TECHNICAL SOCIETY OF ELECTRONICS & COMMUNICATION ENGINEERING

PINNACLE

Volume 05 Issue 01

MESSAGE FROM DIRECTOR

It gives me immense pleasure to pen down a few words for 'Pinnacle' volume 5. I congratulate all the contributors and the editorial board for bringing out the best in the newsletter. Empowerment of the students for their all round development through education is our cherished motto. In this era of cut throat competition, it is of paramount importance to impart an integrated technical education to the future citizens of the nation for successfully facing multitasking. We value individualism, creativity and innovation and when all these constituents come together to work in unison, the expected results are bound to flow.

Dr. M. P. S. Chauhan

MESSAGE FROM HOD

We are privileged to welcome you to the department of Electronics and Communication Engineering at G.B. Pant Institute of Engineering and Technology (formerly known as G. B. Pant Engineering college).

Electronics Engineering – a core engineering discipline plays a central role in creation of the materialistic world, and we at GBPIET presents a platform broad and wide for the inculcation of these core findings.

Dr. Y. Singh

Inside this issue:

OUR VISION

To become a center of excellence offering high quality education and research in the field of Electronics and Communication Engineering.

OUR MISSION

- To provide best facilities, infrastructure and conducive environment to the students, researchers and faculty members for high quality education and research in the field of Electronics and Communication Engineering.
- To adopt the best pedagogical methods in order to maximize knowledge transfer.
- To have adequate mechanisms to enhance understanding of implementation of theoretical concepts in practical scenarios.
- To enable students to develop skills for solving complex technological problems for societal needs.
- To inculcate creative thinking, ethics, learning attitude, communication skills, leadership and teamwork qualities among the students.

ON-CHIP SYSTEM: That could help steer driverless cars

MIT researchers have developed a sub terahertz radiation receiving system that could help steer driverless cars when traditional methods fail. Sub-terahertz wavelengths, which are between microwave and infrared radiation on the electromagnetic spectrum, can be detected through fog and dust clouds with ease, whereas the infrared-based LiDAR imaging systems used in autonomous vehicles struggle.

To detect objects, a sub-terahertz imaging system sends an initial signal through a transmitter; a receiver then measures the absorption and reflection of the rebounding sub-terahertz wavelengths. That sends a signal to a processor that recreates an image of the object.

But implementing sub-terahertz sensors into autonomous vehicles is challenging. Sensitive, accurate object-recognition requires a strong output baseband signal from receiver to processor. Traditional systems, made of discrete components that produce such signals, are large and expensive. Smaller, on-chip sensor arrays exist, but they produce weak signals.

To achieve this, they implemented a scheme of Independent signal mixing pixels called "heterodyne detectors" — that are usually very difficult to densely integrate into chips. The researchers drastically shrank the size of the heterodyne detectors so that many of them can fit into a chip. The trick was to create a compact, multipurpose component that can simultaneous down-mix input signals, synchronize the pixel array, and produce strong output baseband signals.

MIT researchers have developed a chip that leverages sub-terahertz wavelengths for object recognition, which could be combined with light-based image sensors to help steer driverless cars through fog.

Do you suffer with battery anxiety?

"Motor demands have increased dramatically with electric vehicle (EV) and hybrid electric vehicle (HEV) automotive designs."

Our continued reliance on mobile devices means that users are keen to keep their devices always on and charged. As mobile devices become more capable the more power hungry they become, yet the research that has been undertaken into extending the capabilities of battery technology seems to have reached its limit. The term 'battery anxiety' was coined by LG last year, following a survey it conducted on mobile charging habits, that revealed 90% of respondents suffer with this modern 'ailment'. Portable, wireless charging seems the obvious remedy but while there has been a surge in research into this technology and, according to the Wireless Power Consortium (WPC), there has been an increased uptake in wireless charger users, there remains a number of problems in the widespread adoption of this solution.

Nedko Ivanov, CEO of Metaboards, a metamaterials start-up currently developing technology in the wireless charging field, acknowledges the potential of the wireless charging market, but suggests that there are a number of challenges preventing it from being widely adopted. The problem, according to Ivanov, is the user experience by this he means not just how the device charges, but where charging is available.

"To date wireless charging has been little more than a gimmick," according to Ivanov. "A lot of the wireless charging solutions available require the user to place a device directly in alignment with a wireless charger. But, as every wireless charger needs its own unique power supply, users will still effectively have to rely on being close to a cable. So why use wireless charging at all?

LG's survey on charging habits mirrored Ivanov's thoughts, pointing out that among the consumers it had questioned, around 1,600 across the UK, US, Germany and China, there were "high levels of interest in seeing wireless charging beyond the home and car".

