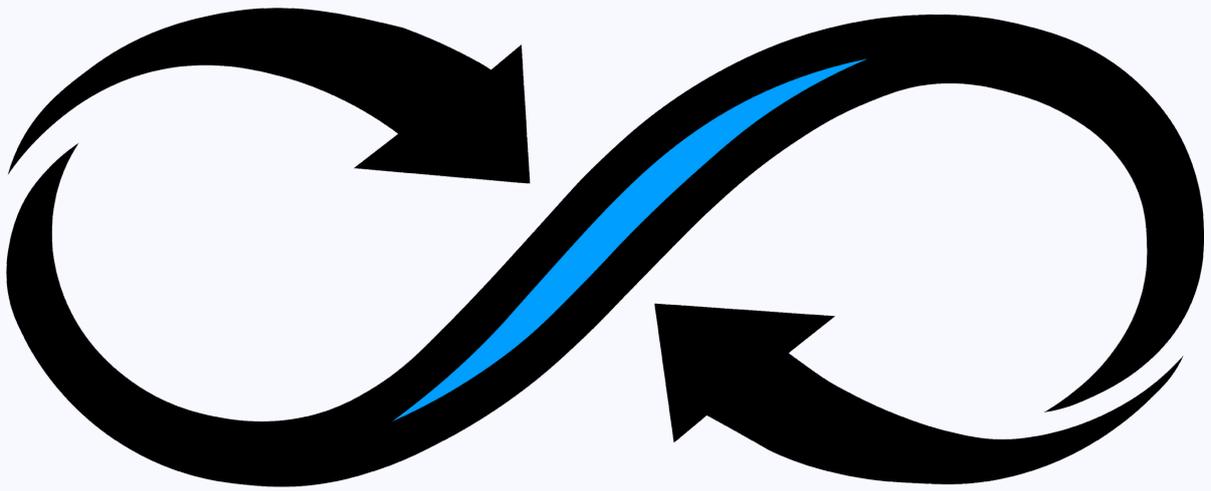


ABIT PRESENTS

ERUDITIO

Innovate . Connect . Inspire





ABIT

TALENTED MINDS

DILIGENT HEARTS



Rajiv Gandhi Institute of Technology
Juhu Versova Link Rd, behind HDFC Bank, Gharkul
Society, Bharat Nagar, Versova, Andheri West,
Mumbai, Maharashtra 400053



Our Inspiration

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To become a leading department committed to nurture student centric learning through outcome and skill based transformative IT education to create Technocrats and leaders for the service of society.

MISSION

1. To shape ourselves into a learning community to flourish leadership, team spirit, ethics, listen and respect each other.
2. To provide computer educational experience that transforms student through rigorous course work and by providing an understanding of the need of the society and industry.
3. To educate students to be professionally IT competent for industry and research programme by providing industry institute interaction.
4. To strive for excellence among students by infusing a sense of excitement in Computer innovation, invention, design, creation and entrepreneurship.
5. To contribute in the service of society by participation of faculty, staff and students in socio-economic and socio-cultural activities.

ABOUT ABIT

ABIT, (Association of Budding information Technocrats) is a departmental committee of Rajiv Gandhi Institute of Technology's Information Technology department. ABIT strives on producing "Talented minds, Diligent hearts", providing them a platform to develop and enhance various technical and soft skills, and excel in various fields.

VISION

To encourage innovation and research while instilling values and providing a vibrant environment for the holistic development of students into valuable global citizens.

MISSION

1. To nurture technical skills, creativity and innovation while encouraging multidisciplinary interaction.
2. Expanding student's technological and cerebral awareness by honing their creative spirit, refining them and helping them discover their abilities.
3. To ensure students to be capable of working effectively as an individual and in a team to complete various projects.
4. To inculcate ethical behaviour, responsibility, and commitment among students.

PRINCIPAL'S DESK

Welcome!

We at MCT's RGIT Mumbai provide a transformative educational experience and believe that "Education is the manifestation of the perfection already in a man." Since inception, the institute is committed to provide quality learning environment and experience to the students and faculty. Over the years, our work ethics and policies have evolved from the vision of our inspiration Late Shree Vilasraoji Dagdojiraoji Deshmukh and various notable educational and social philosophies. Although I firmly believe Science and Technology as extraordinary resources of the world, yet I feel availability of good leadership is necessary in development of nation. We have outstanding record of taking specific efforts in developing academic excellence, Character and Personality of our students. The Academics, Co-curricular and Extra-Curricular activities of our institute are designed for enabling students to be versatile technocrats and leaders of enormous potential.

Our major strengths are our worldwide network of Alumni, our linkages with apex educational and research institutions, our human resource and our infrastructure. The worldwide research in studying role of technocrats in socio-economic development of the nation has proved that technological innovations are the base of economic development of a nation. Moreover, the economic growth of USA in the last fifty years is attributed to science and technology. As a technological institution, this motivates us to shoulder the huge responsibility of contributing to technological world for overall development of our nation. The institute has aligned its mission for developing the young minds into the human capital as an engineering workforce of the nation.



Dr. Sanjay U. Bokade

We aim to enhance linkages with apex educational and national research institution and develop systems for leading the institute towards academic autonomy and set foundation for institute to be a Centre of Excellence in next five years. I assure you that your stay as student at RGIT will be a memorable experience in the context of learning a value based education. Will enable you to be successful in career and life.

HOD'S DESK

Teaching in this institution for more than two decades has endowed me with many momentous memories throughout my term. The memory that shines the brightest out of all of them, belongs to the day the Association of Budding Information Technocrats came into existence.

The synchronization between the latest technology and the ones from the past play an important role in advancing throughout the years. The institution has always encouraged hard work and honesty, and our students have always upheld these values. The students, across the years, have worked relentlessly on various projects and events and have always come up with new ideas that result in great outcomes.

I strongly applaud the ABIT committee on their marvelous work on this magazine. The students always deliver their best and never cease to impress the institute with their creativity and consistency.

There is no substitute for hard work, this is something I have always believed in and I always encourage our students to always do the best they can in any situation that presents itself.

I commend the efforts taken by the "Association of Budding Information Technocrats", or putting together this edition of ERUDITO, and not to forget, the plausible team work that made it possible. As a technological institution, it is essential to keep our thoughts and actions in line with the rapid growth in the technological sector. We are dedicated to



Dr. Sunil B. Wankhade

positively enhancing the learning experience and will always work towards providing the support needed by our talented students to become successful leaders of tomorrow. I wish you a delightful reading experience.



