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Universal College of Engineering

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ELECTROBUZZ

ELECTRONICS DEPARTMENT

MAGAZINE

Compiled and Designed By:-

Ms. MANISHA YADAV – MAGAZINE CO-ORDINATOR

Mr. GANESH BASYAL

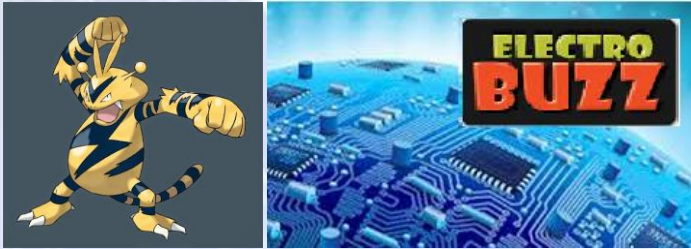
Mr. JATIN GOHIL

Ms. PREETI SHARMA

Mr. AKSHAY LADDHA

ISSUE - 013: AUGUST 2019
electrobuzz.etrx@universal.edu.in
Department of Electronics Engineering

**ELECTRO
BUZZ**



CONTENT TO EXPLORE

- *Princeton unveils Plasma-Powered Satellite.*
- *Start-up transforms Tesla Semi into Motorhome concept.*
- *Utilizing Transistor in the form of an ID?*
- *Study of Black Hole leading to Newton's Law of Gravity being dismissed.*
- *Arduino helps Sound Projector track individuals.*
- *Google's Vision of Recycled Materials by 2022.*
- *Sony unveils Air Conditioner in Shirt pocket.*
- *New age Begins in Jammu Kashmir.*
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PRINCETON UNVEILS PLASMA-POWERED SATELLITE, 'THE NEW THRUSTER'

Future satellites could make their way deeper into space than ever before thanks to a new plasma-fueled thruster.

Built by Engineers at the Princeton Plasma Physics Laboratory, could open up a whole new realm of Scientific Research. The Thruster could finally give the tiny satellites called CubeSats, the ability to move between upper and lower bounds of orbit – a spectacular leap towards comprehensive orbital infrastructure.



FREE SHUTTLE

The thrusters on the new satellites allow for a much efficient impulse than existing systems – meaning they can do a lot more with the small amount of plasma fuel that can fit into them.

With existing thrusters powered by conventional gas or a rocket fuel, CubeSats can't efficiently navigate to different altitudes after they are launched. The Plasma-Powered thrusters, according to the Princeton engineers who built it, could change that.

GRAVITY WELL

For example, the press release details how a satellite could use the plasma thruster to descend into a lower orbit, from which it could monitor storms and other weather conditions on earth. When it's done, it would be able to climb back up to the higher orbit.

KEY ADVANTAGE

A key advantage of Miniaturized Cylindrical Hall Thruster will be its ability to produce Higher density of rocket thrust than an existing Plasma thrusters used for most CubeSats orbiting the Earth. The miniaturized thruster can achieve both increased density and a high specific impulse.

High Specific Impulse Thrusters use much less fuel and can lengthen satellite missions, making them more cost effective. These capabilities provide many benefits. For example, a CubeSat might descend to lower orbit to track hurricanes or monitor shoreline changes and return to the higher orbit where the drag force on the satellite is weaker, requiring less fuel for propulsion.

"Essentially, we will be able to use these miniature thrusters for many missions" – Yevgeny Raitses, Princeton Physicist.

Reference: <https://futurism.com/the-byte/princeton-plasma-powered-satellite>



STARTUP TRANSFORMS TESLA SEMI INTO MOTORHOME CONCEPT

A start up called VanLifer believes Tesla's in-development Semi-Truck could become World's first long-range, all-electric motorhome with a few modifications. It took the liberty of hashing out a new concept of design.



COST OF LIVING

VanLifer's sleek vision of the Tesla Semi Campervan has enough room to fit six people and includes a full kitchen, living space, and a bathroom.

The Version of the Tesla Semi with a 500-mile range is expected to sell for \$180,000 and then there's the added cost of making it liveable – which VanLifer

doesn't estimate in it's Blog post on the concept.

ROAD READY

As for why VanLifer would want to use a Tesla Semi as the basis for a motorhome, it sees value in both the Vehicle's range and its **autonomous features**.

"Not only does the Tesla Semi promise a fuel saving of \$200,000 over two years, it's range of up to 500 miles (fully loaded) makes it ideal for motorhomes," –

Reference : <https://futurism.com/the-byte/tesla-semi-motorhome-concept>

CAN A TRANSISTOR BE USED AS A FORM OF ID?