"This is the world we are trying to create at Metaboards," Ivanov explains. The metamaterials company has developed a patented prototype that enables wireless charging through any surface (apart from metal) without the need to directly align two devices. It can also charge multiple devices on one surface from one power source."

Metaboard surfaces can be used in an array of different environments including cafes, offices and in the home

RF AMPLIFIER EFFICIENCY—Big challenges for Designers

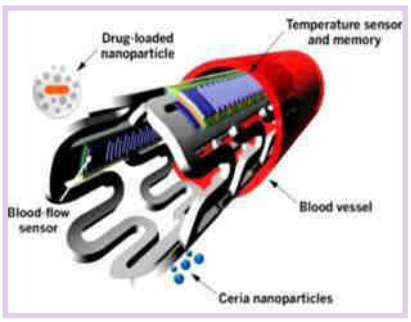
The basic laws of thermodynamics ensure that no electronic device can achieve 100% efficiency--although switch-mode power supplies come close (approaching 98%). Unfortunately, anything that generates RF power cannot presently boast such near-ideal performance as there are simply too many impediments to converting DC power into RF power, from losses incurred throughout the signal path, to operating frequency, the inherent characteristics of the device, and others. The result, as an article in MIT Technology Review uncharitably put it, is "a grossly inefficient piece of hardware." Not surprisingly, every manufacturer of RF power products, from semiconductors to amplifiers to transmitters, along with universities and the Department of Defence, spends enormous amounts of time and money every year to increase the efficiency of RF power generation. And for good reason: Even small increases in efficiency increase operating time in battery-powered products and reduce the annual electricity bills of wireless base stations.

Fortunately, these efforts are delivering results that continue to increase RF efficiency every year, some at the device level and others through use of techniques such as envelope tracking, digital pre-distortion/ crest factor reduction schemes, and higher classes of amplifiers beyond the ubiquitous ClassAB.. A major change in amplifier design, which has in 5 years become the standard in base station amplifiers, is the Doherty architecture. Essentially dormant, it has been used in only a few applications since it was invented by W.H. Doherty of Bell Labs (then a part of Western Electric) in 1936. Doherty's research produced an amplifier architecture that delivers very high power-added efficiency with input signals that have high peak-to-average ratios (PARs). In fact, when properly designed, a Doherty amplifier can produce increases in efficiency of 11% to 14% when compared to standard parallel Class AB amplifiers.

BIORESORBABLE ELECTRONIC IMPLANT

Researchers at Northwestern university USA and Washington University of medicinal in St. Louis, USA, have collaboratively developed the first bioresorbable wireless device that speeds up nerve regeneration and improves the healing of damaged nerves.

During testing, the device delivered regular pulse of electricity to damaged peripheral nerves in rats, after a surgical repair process,



accelerating the regrowth of nerves in their legs and enhancing the recovery of muscle strength and control.

The wireless device is the size of the dime and the thickness of sheet of paper. It operates for about two weeks before naturally absorbing into body.

This type of technology, which they refer to as bioresorbable electronic medicine, provides therapy and treatment over a clinically relevant period of time and directly at the site where it is needed, thereby reducing the side effect of risks associated with conventional, permanent implant.

What does the future hold for video surveillance technology

Video surveillance has proven itself to be an advanced sensor with benefits. Serving as a remote set of eyes, video surveillance allows a virtual presence in off -site locations from a single point. What's more, video cameras cover a large contiguous swath of view, allowing a panning camera to steadily and consistently sweep a search pattern. Video systems can also function in locations where

humans cannot. The earliest known video surveillance technology was used to safely monitor the development and launch of V-2 rockets in 1942. From a safe distance, scientists and engineers could observe performances and identify failures. Since then, video systems have acted as an extension of our eyes and ears. A steady stream of technology developments and

Drastic rise in demand for motor control

"Motor demands have increased dramatically with electric vehicle (EV) and hybrid electric vehicle (HEV) automotive designs."

Th internal-combustion car historically had only one high-current electric motor: the starter. This 12-V/100-A (typical) unit does not need sophisticated control, as it is just an on/off, "give it the full 12 V DC and let it rip" motor. The few other motors were small and easily controlled, such as for the windshield wipers. Jump to the present: Today's cars have dozens of small and medium-size motors for power windows, seat adjustment, outside mirrors, and vent controls, for example. The number of wiring loops in a car for all these functions became so high that car motors are now networked, as individual wire runs were taking up too much space, adding considerable weight, hard to trace and debug, and exploding the cost. Further, motor demands have increased dramatically with electric vehicle (EV) and hybrid electric vehicle (HEV) automotive designs. The vehicle electric systems now must route power at many hundreds of amps and several hundred volts or more to the wheel motors (the Toyota Prius motors operate at 200 V), and these motors must be carefully controlled to meet performance requirements.