CONVENOR'S DESK

Prof. Nilesh Rathod

Greetings to dear students, teachers, other staff members, and parents. The academic year 2018- 19 was an insightful year for all of us. However, I believe we have been able to grow and learn together with the best of our efforts. I sincerely appreciate the hard work of our students who enthusiastically organized events while keeping in mind the objectives of the Association of Budding Information Technocrats. Students put up a lot of effort to make sure that the events were successful and enjoyable for everyone involved. The guidance and support of the teachers who were involved in the society work needs a special applause. Despite multiple challenges, I am proud to mention that the core team of the ABIT RGIT was able to organize numerous activities. I am sure that all the participants, especially the students of the department of Information Technology have benefited by participating in various events that were held under the banner of the ABIT and had an enriching experience..

ERUDITIO 2019 is a matter of great pride to me, as a student convener of ABIT RGIT, I am proud to be part of this thriving committee which has been in the circuit for more than 9 years now at this college. This magazine is our way of getting the latest in technology and that of our work towards each student. Though the academic curriculum of the Mumbai University is fairly extensive, there is a lot more that is happening in the technical world we do not really have a clue of. Acknowledging this fact there is a need among the students to know all that is happening in the areas related to their field of study. Hence, ERUDITIO was incepted going to be a magazine dedicated to the fields of popular science and technology. it will also help the students, to share with the student community, their knowledge of the recent trends in technologies. I wish all the students a very bright career ahead.

EDITOR'S NOTE

Aniesha Razdan
Editorial Secretary
ABIT-RGIT

Dear All,

An industry set forth in the recent past - Information technology - has evolved with superlative momentum, and accrued a dignified status for itself, and all those associated with it. Information technology is one such field that helps to insinuate, and develop business acumen, and operational tenacity. To promote the same ideology, and make a fundamental difference in the digital society, our department including students, faculty and staff altogether took an initiative and formed one of the leading committees of our college, Association of Budding Information Technocrats (ABIT) that has been bringing forth the budding scientist, that lies within every individual since its inception in 2002.

We at ABIT-RGIT believe that each and every individual has, as it is said: **“Talented Minds, Diligent Hearts”**. Taking a leap forward, with a feeling of pride and a sense of contentment, I, along with my team present to you the first edition of our magazine

“Erudito 2019 : Innovate..Connect..Inspire ”.

Being the first of its kind in IT Department, it is a momentous undertaking, undeniably special, which I believe will serve as a reflection of our department’s intuitive thinking, and its efforts to keep up the pace with the constantly evolving digital and technological environment and find something new, something innovative.

It will take you on a journey to witness the goals and achievements of ABIT, and events that have been held under its banner during the academic year. Not to miss, the special segment ERUDITO brings to the table, is what will let all the tech enthusiasts take a sneak peek at major breakthroughs and advancements that have occurred in the field of technology for the respective academic year.

Lastly, as the Editorial Secretary, I take this opportunity to express my sincere gratitude to Dr. Sanjay Bokade (Principal, RGIT), Dr. S. B. Wankhade (H.O.D), Prof. Nilesh Rathod (Student Convenor, ABIT), Professors of the IT Department and my team for extending their invaluable support that made it possible for us to achieve this milestone. So, hop along and join me in this venture to Innovate, Connect and Inspire. Over to you now.....Enjoy Reading!



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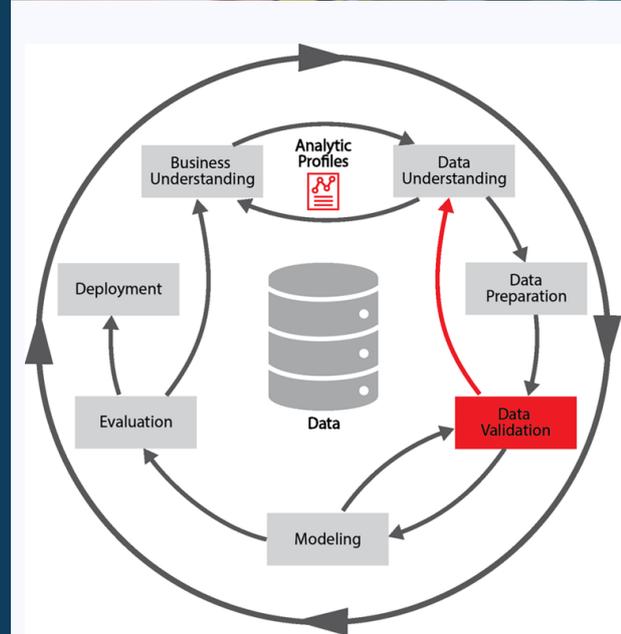
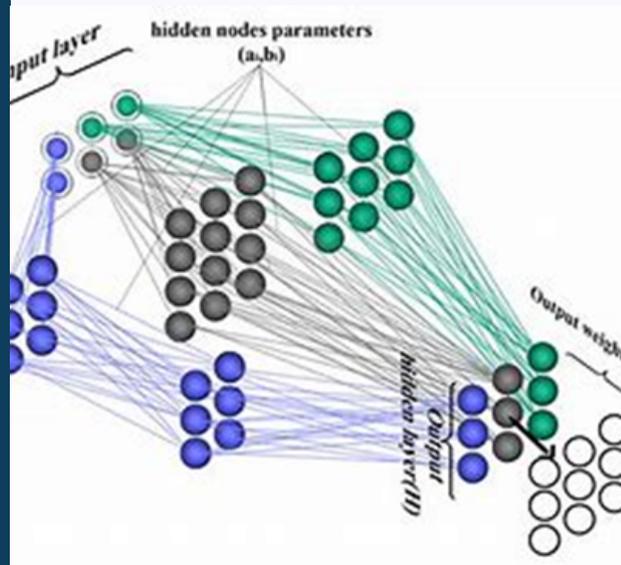
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Aurorae &

The Aurorae make the most spellbinding view. The term was derived from the name of the Greek goddess of the dawn, Aurora. Also acknowledged as Aurora Polaris, these are a characteristic peculiarity seen in both the northern and southern hemispheres. In the Northern hemisphere it's called aurora borealis whereas in the southern half, lights are known as and aurora australis. Now what precisely is this occurrence? The Sun continually produces a solar wind, made of charged particles that flow into the solar system. When the solar wind reaches Earth's magnetic field, it can cause magnetic reconnection, an explosive process that lets in charged particles from space to accelerate into the atmosphere.



