic data collection, and cutting-edge deep learning. Our unique hybrid structure of a softshell enclosing a stiff skeleton ensures high sensitivity and robustness. Our camera can detect even the slightest deformations of the surface from one single image. Indeed, while testing the sensor, the researchers realized it was sensitive enough to feel its own orientation relative to gravity. Previous soft haptic sensors had only small sensing areas, were delicate and difficult to make, and often could not feel forces parallel to the skin, which are essential for robotic manipulation like holding a glass of water or sliding a coin along a table. The testbed probes the sensor all around its surface and records the true contact force vector together with the camera image inside the sensor. In this way, about 200,000 measurements were generated. It took nearly three weeks to collect the data and another one day to train the machine-learning model. Surviving this long experiment with so many different contact forces helped prove the robustness of Insight's mechanical design, and tests with a larger probe showed how well the sensing system generalizes. Another special feature of the thumb-shaped sensor is that it possesses a nail-shaped zone with a thinner elastomer layer. This tactile fovea is designed to detect even tiny forces and detailed object shapes. For this super-sensitive zone, the scientists choose an elastomer thickness of 1.2 mm rather than the 4 mm they used on the rest of the finger sensor. The hardware and software design we present in our work can be transferred to a wide variety of robot parts with different shapes and precision requirements. The machine-learning architecture, training, and inference process are all general and can be applied to many other sensor designs.

For more details:
https://www.sciencedaily.com/releases/2022/02/220224112625.htm

## TECH PUZZLE



Across
4 learning
6 store students work
9 website where you can buy things on the internet
10 Facebook
11 helps you buy more product
13 produces energy
15 helps with everything
18 some you search with

Down
1 portable music player
2 teach the lessons
3 objects that you cannot buy or sell
4 Helps you see
5 helps you get around
7 helps people get better
8 Reduce the amount of employers and upgrade
12 listen to music
13 helps you find your way around
14 listen to music when you are in car
16 texting
17stores food in it