Sensing the Current Flow :

When it is necessary to know what the motor is doing, to be able to compare with the commanded motor action (position, speed), some sort of feedback is needed. This can be obtained by using a shaft encoder (Hall-effect, optical, magnetic) or sensing current flow through the motor windings. Generally, designers like to start with the current-sensing approach alone, because it is less expensive and physically easier to implement than a shaft encoder. For current sensing, the topology is simple at first appearance: a resistor is placed in series with each motor winding and the voltage across it is sensed and monitored by the motor controller. This resistor is often called a "shunt," but this is a misnomer, as it is in series with the winding and not shunting the current flow.

Mobile 3D sensing

Many of the key technologies behind advancements in mobile devices, including smartphones, tablets and wearables, are based on the ubiquitous use of light. This does not only include visible light such as display lighting or flash applications. Gesture recognition, iris scanning or facial recognition are just a few examples of how invisible infrared light can be used in mobile devices. What role can VCSEL technology (vertical-cavity surface-emitting laser) play in this space? First, what is VCSEL? A VCSEL is a semiconductor-based laser diode which radiates the light vertically to the surface of the semiconductor chip, as opposed to edge-emitting laser diodes, where the light exits at the edge of the chip. As a surface mountable component, VCSEL combines the characteristics of a LED with those of a laser. VCSEL technology has been established and matured within the datacom industry, serving in data infrastructure links for more than 15 years. The technology can also be used as an array – a composite of several hundred or even thousand VCSELs – for example a chip with 500 apertures of 1 mm x 1 mm, glued and bonded like a normal LED.

VCSEL use in biometrics

Biometrical user identification methods are the most reliable and secure access options that are currently available. They are an alternative to complex password management tools for mobile device security, access control, and increasingly authentication for mobile payments and other transactions. The need for these solutions is driven by users increasingly managing all aspects of their digital lives via their smartphone and other mobile devices which accelerates the development progress.

New application fields

VCSEL technology is not a new invention, but has been used previously for data communication. Recently, a multitude of application opportunities in different markets have been identified. The decisive features of the surface emitter are the lower production costs compared to edge emitters and the superior beam quality but lower output power.

VCSEL operating principles

The beam shape of a VCSEL is a circular spot, compared to the elliptical shape of FP-EEL (Fabry-Perot Edge Emitting Laser) and DFB (Distributed Feedback laser diodes). The optical resonator of a VCSEL array is only 4µm, compared to approx. 600 – 1200µm for FP-EEL (depending on the optical power) and 1000 – 2000µm for a DFB (depending on the optical power).

Current solutions for mobile 3D sensing include structured light and time of flight (ToF). One of the most recent smart phone models uses structured light with its dot projector producing several ten thousand dots of infrared lights on the face. Then the infrared camera receives the light reflected back from the face to create a 3D facial landscape.

Additional application fields include autofocus and proximity functions in cameras, especially in smart phone cameras. 3D sensing is also being integrated with AR and VR – for smart glasses or future smart phones and other mobile devices, including drones.

Due to its broad range of advantages such as a very small footprint, relatively low costs, optical efficiency, low power consumption, wavelength stability and high modulating rates, VCSEL technology could be key for a wider adoption of applications such as 3D sensing in the mass market.

Although the technology offers many advantages compared to existing technologies, it is not the best solution for all segments. It should therefore be viewed as an expansion of infrared and other light-based technologies. In order to help customers and clients choose the best suited solution for each application field, leading providers of optoelectronics components are looking to complement their infrared technology portfolios with a growing number of VCSEL solutions.

Advancement in USB Technology

With the advancement in processing speed, data transfer rates are needed to be increased and is in progress. One of the most used communication protocol – USB (Universal Serial Bus) was designed to standardize the connection of computer peripherals (key boards, pointing devices, digital cameras, printers, portable media player, disk drives etc.) to personal computers, both to communicate and to supply electric power. USBs have replaced all other protocols such as PS/2, RS-232 etc.

RELEASE NAME	RELEASE DATE	SPEED
USB 1.1	1998	12 MHz
USB 2.0	2000	480 MHz
USB 3.0	2008	5 GHz
USB 3.1	2013	10 GHz

Now the question is, what are the USB TYPE A, B and C? Are USB 3.1 and TYPE C the same things?