Earth's magnetic field, magnetosphere, continually responds to the altering intensity of the solar wind. The solar wind particles come to be trapped in this magnetic field. The particles then are accelerated towards Earth's poles after magnetic reconnection. The particles collide with atoms and molecules in Earth's upper atmosphere, which is

visualized as a burst of light as this interaction offers the atoms greater energy. These collisions continue at lower altitudes till all the incoming energy is lost. When we see the brilliant, rapturous aurora, we are observing a billion individual collisions, lighting up the magnetic field of the Earth.

Technology

- Jinisha Kande

The Northern Lights occur so high up in the atmosphere that they don't pose any threat to people watching them from the ground. The electrically charged particles created produce an electrical current that reaches the ground which could potentially have negative effects to infrastructure and technology. In radical incidents, this could affect electric



power lines, oil and gas pipelines and even computer networks. Did you know that the electric currents can also be a risk to airplanes flying at very high altitudes? But don't worry, very few aircrafts fly that high.

It seems so trivial that satellites, GPS systems, and even whole electrical grids can get knocked out by mere electric particles. An article published in 1996 stated that the surge of electric current is on such a major scale that the magnetic fields associated with these currents reached down and sped up the corrosion of the 800 mile Alaska oil pipeline.

Even though this phenomenon has such adverse effects on our technology, the consequences don't last that long, in a matter of hours the problems get resolved. But it does make me think, are humans really as technologically advanced as we think we are? With the Aurorae affecting our most



basic GPS systems and no solution of this in sight, it is definitely something to wonder about.

Augmented Reality

- Smit Shah

Augmented actuality (AR) is one of the largest technological know-how developments proper now, and it's solely going to get larger as AR equipped smartphones and different gadgets turn out to be extra on hand round the world. AR let us see the real-life surroundings properly in front of us—trees swaying in the park, puppies chasing balls, children taking part in soccer—with a digital augmentation overlaid on it. For example, a pterodactyl would possibly be considered touchdown in the trees, the puppies may want to be mingling with their cool animated film counterparts, and the children ought to be considered kicking an alien spacecraft on their way to rating a goal.

With advances in AR technology, these examples are no longer that one of a kind from what may already be handy for your smartphone. Augmented truth is, in fact, with no trouble reachable and being used in a myriad of approaches such as Snapchat lenses, in apps that assist you discover your vehicle in a crowded parking lot, and in range of buying apps that let you strive on garments besides even leaving home.

Perhaps the most well-known instance of AR science is the cellular app Pokemon Go, which was once launched in 2016 and rapidly grew to be an inescapable sensation. In the game, gamers come across and seize Pokemon characters that pop up in the actual world—on your sidewalk, in a fountain, even in your very own bathroom.

Games aside, there are as many uses for AR in our daily lives as there are Pikachu on the free in Pokemon GO. Here are simply a few examples:

Enhanced navigation structures use augmented truth to superimpose a route over the stay view of the road.

During soccer games, broadcasters use AR to draw traces on the subject to illustrate and analyze plays.

Furniture and housewares large IKEA provides an AR app (called IKEA Place) that lets you see how a piece of furniture will appear and in shape in your space.

Military fighter pilots see an AR projection of their altitude, speed, and different facts on their helmet visor, which skill they don't want to waste center of attention through glancing down to see them.

Neurosurgeons once in a while use an AR projection of a 3D talent to useful resource them in surgeries.

At historic websites like Pompeii in Italy, AR can take views of historical civilizations over today's ruins, bringing the previous to life.

Ground crew at Singapore's airport put on AR glasses to see records about cargo containers, dashing up loading instances

5 Ways Augmented Reality Impact in you Day-To-Day Life

1. Interactive Gaming

When it comes to AR users, the Pokémon Go app takes the gold. Based on an enjoyable card sport that grew to become famous in the 90s, this Nintendo gaming app skyrocketed in recognition when it used to be launched as a free cell app in 2016. Users truly downloaded the app to hunt for Pokémon characters in their daily surroundings. The app makes use of your GPS facts to decide the place you are and divulge the digital characters inside your actual world. Pokémon Go had 60 million energetic customers in 2017 and accounted for 84% of the complete cellular AR client spending that year. In the close to future, mainstream video sports followers will be capable to be a part of their pals in an alternate actuality thru AR facial cognizance and be in a position to communicate with their teammates thru digital puppetry.

2. Data-Driven Sports Broadcasting

These days there's no scarcity of AR on a field, rink, court docket, or turf when it comes to staying motion sports. These have been some of the first functions of AR praised by using mainstream consumers. The aim behind AR in sports activities broadcasting was once to enlarge viewership by offering extra statistics all through a game. In this case, AR applies 3D snapshots and interactive visible factors on the pinnacle of the stay video pictures of the game. It's simply some other way to visualize the trajectories of a ball, puck, or a participant with the assist of traces and curves. This device helps the target market see shut calls, fouls, and record-breaking achievements in plenty of extra designated ways than ever before.

3. More Efficient and Engaging Shopping

Another frequent use of AR in our daily lives is at some point in the domestic shopping process. Using a “virtual tours” option, potential homebuyers can regularly view a property from the remedy of their computing device pc or cellular machine earlier than making the trek to see the domestic in-person. These consumers can additionally use fixtures placement apps like Houzz and DecorMatters to see how they would furnish one of their workable homes. In fact, IKEA is mainly the cost in this appreciation of the usage of a digital fixtures placement app referred to as IKEA Place that additionally lets in you to actually “try earlier than you buy.”

4. Video Conferencing

Filters on Snapchat, Instagram, and iPhone Facetime Memoji are simply some of the methods buyers use AR every day. Facial cognizance software program inside digital camera hardware has gotten increasingly more extra sophisticated. Apple even provides an answer developer package simply for your face. In this case, commit the front digital camera arrays, acknowledged popularly as the “dreaded” notch, which has to turn out to be an enterprise standard, scans your face with up to 30,000 dots near- right away to get a very invulnerable read. This gives a special and in-depth evaluation of your face through mathematical ratios.

5. Authorization

The quickest and most common way iPhoneX (or newer) customers use AR nowadays is with the aid of unlocking their smartphones with their faces. Long long gone are the days of the usage of a thumbprint or pushing a button to release your phone. These customers are additionally capable of scanning their faces as a way of gaining the right of entry to password-protected sites. Instead of resetting or searching up a forgotten password - which can frequently take many minutes, the facial attention software program can be used in the region of a username and password to any internet site or app in simply a few seconds. The facial focus software program additionally permits customers to authorize repayments thru Apple Pay, Google Pay, or Samsung Pay.