We might imagine electric current flows as smooth, even stream of electrons through our electronic devices, but at the quantum scale, the flow of electric current is much more pictured as bubbling brook containing many tiny ripples. These ripples can cause single-electron effects, which arise due to repulsion among electrons confined in very small spaces, such as trap sites in transistors. Single-electron effects can lead to tiny changes in current-voltage characteristics of these devices.

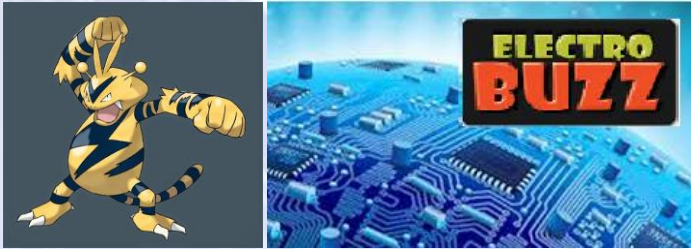


TRAP SITES

Trap sites are basically tiny defects randomly distributed in an uncontrollable way during fabrication, the number, location and energy levels of trap sites differ for every transistor. As a result single-electron effects lead to unique modification in current-voltage

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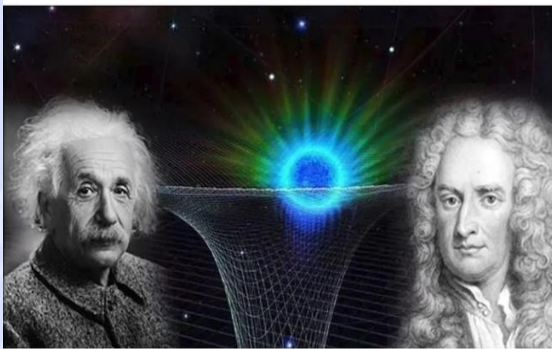


characteristics, effectively giving each transistor a unique 'fingerprint'.

IN THE FORM OF AN ID?

Researchers have been investigating how quantum fingerprints might be used as an inexpensive form of an ID to protect user's personal information for technologies in the emerging network of interconnected devices known as Internet of Things (IoT).

The fingerprint of an electronic device can be thought of as a physically unclonable function (PUF). PUF's are based on unique, naturally occurring physical variations and cannot be transferred to other devices.



Physicist applied image-matching algorithms in order to identify different current-voltage featured called Coulomb Diamonds. Just as Human fingerprint changes depending on the conditions, such as being wet, dry or oily, the Coulomb Diamond images can also look slightly different when measured under different conditions.

In the future, physicist plan to explore other ways of fingerprinting transistor. As with single electron effects, unique and random distribution of traps in transistors is expected to result in a unique fingerprint for each transistor.

"Our research opens a different way of using single-electron effect: as a security device. The importance of security is increasing day-by-day" – T.Tanamoto, Applied Physics Letter

Reference: <https://futurism.com/the-byte/transistor-unique-quantum-fingerprint>

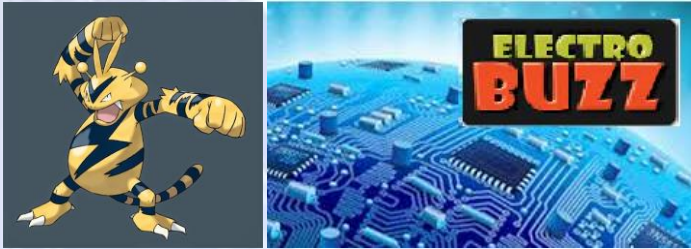
STUDY OF BLACK HOLE LEADING TO NEWTON'S LAW OF GRAVITY BEING DISMISSED

The world knew the famous Law of Gravity when an apple fell on Isaac Newton's head prompting him to form the earliest theory of Universal Gravitation. The 17th-Century Gravitational Law is a landmark in Physics and has help up true until now. The theory of universal gravity has been dismissed in the study of Black holes. Scientists conducted a research on a star called "S0-2" which is at its closest to the black hole Sagittarius A* that lies at the centre of Milky way Galaxy, 26,000 light-years away from Earth. The study put the law of universal gravitation to test and it did not hold true.

- As per new findings, scientists are now placing their bets on Einstein's theory of General relativity.