"USB TYPE C can deliver up to 100 watt of power over a USB connection while data is being transferred."

Now the question is, what are the USB TYPE A, B and C? Are USB 3.1 and TYPE C the same things? TYPE A, B and C are the connectors supporting USB standards and 1.1, 2.0, 3.0, 3.1 are the revision numbers.

TYPE A connector s ar e found on host controller s in computer s and hubs. These types of connector s supply power as well as data to a USB peripheral device.

TYPE B connectors are found on USB peripheral devices. These draws power from host controller s. This two Connector type scheme (A/B) prevents a user from accidentally creating an electrical loop (hazardous condition).

TYPE C connector is the newest 24 pin USB connector in the market. The USB C connector has a reversible/ symmetrical design and can be plugged into any USB C device using either end (i.e. takes care of inconvenience by being reversible). In other words, you can plug in a Type C plug into a Type C port either way. A USB C cable is capable of carrying USB 3.1, USB 3.0, USB 2.0, and USB 1.1 signals.

TYPE C's new plug and receptacle can carry up to a USB 3.1 connection, transmit Display Port signals at up to 4K resolution, and handle up to 100W of electrical power, all at the same time. The latest Apple Mac Book has a single Type C port, which is being used for charging, data transfer, and video output.

USBs at the time of its conception were expected to be a vessel for carrying data, not power. That's why USB 1.x and USB 2.0 were capped at 2.5 watts (0.5 amps at 5 volts) – enough to charge a compatible cell phone, but not always sufficient to power something bigger, such as an external hard drive. Then came USB 3.0 and bumped the output to 4.5 watts (0.9 amps at 5 volts). That's a much more acceptable figure, but today's mobile gadgets can easily take at least twice as much when charging up their batteries.

USB TYPE C can deliver up to 100 watt of power over a USB connection while data is being transferred. The good news is that USB PD (Power Delivery) makes it possible for host and peripheral to switch roles in providing power to the other. In other words, it will be technically possible to charge a tablet from a laptop and vice versa. This feature would also allow smart phones to act as portable power banks for compatible mobile devices.

Qualcomm Snapdragon

The Qualcomm® Snapdragon™ 8cx Compute Platform combines the best of the smartphone with the power and performance of a premium laptop in ultra-thin, fan less form factors to deliver a superior Always On, Always Connected PC computing experience. The first 7nm PC platform, the Snapdragon 8cx supports transformative 5G experiences, multi-gigabit LTE, and multi-day battery life and marks the biggest generational performance increase ever in a Snapdragon platform.

5G

Always Connected with 5G

Snapdragon 8cx unleashes transformative 5G experiences with the Snapdragon X55 5G modem, which also allows users to harness multi-gigabit 4G LTE connectivity.

Extreme performance

The Qualcomm® Adreno™ 680 GPU is engineered to provide a 2x performance improvement and 60% greater power efficiency over the previous generation platform. Together with the Qualcomm® Kryo™ 495 CPU, the fastest ever in a Snapdragon, the Snapdragon 8cx is designed to deliver amazing graphics, powerful productivity, and multi-day battery life.

"Wireless signals transmitted with Bluetooth cover short distances, typically up to 30 feet (10 meters)."

LTE

Always Connected with multi-gigabit LTE

The integrated X24 LTE modem delivers peak download speeds of up to 2 Gbps, and improves throughput by up to 70% in poor network conditions over non-gigabit LTE. High speed connected computing for fast and efficient productivity and entertainment, virtually anywhere.

New AI architectures for advanced applications

The integrated Qualcomm® AI Engine takes advantage of the Snapdragon 8cx highly integrated architecture, and allows developers to utilize the platform intelligently and efficiently, reducing reliance on the CPU alone and supporting the creation of the next generation of user experiences.

QUANTUM DOT : AN EMERGING FIELD OF TECHNOLOGY

Quantum dots (QDs) are semiconducting particles that are a few nanometers in size. Due to their small size, these can confine electrons' motions. These have the ability to tune their band gap, which enables these to control the frequency of light emission and absorbance. After absorbing a photon of light, these emit a photon of longer wavelength. Wavelength of the emitted photon can be controlled by controlling the size of QDs. Hence, it is possible to control their properties (electrical and optical) according to their use. A full range of QDs can be manufactured, each with a narrow, distinct emission spectrum by manipulating the color of light emitted from these. QDs emit light of a particular color after being illuminated by light. The color depends on the size of the nanoparticle, that is, difference between conduction band (CB) and valence band (VB). The smaller the nanoparticle, the larger the difference between CB and VB, resulting in a deeper blue color. For a larger nanoparticle, the difference between CB and VB is lower, which shifts the glow towards red. Recently, a NASA technologist has teamed with the inventor of a new nanotechnology that could transform the way space scientists build spectrometers.