What's Next for Consumer AR?

Luxury cars with the potential to venture AR-enabled records on their windshields and dashboards. Imagine being warned about upcoming dangers, riding directions, wind speed, region data, and restaurant critiques as a layer to the view in your car's windshield. These are simply some of the examples of car AR functions Google and different Silicon Valley groups are currently working on. Eventually, these groups will be releasing kits that can be equipped on luxurious auto automobiles except having to purchase a brand-new car.

When it comes to wearable technology, the days of Google Glass 1 have been simply the beginning. Apple is working on fashionable eyeglasses that tether to the iPhone. Each pair of glasses will match a display screen in the glass, so you get a heads-up display. The glasses will be actually indistinguishable from the modern-day eyeglasses you see being bought today. Of course, the launch of Apple's AR eyewear will come with its personal set of privacy policies and trepidations.

Astrophotography

- Riddhi Dange

Astrophotography, also known as astronomical imaging, is photography or imaging of astronomical objects, celestial events, and areas of night sky.



An image of Orion's Belt composited from digitized black-and-white photographic plates recorded through red and blue astronomical filters, with a computer synthesized green channel. The plates were taken using the Samuel Oschin Telescope between 1987 and 1991.

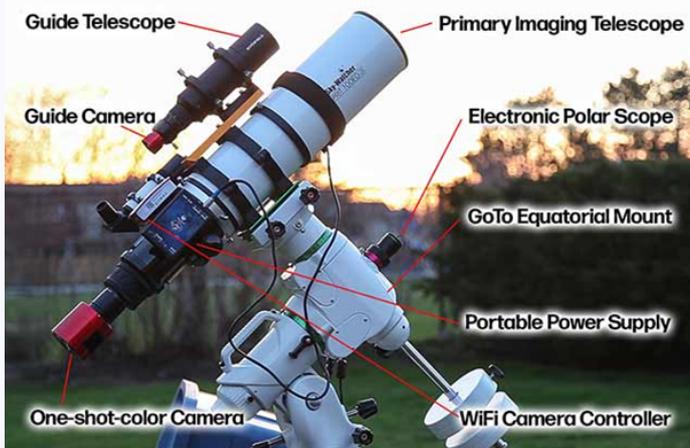
HISTORY

The development of astrophotography as a scientific tool was pioneered in the mid-19th century for the most part by experimenters and amateur astronomers, or so-called "gentleman scientists" (although,

as in other scientific fields, these were not always men). Because of the very long exposures needed to capture relatively faint astronomical objects, many technological problems had to be overcome. These included making telescopes rigid enough so they would not sag out of focus during the exposure, building clock drives that could rotate the telescope mount at a constant rate, and developing ways to accurately keep a telescope aimed at a fixed point over a long period of time.

The first known attempt at astronomical photography was by Louis Jacques Mandé Daguerre, inventor of the daguerreotype process which bears his name, who attempted in 1839 to photograph the Moon. Tracking errors in guiding the telescope during the long exposure meant the photograph came out as an indistinct fuzzy spot. John William Draper, New York University Professor of

Chemistry, physician and scientific experimenter managed to make the first successful photograph of the moon a year later on March 23, 1840, taking a 20-minute-long daguerreotype image using a 5-inch (13 cm) reflecting telescope.



EQUIPMENTS FOR ASTROPHOTOGRAPHY

A basic deep-sky astrophotography equipment setup typically includes an equatorial mount, telescope, camera, autoguiding system, and a slew of additional accessories required to run the camera throughout the night.

ASTROPHOTOGRAPHY TODAY

The art of astrophotography is a pursuit that requires real precision. Astro photographer needs to be well-prepared as the discipline requires a lot of specialized kit – they also need a lot of patience, as they often must hang around waiting for ideal shooting conditions. The best in the field can capture the night skies with a sense of wonder while also offering a scientific portrayal of their subjects. Some well-known Astro photographers are

VINCENT BOUCHAMA

Vincent Bouchama was runner-up in the 2021 Astronomy Photographer Of The Year competition, which is organized by Royal Museums Greenwich. His image, 'The Sun Sharing Its Crown With A Comet,' is shown below and was shot in Río Negro, Argentina. Bouchama has managed to create an image that is both dramatic and detailed, highlighting the delicate lines of the comet. He is able to show us what a wide range of events a solar eclipse can offer to the eye and how paying attention to little touches can lift



an image from something ordinary to something wonderful. He possesses a great eye for creating symmetrical night sky images, which almost look otherworldly in their portrayal.



SEAN PARKER

Sean Parker is a professional photographer and time lapse photographer based in Tucson Arizona. His work has been published by the likes of the New York Times and the Smithsonian in Washington. Parker used to work as a computer technician, which gives him an extra understanding of electronics. His use of single exposure photography to shoot the night skies gives his work extra

impact. He is happy to spend many hours alone in the desert waiting for the perfect moment to get his shot.

NAVANEETH

UNNIKRISHNAN

Unnikrishnan is an amateur Indian deep space photographer, who captures both the majesty of the night skies and the beauty of landscapes. It was seeing the Milky Way from his backyard that made him fall in love with astrophotography. He started out in his journey by using a digital SLR, but now he works with many of the world's top brands including Sony and Manfrotto. He shoots a range of deep sky



objects from nebulae to galaxies, adopting a kind of ethereal approach to astrophotography.



MANUEL DIETRICH

Dietrich is a German professional landscape photographer who brings his love of landscapes to the forefront of his astrophotography. His shots are always dramatic and he is able to distil a real sense of the infinite into his photos. Dietrich also works closely with Adobe and has themed Lightroom presets available to buy, if you're looking to emulate his style. He is able to place buildings very much alongside the

night skies that he photographs, contextualizing their place in this vast universe. His travel photography to places like Europe and Australia shows off his expert grasp of astrophotography as well.