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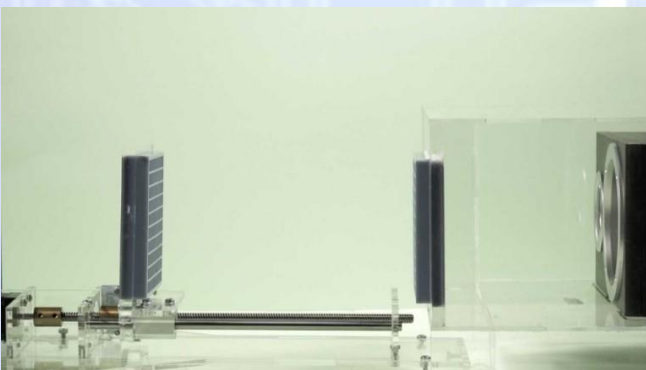
- The Black Hole study found that intermingling of space and time near Sagittarius A* doesn't comply with Newton's Law.
- Observations of light from S0-2 prove Einstein's theory that describes law of Gravity and relation to other forces. It proves that we perceive as gravity is curvature of space and time.
- S0-2 has a mass that's 10 times larger than the sun, taking 16 years to orbit around black hole in an ellipse.
- Studies found that the star's light escaped the black hole's Gravitational pull. Black hole's mass is 4 Million times that of sun.
- Einstein had predicted that light finds it harder to resist black hole's gravitational pull, expending more photons to escape it.
- Black holes are extraordinarily dense and have Gravitational fields so strong that light and matter cannot escape.

"Newton had the best description of gravity for a long time but it started to fray around the edges. And Einstein provided a more complete theory. Today we are seeing Einstein's theories starting to fray around the edges,"

-Prof. Andrez Ghez, University of California

Reference: <https://futurism.com/the-byte/transistor-unique-quantum-fingerprint>

AN ARDUINO HELPS SOUND PROJECTOR TRACK INDIVIDUALS



We tend to think that sound is omnidirectional. Taking stereo for an example, sounds much different if you stand behind the speakers than if you are standing in front of them. That can even be narrowed down and focused much further to create "sound projector" with researches from University of Sussex who have developed first sound projector that can track individuals.

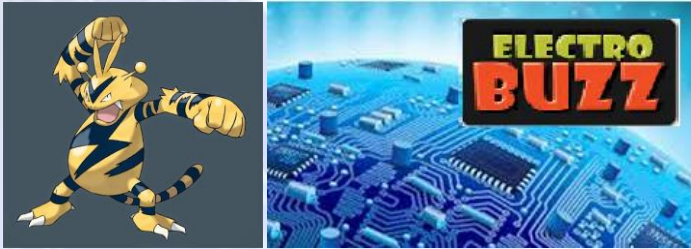
CONCEPT



The concept essentially relies on emitting a narrow beam of sound waves at a target. Anyone outside the beam is unable to hear the sound. That can be further reduced to a small packet of volume by aiming two beams at a single point. Neither beam actually carries the sound "Picture", but where the sound waves modify each other, where

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they intersect to create a small space where audio can be heard clearly.

It's possible to direct those sound waves in a way similar to optical techniques that have been used with light. An inexpensive commercial webcam is used for facial tracking in order to target a specific individual. An Arduino controlled acoustic telescope is then aimed at that person, the telescope points sound waves at the person's head but also focuses them just like you would focus the lens on a camera. That makes it possible to create a small pocket around a person's head with audio that only they can hear, which opens up all kinds of interesting possibilities for entertainment and even personal alerts.

Reference: <https://blog.hackster.io/an-arduino-helps-this-sound-projector-track-individuals-3c2a8e421e2a>

GOOGLE'S VISION OF RECYCLED PRODUCT MATERIALS BY 2022

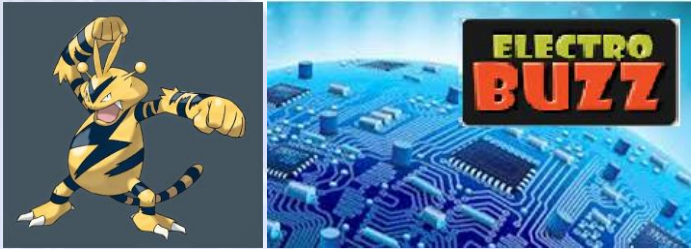
The Pixel phones and the Google Home speakers all fall under Google's "Made by Google" brand. This unit was started some 3 years ago by the company, before which Google was dabbling in other hardware like Nexus. Now, Google is ready to make its products more sustainable. In a tweet shared by the company, Google says that starting 2022, 100 percent of its "Made by Google" products will include recycled materials and will maximize recycled content whenever possible. Google's Anna Meagan, Head of Sustainability, Consumer Hardware further wrote in the blog that by 2020, 100 percent of all the company shipment going to or from customers will be carbon neutral.