A central theme in nanotechnology, quantum dots can tune their band gap, which enables these to control the frequency of light emission and absorbance.

SOME OF THE APPLICATIONS OF QD :-

- QDs are used to detect the presence of biomolecules. For example, these can detect the presence of sugar maltose by conjugating the maltose-binding protein with the nanocrystal surface.
- QDs can also be used for sensing specific DNA sequences.
- High resistance to metabolic degradation and fluorescence properties enable a wide range of experiments.
- QDs' high photostability and brightness make these suitable for high-sensitivity applications like leaf cell imaging.
- Temperature-dependent changes in optical properties of QDs is the basis for temperature measurement technique.
- Because of their highly-tunable properties, there are various potential applications in transistors, solar cells, LEDs, diode lasers, second-harmonic generation, quantum computing and medical imaging, among others.
- QDs generate two electrons for a single photon of light, as compared to normal solar cells that generate only one electron. Therefore use of QDs increases the efficiency of solar cells in producing electric power.
- QDs display consume less power than current displays. So these are a better choice for applications ranging from cellphones to large-screen TVs.

QDs versus other technologies

The use and application of QDs have many advantages. These require a small amount of energy for excitation regardless of size. This can be achieved by a single blue or ultraviolet wavelength beam. It reduces cost of sensing, too.

Being nanometer in size, QDs have a higher density of states than high-dimensional structures. This means electrons do not have to travel as far as with larger particles. Thus, electronic devices can operate faster.

QDs are brighter and have little degradation over time, making these superior to traditional organic dyes used in biomedical applications. QD light has a sharp and narrow emission peak, due to a radiative recombination of an exciton.

THE WEARABLE DOCTOR

In the past decade technology has started to play an increasingly important role in the provision of healthcare, whether that's in the form of wearable devices, home diagnostic applications or remote monitoring devices. Many powerful artificial intelligence (AI) tools are now being embedded into both mobile and wearable devices enabling users to collect data on their bodies to better manage their health and well-being.

According to a recent survey in the UK, these health and fitness focused technologies are being used by more people to achieve their fitness goals.

Those devices seen as most helpful were wearable fitness trackers (34%) and smart watches (26%) followed by smartphone apps; heart rate monitors and lower tech wearable trackers, that simply monitor the users heart rate, were also listed.

Commenting Mark Kelly, marketing manager at LaptopsDirect.co.uk, said: "From using fitness trackers whilst

walking to work to apps that plan meals, it's clear that adults in the UK are turning to technology to help them reach their 2019 fitness goals." It's true to say that wearable technology has garnered plenty of headlines, both positive and negative, but many of the early lessons learned are now poised to deliver real benefits.

For example, a new wearable assistive technology from Control Bionics is helping people suffering from paralysis and loss of speech to better communicate with friends, family and clinicians. The 'Neuronode' device is said to be the first wearable electromyography (EMG) device and is able to use EMG signals to control a paired computer, tablet or smartphone. Essentially a wireless keyboard, the Neuronode connects to a device via a Nordic nRF52832 Bluetooth Low Energy System-on-Chip (SoC), users are able to send emails, access the Internet and watch online entertainment via the device.

Wearables slow-down

Research from Tractica, a market research company that focuses on human interaction with technology, expects the wearable device market to exceed $95billion by 2021 with total shipments expected to exceed 560milliion units and this despite last year when growth in the market dipped to single figures.

This slowdown was ascribed to weak demand for basic step-counting wearables, but analyst IDC is predicting that double-digit growth will return this year as smartwatches and new form factors start to gain acceptance in the market.

"Glabella is essentially a pair of glasses that monitors the heart rate at three sites on the wearer's head. In addition, the prototype incorporates optical sensors, processing, storage, and communication components, all of which are aimed at precise monitoring of the wearer's pulse transit time.

"The Microsoft team believe that this can be used to reliably establish the wearer's systolic blood pressure, but in a far more convenient package than the current alternative of a cuff-based oscillometer device."

"From using fitness trackers whilst walking to work to apps than plan meals, it's clear that UK adults are turning to technology to help reach their fitness goals."
- Mark Kelly

Accurate sensing

While early fitness trackers often relied heavily on step counting, the wider availability of accurate sensors is helping to transform the market.

In particular, more flexible and usable pressure sensors are having a major impact on devices that offer running coaching, as they open up the possibility of delivering kinetic gait analysis, which factors in measurements of force, such as power, torque, and pressure, giving far more accurate results than visual analysis of gait alone.