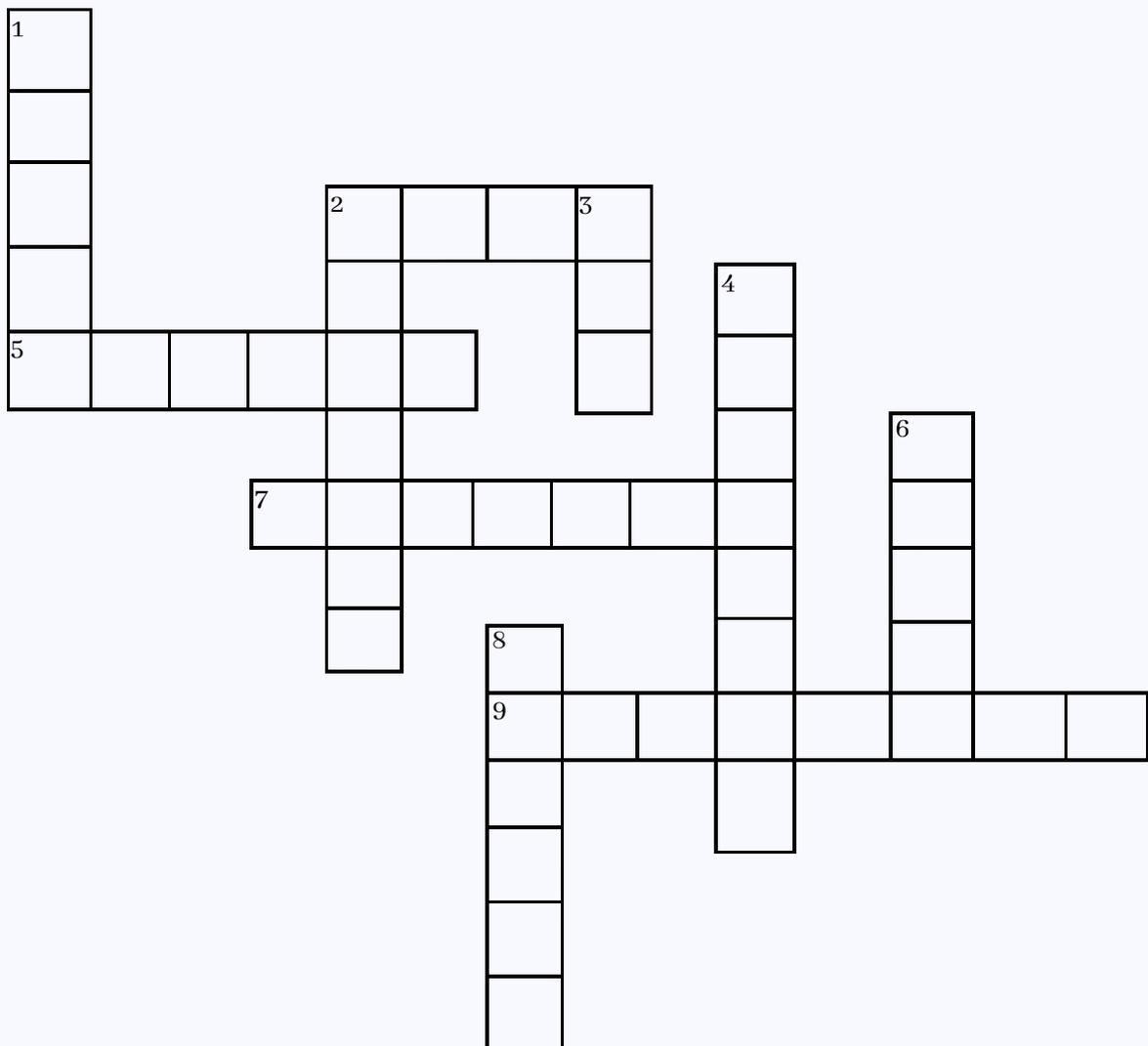
WAYNE PINKSTON

An American night skies photographer, Pinkston initially started to shoot astrophotography as a way of capturing the Milky Way from the Grand Canyon. He uses his photography as a way of capturing the different colors of the system and frequently uses low level lighting to get his images.



THE SOLAR SYSTEM

Are you an astronomy geek like us? Do you spend your nights stargazing? Do you have your nose buried deep in astronomy books marveling at the wonders of the universe? Then you will surely enjoy this crossword puzzle. If you get all the answers, you will receive an honorary membership of The Esteemed Club of Self-Proclaimed Astronomy Experts, so give it your best!



ACROSS :

2. This planet was named after the roman god of war
5. This gas giant can float on water
7. This is the largest planet of the solar system
9. These small rocky objects form a belt in the shape of a torus

DOWN :

1. This planet is the only one this spins from east to west
2. This is the smallest planet of the solar system
3. This giant star is the center of our solar system
4. This is the most abundant elements of our solar system
6. This dwarf planet was named by an 11-year-old
8. This comet is visible from Earth every 75 years

E-Commerce

- Varun Gupta

E-COMMERCE can be defined as buying and selling of goods, products and some other services over the internet. It is also known by a few other names such as Electronic Commerce or Internet Commerce. E-commerce services are provided online over the internet. It is the meeting of buyers and sellers on the internet which involves transaction of goods and services, transfer of funds and exchange of data. To relate how we use E-commerce in our regular life, take the example of online shopping stores like Amazon and Flipkart. Buying products from Amazon is an example of E-commerce where you interact with the seller i.e. Amazon and you exchange data in the form of text, add your delivery address and make the payment.

There are 4 main types of E-commerce:

1. Business to Business(B2B):

This type of model only involves business to business transactions. The final user or consumer is not involved here. The transaction only involves retailers, manufacturers, wholesalers etc.

2. Business to Consumer(B2C):

In this model, the business or company will sell their products directly to the consumer. The consumer browses the website of the company and purchases the products required by them and the company is responsible to ship that product to the consumer. Some good examples of Business to Consumer model are Flipkart and Amazon.

3. Consumer to Consumer(C2C):

In this model, there is no involvement of any business or company. The consumers or the users are in direct contact with each other. A consumer who wants to sell some products and a consumer who wants to buy the product are involved in the transaction. Few good examples of Consumer to Consumer model are OLX and Quikr.

4. Consumer to Business(C2B):

Here, a consumer will sell his products or services to a business or company. For example, if you are a freelancer and you sell your software to a company. This type of transaction is Consumer to Business.



Advantages of E-commerce

- E-commerce enables the buying or selling of products globally. There is no barrier of location or geography.
- It offers great convenience. A customer can buy products at any time in the day because the website is functional throughout the day and does not have any fixed timings like shops.
- It reduces the cost of transactions and allows the business to earn better profits.
- Customer complaints are also addressed directly and it saves a lot of time and energy for the business as well as the customers.

Disadvantages of E-commerce

- The initial investment is very high. The company has to buy all the hardware and software required and also train the workers.
- Security is a major concern for E-commerce. Protecting confidential data of the customers such as credit card details is very important.
- There is a high risk of failure as well. This is because there is no interpersonal relationship which is very important for some brands and companies.
- There can also be problems caused due to improper shipments which can leave the customers dissatisfied.