This announcement adds to Google's existing efforts to be sustainable. Google says that between 2017 to 2018, it cuts its product shipment carbon emissions by 40 percent. Google also announced its Power Project, which will apparently provide "One million energy saving Nest thermostats to families in need by 2023, and many Nest products are already made with post consumer recycled plastic".

Apparently, it took Google's product team two years to make sure that new sustainable fabric met design and manufacturing requirements and those vendors could supply it a scale. Now, each unit of the material will reuse a third of a plastic bottle. That's the kind of thing we may see more frequently beginning in 2022.

Reference: <https://siliconangle.com/2019/08/05/google-pledges-use-recycled-materials-hardware-products/>



SONY UNVEILS AIR CONDITIONER WEARABLE IN A SHIRT POCKET

Beat The Heat

With global temperatures rising at an alarming rate, it's getting harder and harder to avoid melting into a sweaty puddle during the summer months.



Now, tech giants Sony has come up with a futuristic solution to the problem of staying cool: a tiny personal air conditioner that fits in a shirt pocket.

Cool Tech

Sony calls its personal air conditioner the Reon Pocket, and it's worn just below a person's neck in the pocket of a special undershirt. Once the device is in place, the person can

control it using a smartphone app.

According to Sony, the Reon Pocket can decrease a person's body surface temperature by 13 degrees Celsius (23 degrees Fahrenheit). It can also raise it by 8 degrees Celsius (about 14 degrees Fahrenheit) if you wanted to use the device in the winter months to stay warm.

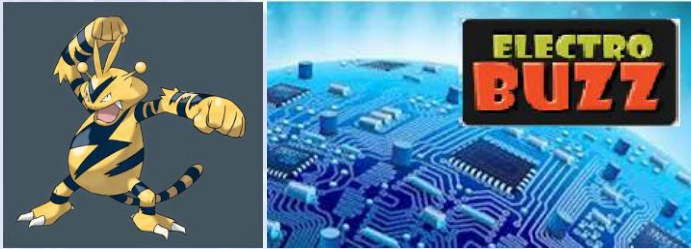
Orders up

Sony is currently taking orders for its wearable air conditioner on its First Flight crowdfunding platform, with the cost of a single device ranging from 2,760 to 19,030 yen (about \$117 to \$175).

At the time of writing, the device was 57 percent funded with 23 days left. If the project does meet its goal, backers should get their devices around March.

Unfortunately, for those of us sweltering in the U.S., however, First Flight products are only available to customers in Sony's home nation of Japan.

Reference: <https://blog.hackster.io/an-arduino-helps-this-sound-projector-track-individuals-3c2a8e421e2a>



NEW AGE BEGINS IN JAMMU AND KASHMIR, SAYS PM NARENDRA MODI

PM Narendra Modi addresses the nation after govt ends Jammu and Kashmir's special status



Prime Minister Narendra Modi addressed the nation two days after Parliament approved his government's historic decision to reorganise Jammu and Kashmir and end the region's semi-autonomous state. Thousands of troops have put Jammu and Kashmir (J&K) under an unprecedented lockdown as Modi speaks.

"A new dawn, better tomorrow awaits!" Modi had said on Twitter on Tuesday after the Lok Sabha approved a resolution to end Article 370 and a Bill to bifurcate the state of J&K into two Union territories. Article 370 gave J&K's state legislature freedom to draft its own laws except in the areas of

communications, defence, finance, and foreign affairs. It prohibited Indian citizens from purchasing land in the state.

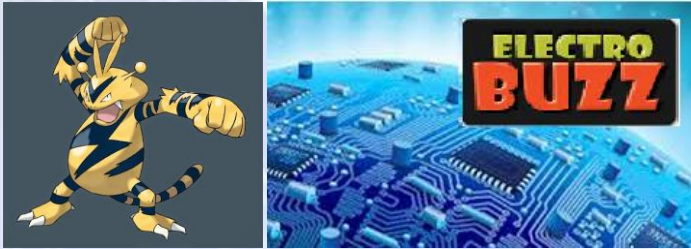
Home Minister Amit Shah, who steered the legislations through Parliament, has said Article 370 only benefitted "three families" of Kashmir, but the people remained in penury.

During the debate in the Lok Sabha, speakers from the ruling BJP-led NDA sparred with those from the Congress over Kashmir's accession and the role of first prime minister Jawaharlal Nehru and his deputy Sardar Patel.