"The sensors have sixty-five thousand layers of pressure sensitivity across toe, heel and arch areas of the foot, theoretically providing highly accurate data on foot strike, position and cadence," said Keenan. While the market for fitness and health wearables is forecast to grow in the coming years another sub-sector within this space, and one that extends the concept of well-being beyond that of simply better long-term health decisions or better monitoring an ageing population, is the use of personal safety devices.

Leaf Wearables, an India-based company, has developed the 'Safer Pro' device which comes in a smartphone form factor – but can also be embedded into other devices, such as jewellery.

MIT cheetah robot : lands the running jump

In a leap for robot development, the MIT researchers who built a robotic cheetah have now trained it to see and jump over hurdles as it runs — making this the first four-legged robot to run and jump over obstacles autonomously.

To get a running jump, the robot plans out its path, much like a human runner: As it detects an approaching obstacle, it estimates that object's height and distance. The robot gauges the best position from which to jump, and adjusts its stride to land just short of the obstacle, before exerting enough force to push up and over. Based on the obstacle's height, the robot then applies a certain amount of force to land safely, before resuming its initial pace.

In experiments on a treadmill and an indoor track, the cheetah robot successfully cleared obstacles up to 18 inches tall — more than half of the robot's own height — while maintaining an average running speed of 5 miles per hour.

"A running jump is a truly dynamic behavior," says Sangbae Kim, an assistant professor of mechanical engineering at MIT. "You have to manage balance and energy, and be able to handle impact after landing. Our robot is specifically designed for those highly dynamic behaviors."

Kim and his colleagues — including research scientist Hae won Park and postdoc Patrick Wensing — will demonstrate their cheetah's running jump at the DARPA Robotics Challenge in June, and will present a paper detailing the autonomous system in July at the conference Robotics: Science and Systems.

Robot sees, clears hurdles while bounding at 5 mph.

See, run, jump

MIT researchers have trained their robotic cheetah to see and jump over hurdles as it runs — making this the first four-legged robot to run and jump over obstacles autonomously

Last September, the group demonstrated that the robotic cheetah was able to run untethered — a feat that Kim notes the robot performed "blind," without the use of cameras or other vision systems.

Now, the robot can "see," with the use of onboard LIDAR — a visual system that uses reflections from a laser to map terrain. The team developed a three-part algorithm to plan out the robot's path, based on LIDAR data. Both the vision and path-planning system are onboard the robot, giving it complete autonomous control.

The algorithm's first component enables the robot to detect an obstacle and estimate its size and distance. The researchers devised a formula to simplify a visual scene, representing the ground as a straight line, and any obstacles as deviations from that line. With this formula, the robot can estimate an obstacle's height and distance from itself.

Once the robot has detected an obstacle, the second component of the algorithm kicks in, allowing the robot to adjust its approach while nearing the obstacle. Based on the obstacle's distance, the algorithm predicts the best position from which to jump in order to safely clear it, then backtracks from there to space out the robot's remaining strides, speeding up or slowing down in order to reach the optimal jumping-off point. When the robot reaches the jumping-off point, the third component of the algorithm takes over to determine its jumping trajectory.

Based on an obstacle's height, and the robot's speed, the researchers came up with a formula to determine the amount of force the robot's electric motors should exert to safely launch the robot over the obstacle.

The formula essentially cranks up the force applied in the robot's normal bounding gait, which Kim notes is essentially "sequential executions of small jumps."

Optimal is best, feasible is better

Interestingly, Kim says the algorithm does not provide an optimal jumping control, but rather, only a feasible one.

"If you want to optimize for, say, energy efficiency, you would want the robot to barely clear the obstacle — but that's dangerous, and finding a truly optimal solution would take a lot of computing time," Kim says. "In running, we don't want to spend a lot of time to find a better solution. We just want one that's feasible."

Sometimes, that means the robot may jump much higher than it needs to — and that's OK, according to Kim: "We're too obsessed with optimal solutions. This is one example where you just have to be good enough, because you're running, and have to make a decision very quickly."

The team tested the MIT cheetah's jumping ability first on a treadmill, then on a track. On the treadmill, the robot ran tethered in place, as researchers placed obstacles of varying heights on the belt. As the treadmill itself was only about 4 meters long, the robot, running in the middle, only had 1 meter in which to detect the obstacle and plan out its jump. After multiple runs, the robot successfully cleared about 70 percent of the hurdles.

In comparison, tests on an indoor track proved much easier, as the robot had more space and time in which to see, approach, and clear obstacles. In these runs, the robot successfully cleared about 90 percent of obstacles.