Electric

The minute you read about the word electric vehicles the first thing that would have popped up in your mind is Tesla. The Mission of Tesla was “to accelerate the world’s transition to sustainable transport.” But when was the first electric vehicle built? What was the need for innovation of electric vehicles? And what do electric vehicles exactly are?

The first Electric Vehicle (EV) was built by Thomas Davenport from Brandon, UK in 1834, he built a battery to supply an electric motor and he used it to drive a small vehicle that managed to go on a short ride on rail. The need for the innovation of electric vehicles is the growing concern in today's

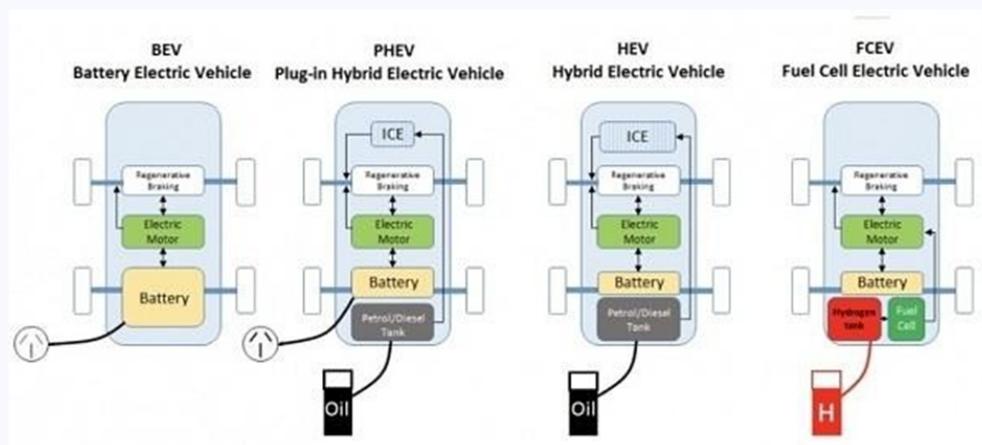


world which is environmental protection and energy conservation. Automotive manufacturers are developing alternatives to existing fossil fuel-driven vehicles. A vehicle which is propelled by one or more electric motors and draws power from onboard electric source is an electric vehicle. They are vehicles that are either partially or fully powered on electric power. Electric vehicles have low running costs as they have less moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). They are more durable and mechanically simpler than gasoline powered vehicles. They produce less pollution than gasoline powered vehicles. Electric Vehicles are much more energy efficient, produce absolutely no tail pipe emissions and requires less maintenance as compared to the conventional internal combustion engine (ICE) vehicles. EVs have no need for the engine and transmission, the two of the most crucial components for internal combustion vehicles. Instead, EVs carry several components for electric power: the motor, the

Vehicles

- Mohd Rameez Bhajjee

battery, the on-board charger, and the Electric Power Control Unit (EPCU). Currently, there are 4 relevant types of electric vehicles prepared to be launched in the markets: Hybrid EVs and Plug-in HEVs, Battery EVs, fuel cell EVs. Battery and fuel cell EVs are driven only by electric power while current available hybrid EVs and Plug-in HEVs have also an internal combustion engine.



The fact of the matter is as long as you can provide a good charging spot at your residence, it's one of the best new invention. You can just battery degrade over time, so after about 5 years you will have 80% capacity and after 10 years maybe around 60%. They have almost zero maintenance because there are very few parts but unfortunately this doesn't apply in India as we don't have fully electric cars yet. As India hurtles towards an apocalyptic future, the Indian government is now racing to switch to all-electric cars by 2030.

FUN FACT: THE CONTINUOUS RISE IN THE COST OF PETROL WILL CONTRIBUTE IN THE DEVELOPMENT OF ELECTRIC VEHICLES.

Extreme Learning Machine

- Tejas Nayak

EXTREME LEARNING MACHINES are feedforward neural networks for classification, regression, clustering, sparse approximation, compression and feature learning with a single layer or multiple layers of hidden nodes, where the parameters of hidden nodes (not just the weights connecting inputs to hidden nodes) need not be tuned. These hidden nodes can be randomly assigned and never updated (i.e., they are random projections but with nonlinear transforms), or can be inherited from their ancestors without being changed. In most cases, the output weights of hidden nodes are usually learned in a single step, which essentially amounts to learning a linear model. The name "extreme learning machine" (ELM) was given to such models by its main inventor **Guang-Bin Huang**.

According to their creators, these models are able to produce good generalization performance and learn thousands of times faster than networks trained using backpropagation. In literature, it also shows that these models can outperform support vector machines in both classification and regression applications.

HISTORY

From 2001-2010, ELM research mainly focused on the unified learning framework for "generalized" single-hidden layer feedforward neural networks (SLFNs), including but not limited to sigmoid networks, RBF networks, threshold networks, trigonometric networks, fuzzy inference systems, Fourier series, Laplacian transform, wavelet networks, etc. One significant achievement made in those years is to successfully prove the universal approximation and classification capabilities of ELM in theory.

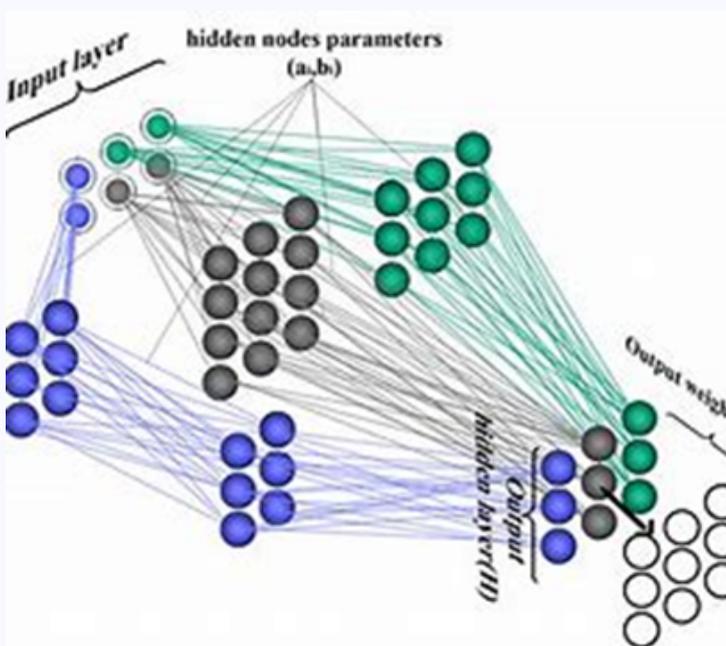
From 2010 to 2015, ELM research extended to the unified learning framework for kernel learning, SVM and a few typical feature learning methods such as Principal Component Analysis (PCA) and Non-negative Matrix Factorization (NMF). It is shown that SVM actually provides suboptimal solutions compared to ELM, and ELM can provide the white box kernel mapping, which is implemented by ELM random feature mapping, instead of the blackbox kernel used in SVM. PCA and NMF can be considered as special cases where linear hidden nodes are used in ELM.