Pakistan on Wednesday expelled the Indian High Commissioner and suspended bilateral trade to protest what it called New Delhi's "unilateral and illegal" move to revoke the special status of J&K.

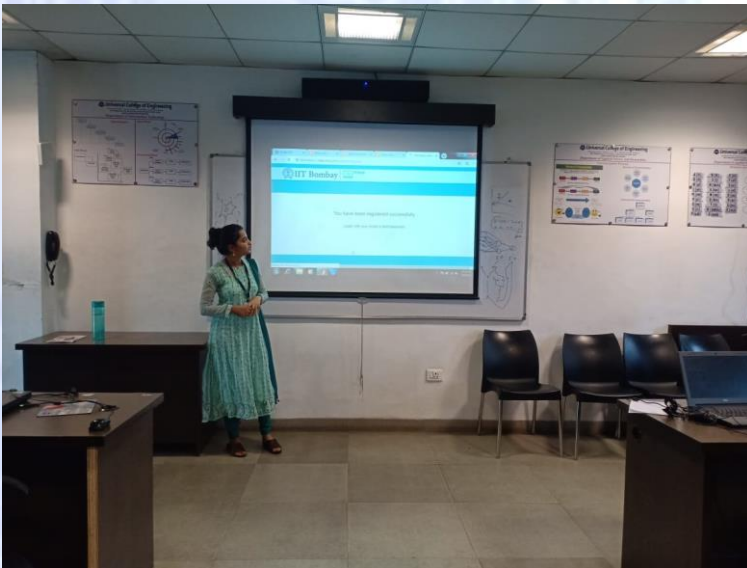
A Donald Trump administration official told PTI in Washington on Wednesday the US appealed for an "urgent need" for dialogue among all actors to reduce tensions and avoid a potential military escalation in South Asia.

Reference: https://www.business-standard.com/article/current-affairs/pm-modi-explains-decision-to-end-jammu-and-kashmir-s-special-status-119080801361_1.html



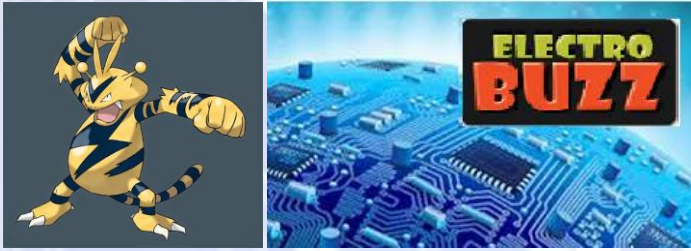
DEPARTMENTAL ACTIVITIES

WORKSHOP CONDUCTED ON IIT VIRTUAL LABS USAGE AND DEVELOPMENT FOR FACULTY COORDINATORS



A Workshop on Orientation/ Hands-on training programme on IIT Virtual labs usage and development was organized at Universal College of Engineering Lab No. E219 on 20th June 2019. Ms. Swarali Narvekar conducted workshop on Virtual Labs for the faculty of each department. The session covered the different types of virtual labs available, benefits of using the same for students as well as faculties. The process of participation in BootCamp and its benefits for students were also covered in the session. The Program was concluded by feedback from the participants.





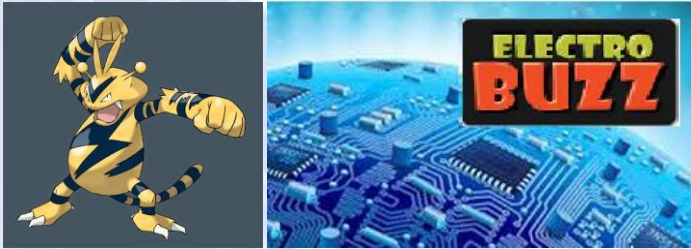
EXPERT LECTURE ON ELECTRONIC HARDWARE DESIGNING



Department of Electronics Engineering conducted Expert lecture on Electronic hardware designing on 19th July 2019. It was conducted Mr. Pradeepkumar Podal, (Director, Grassroots energies Technologies) M.tech from IIT Pawai.

The main focus of the Expert lecture was to provide importance of Electronic hardware designing and its use in various electronics and automation industries. Expert also guided the students about what will be the opportunities and scopes pertaining to jobs and research in the upcoming years.





PARENTS TEACHER INTERACTION

Department conducted PTI meet for Second year and Third year students.



Faculty addressing Third year parents



Faculty addressing Second year parents

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