Kim is now working on getting the MIT cheetah to jump over hurdles while running on softer terrain, like a grassy field.

The Future of Photography: A Look at the Latest Trends in Camera Technology

With so many new cameras and lenses launched recently, now is the best time to take a look at how the latest technology will likely play out in the coming year. We see three trends reshaping photography in the near future: Lenses evolving to accommodate the needs of video capture, sensors emerging in new sizes and designs, and Wi-Fi connectivity being built into more cameras.

Taking their cues from camcorders, lens makers have begun to add silent electronic zooms for video, while retaining the manual zoom controls stills shooters are used to. And lighter, smaller, more versatile optics are proliferating. While the fundamental laws of optics will not change, there is a lot more to a camera lens than just the glass elements—especially with zooms. Both electronics and mechanics play a key role in performance. With the advent of contrast based autofocus in interchangeable lens compacts, lenses for these systems have developed more robust communications with camera bodies.

Plus, new designs, such as the Olympus 12–50mm f/3.5–6.3 EZ M.Zuiko Digital ED kit lens for the OM-D line, let you switch between manual and electronically controlled zooming and AF. "You're able to uncouple the zoom motor from the mechanics that move the elements, and operate it manually," says Rich Pelkowski, an Olympus product manager for DSLRs, Pens, and the OM. "Then you can seamlessly switch back for three-speed electronic zooming that's great for movies. There's no more mechanical linkage with the body, so your imagination can run wild as to how you control the lens."

Take the button on the new 12–50mm lens that converts it to macro mode. While it won't afford life-sized 1:1 magnification, it's a great feature to include in a kit lens for users who might step up to an ILC from a true compact and miss the close-focusing capabilities of those small cameras.

Wireless Connectivity:

"Wireless is really becoming more of a factor this year in the point-and-shoots," says Canon's Chuck Westfall. "The key is making it easy and friendly for people to share their images." Camera manufacturers have realized that smart phones can be their gateway. Using peer-to-peer Wi-Fi connections between the camera and a smart device, such as an iPhone or Android phone, you can move images from the camera to the phone and then on to social media sites or elsewhere. Apps, such as Canon's Camera Window for iPhone, make the process easier. So what's next?

Connecting wirelessly to cell phones. This way you can

capture a picture that puts a cell phone image to shame, and then seamlessly send it to the phone for upload to the Internet. And the possibilities for communication between the camera and cell phone or digital tablet are vast.

"We've built an app paradigm," says Samsung's Jay Kelbley. "With our remote viewfinder app, your smart device can be used to remotely control your camera while using the smart device as the finder to frame your images. Our mobile-link app lets you browse content on your camera, bring those images into your smart device, and upload them to Facebook or back them up on a cloud-based service like Samsung's All-Share."

What's in store?

High-resolution images, smaller and smarter gear, and instantaneous wireless image transfer

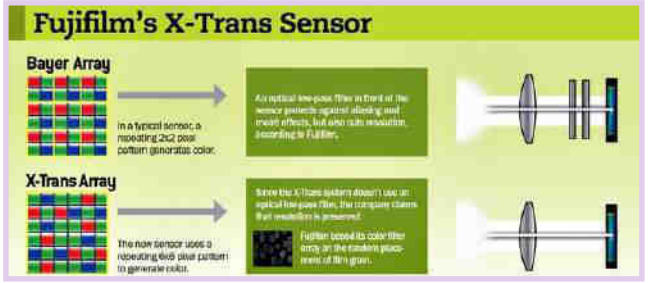
Sensor Shake-Ups:

Less noise, faster data readout, more resolving power. That's the buzz on next-generation sensors. As usual, size matters. The larger the imaging sensor, the greater chance of a defect, driving up their cost to manufacture. But larger sensors can accommodate physically larger pixels that capture more light and typically produce less noise than their smaller counterparts. Those qualities make a huge difference to photographers.

Sensor makers' need to balance cost and quality has led to lots of experimentation and a burst of innovation. New models include the nearly APS -C-sized sensor in the Canon PowerShot G1 X and Fujifilm's X-Trans sensor with its unique color filter array in the new X-Pro 1 (illustrated above).

Fujifilm is trying to add resolution by scrapping the low-pass filter most digital cameras have in front of the sensor, where it works as an anti-aliasing filter to fight moiré effects. The X-Trans uses a color filter array that is said to mimic the grain in film, which forms a random pattern. Fujifilm believes this will cut moiré while eliminating a layer of glass for a sharper image.