From 2015 to 2017, an increased focus has been placed on hierarchical implementations of ELM. Additionally, since 2011, significant biological studies have been made that support certain ELM theories.

From 2017 onwards, to overcome low-convergence problem during training LU decomposition, Hessenberg decomposition and QR decomposition based approaches with regularization have begun to attract attention

In a 2017 announcement from Google Scholar: "Classic Papers: Articles That Have Stood The Test of Time", two ELM papers have been listed in the "Top 10 in Artificial Intelligence for 2006," taking positions 2 and 7.

ARCHITECTURE



In most cases, ELM is used as a single hidden layer feedforward network (SLFN) including but not limited to sigmoid networks, RBF networks, threshold networks, fuzzy inference networks, complex neural networks, wavelet networks, Fourier transform, Laplacian transform, etc. Due to its different learning algorithm implementations for regression, classification, sparse coding, compression, feature learning and clustering, multi-ELMs have been used to form multi hidden layer networks, deep learning or hierarchical networks.

A hidden node in ELM is a computational element, which need not be considered as a classical neuron. A hidden node in ELM can be classical artificial neurons, basis functions, or a subnetwork formed by some hidden nodes.

RELIABILITY

The black-box character of neural networks in general and extreme learning machines (ELM) in particular is one of the major concerns that repels engineers from application in unsafe automation tasks. This particular issue was approached by means of several different techniques. One approach is to reduce the dependence on random input. Another approach focuses on the incorporation of continuous constraints into the learning process of ELMs which are derived from prior knowledge about the specific task. This is reasonable, because machine learning solutions have to guarantee a safe operation in many application domains. The mentioned studies revealed that the special form of ELMs, with its functional separation and the linear read-out weights, is particularly well suited for the efficient incorporation of continuous constraints in predefined regions of the input space.

CONTROVERSY

There are two main complaints from the academic community concerning this work, the first one is about "reinventing and ignoring previous ideas", the second one is about "improper naming and popularizing", as shown in some debates in 2008 and 2015. In particular, it was pointed out in a letter to the editor of IEEE Transactions on Neural Networks that the idea of using a hidden layer connected to the inputs by random untrained weights was already suggested in the original papers on RBF networks in the late 1980s; Guang-Bin Huang replied by pointing out subtle differences. In a 2015 paper, Huang responded to complaints about his invention of the name ELM for already-existing methods, complaining of "very negative and unhelpful comments on ELM in neither academic nor professional manner due to various reasons and intentions" and an "irresponsible anonymous attack which intends to destroy harmony research environment", arguing that his work "provides a unifying learning platform" for various types of neural nets, including hierarchical structured ELM. In 2015, Huang also gave a formal rebuttal to what he considered as "malign and attack." Recent research replaces the random weights with constrained random weights.

APPLICATIONS

Perhaps the most significant problem with ANNs is that the learned features involved when it comes to assessing huge amounts of data can sometimes be difficult to interpret. This is potentially why ANNs are more commonly used during situations wherein we have a lot of data to ensure that the observed data doesn't contain too many "flukes". Think of it this way - if you toss a coin three times and receive "tails" every time, this doesn't mean that a coin only has a "tails" side. It just means that you need further evaluation and more testing to get a proper reading of probability. ELM has better generalization capabilities and it can reach the smallest error. ELM can help revolutionize the medical field where classification based application is concerned.

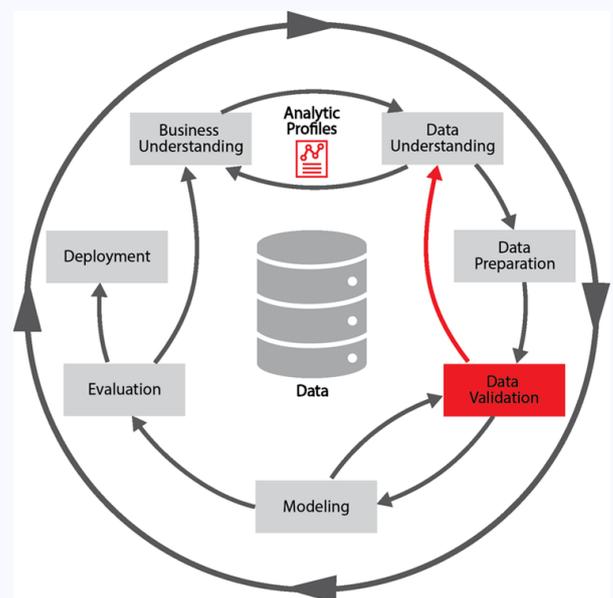


Making a Machine More

A Machine Learning pipeline is crucial to automate ML workflow in a project and planning the pipeline is an important task as it not only impacts the future outcome of the project but also adds additional benefits.

A well-planned ML pipeline helps to make the implementation of the project more flexible and scalable to further improvements.

ML pipelines are iterative and repeated in order to improve the accuracy of the model continuously and achieve the most optimized result. Pipelines are cyclic in nature which enables iteration and improving the scores of the machine learning model.



CONSIDERATIONS FOR SETTING UP A MACHINE LEARNING PIPELINE

- **User oriented model pipeline:** The model pipeline must be predefined in order to accumulate user varying changes.
- **Every step in a pipeline must lead to reusable components:** The pipeline must be set in such a way that the components lead to improvement of model or reusable data usage in order to optimize further predictions or metrics.
- **Code tests into components:** A pipeline gives opportunities to be much, much more thorough with testing as you will not have to perform them manually each time.