Fujifilm is not alone in removing the low-pass filter—Nikon's D800 can be purchased without one. And new software has also begun to account for moiré: Both Adobe Lightroom 4 and Nikon Capture NX 2 will include a tool to reduce it.



TEACHER'S DAY CELEBRATION

Teachers are regarded as the backbone of our society . They have the greatest contribution to build up the characters of students and help them to become ideal citizens . Teacher's day is observed to respect to the teachers of our country.

We student of electronics and communication department also celebrated teacher's day on 6th September 2018. The event was conducted by TSECE to thanks and acknowledge our teachers. The program began with the entry of guests of the day, our respected teachers.

The advent of the program took place with a welcome speech given by Seeya Rawat (2nd year) followed by a presentation on IOT by Ayush Mishra (3rd year) and Ayushi Rawat (3rd year). The program proceeded to the relay of the gift to the underprivileged children of nearby villages , by the teachers . The program reached it's peak as began the quiz competition conducted amongst the teacher . The team B which included Dr. Y. Singh, Dr. M.K. Agarwal, and R. B. Yadav sir won the competition . The celebration was made memorable one when the teachers were presented saplings as a symbol of our regards of things. The program came to an end with the feedback of the faculty and their departure.

JOSH 2K18

"I've missed more then 9000 shots, lost almost 300 games, 26 times I've been trusted to take the game winning shots and missed. I've failed over and over and over again in my life. And that's why I succeed."

- Michael Jordan

JOSH is an annual sports event organized by GBPIET .

It includes various both indoor and outdoor games like Football, Cricket, Volleyball, Table Tennis, Athletics, etc.. Students participate in these events enthusiastically and put their best in making their branch the overall winner.

Some of the achievements of our branch students are :-

400m Race (1st Position)

DEEPAK BATHYAL

Shotput (1st Position)

SUMIT DWIVEDI

Volleyball (finalist)

- CHINMAY POKHRIYAL
- NEERAJ BAHUGUNA
- SUMIT DWIVEDI
- TARANG NAUTIYAL
- MANOJ
- NITIN

Kabaddi (2nd Position)

- HIMANSHU POKHRIYAL
- JAIDEEP
- ROHIT SARKAR
- SANCHIT

Long Jump (3rd Position)

UTKARSH SEMWAL

Relay Race (3rd Position)

- ROHAN RAWAT
- DEEPAK BATHYAL

Table Tennis (2nd Position)

- RAHUL PANGTEY
- SIMRAN BHATT
- SAKSHI PADIYAR
- DEEPSIKHA BUTOLA
- AKASH RAWAT
- MD. HABIBUL BASHAR

About TSECE

"***LET THE DREAM SOAR AND PASSION IGNITE***"

- The Society was constituted by the Honorable Principal of GBPEC .
- It is a self-sustaining body and meets its expenditure mainly through charging fee from members of TSECE.
- Enables students to develop skills to solve complex technological problems of current times.
- It aims at bridging the gap between the theoretical knowledge and practical applications hence producing Electronics and Communication Engineers with excellent technical and innovative skills.

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MESSAGE FROM EDITOR

Dear readers,

It is with great pleasure that we present you the volume-5, issue 01 of our newsletter "PINNACLE". In our attempt to make it a more enjoyable read, we have been consistently including articles which do not merely state facts, but seek to understand and analyse and the vision and perspective behind the activities.

What you will find in the pages of pinnacle is a collection of inspired and instructive articles written by honest and unceasingly diligent folks and a glimpse of our journey through the semester. Additionally I can't begin to tell you the number of hours that our publication and documentation team put into testing and designing the newsletter.

As always, we are grateful to the students and the faculty fraternity for their immense cooperation through out the journey of this newsletter. Your feedback is quite important to so feel free to share your thoughts. To do so email us on:- gbpec.ac.in.

MUSKAN AGARWAL

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MESSAGE FROM PUBLISHER

It is a matter of pride and pleasure to present our newsletter of electronics and communication departmental society TSECE "pinnacle". Our pinnacle aptly sums up the prospectus of our department. We are thankful to the students for coming up and help us to publish the articles and researches. As most of the students had tried to be a part of the Pinnacle, so it was very tricky for us to select the articles. We feel honored for the faith reposed in us for performing the role of editors of department's newsletter. We have put whole-hearted endeavors to give a complete view of laudable achievements of the faculties and students.

Our previously issued newsletter got good feedback and thus we have tried again to be at our best to meet with your expectations. The main motive to present this pinnacle is to give readers a broad vision about the upcoming technologies and to link readers with literature point of view. So we hope you will appreciate this newsletter and do let us know if there are any topics you would like to see covered in the future.

PIYUSH MEENA

8650236466