Learning Pipeline

Efficient

- Kunal Takke

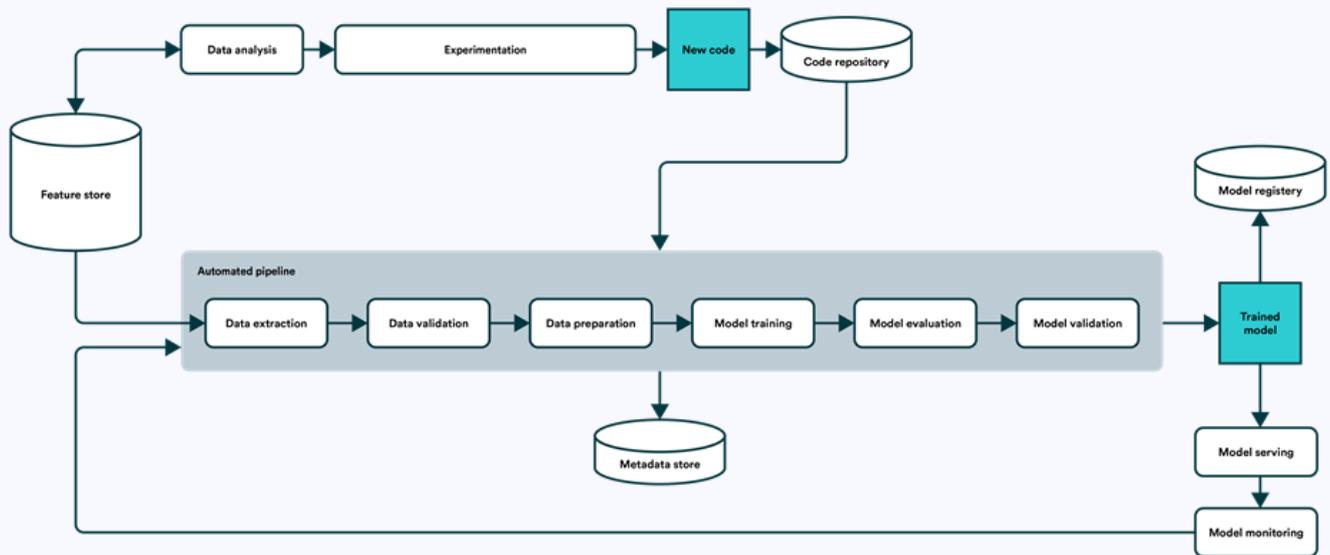
COMPONENTS IN A PIPELINE

- **Examples of different components:**
- **Data validation:** Before using, importing, or otherwise processing data, it is necessary to validate its correctness and quality.
- **Data cleanup:** Data cleaning is the process of locating and correcting flaws in a dataset that could have a negative impact on a prediction model.
- **Model training:** The phase of the data science development lifecycle where practitioners try to match the best mix of weights and bias to a machine learning algorithm in order to minimize a loss function over the prediction range is known as model training.
- **Model evaluation:** Model evaluation is the procedure for determining the accuracy of a system's predictions.
- **Model validation:** Model validation is the process of evaluating a trained model against a testing data set in machine learning.
- **Re-training trigger:** Re-training trigger is a trigger for a re-build can be data change, model change, or code change.

IN ADDITION, THE PIPELINE ALSO HAS STATIC COMPONENTS LIKE

- **Feature store:** Feature store pulls data from enterprise data warehouse or streaming applications.
- **Deployment endpoint:** It is the process of deploying endpoint configuration.
- **Metadata store:** A metadata store is a database of common data fields across a project
- **Source code version control:** It is a practice of keeping track and managing changes to software code.

GIVEN BELOW IS THE EXAMPLE OF AN AUTOMATED PIPELINE



REAL LIFE CASE STUDY OF IMPROVING THE EFFICIENCY OF A PIPELINE

Knowing customer feedback is an important aspect to improve the product accuracy and it also adds some human evaluation grounds but this feature can be used to automate the process of improving a model in a pipeline by adding human evaluation check using feedback question.

GIVEN BELOW IS AN EXAMPLE OF SUCH CASE



Consider a Chatbot app ML project, the chatbot is trained on training set and evaluated on testing set based on the dataset of inputs taken from an available dataset but in order to increase the efficiency of the chatbot in the future we will need to fetch more data into the dataset and label it and again train the model on the data which will be a tedious process. Hence a better idea will be to add a single step into the user input process and make the data labelled and usable to train immediately on remote cloud server, the extra step can consist of an additional feedback question at the end by the chatbot that "Are you satisfied with the suggestions?" ,if the user types yes we can label the data as YES in the database or NO based on the user feedback and then we can further use optimized ML algorithms to train the data in order to further improve the accuracy metrics of the chatbot ,so here just by adding a simple feedback question in the chatbot and fetching the data into the database we are improving the further scalability of the chatbot by adding some small but impactful changes into our pipeline ,this is an example of a well-planned project pipelining.

GREATEST DISCOVERIES OF THE 19TH CENTURY

The 19th century was the era of the Second Industrial Revolution. There were tremendous strides made in the field of science and technology. It truly was an age of inventions! In this puzzle we have listed ten such inventions of the 19th century that shaped the future. Try your best to find as many as you can from the word block below!

WORDS TO FIND :

Typewriter - 1867

Camera - 1888

Telephone - 1876

SewingMachine - 1846

CocaCola - 1886

Elevator - 1852

Automobile - 1889

Telegraph - 1836

ElectricBattery - 1800

Escalator - 1892

C X T S T N Q X C Y N Y B M Y
W B R E L I B O M O T U A O S
C B N W L Y H U P D M L T I U
A V C I H E B Y M P O Q V N P
E R K N S D G V A C T K T U F
N W E G X S J R A Z R W X J X
O E G M A E R C A O S D M I E
H X H A A Z O Z T P V O L R A
P N X C O C Q A M S H J N Z Y
E L G H F N V O W C K B B K I
L O U I V E S C A L A T O R T
E J J N L T T C J H P O U W R
T Y P E W R I T E R B C J N A
E L E C T R I C B A T T E R Y
T X Z X Z H B E O J D J V F U

DEPARTMENTAL AND COMMITTEE ACTIVITIES

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Insight on career options
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Insight on career options
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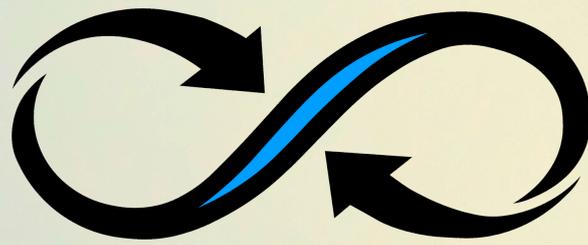


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FOR READING**



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DILIGENT HEARTS

2019



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