VIDYAVARDHINI'S COLLEGE OF ENGINEERING & TECHNOLOGY

Department of Information Technology

LOGIN

TO EXPLORE

2016 | 7th Edition

Vidyavardhini's College of Engineering & Technology

I-Tech Committee

PRINCIPAL
Dr. A. V. Bhonsale

HEAD OF DEPARTMENT
Prof. Madhavi Waghmare

STAFF INCHARGE
Prof. Anagha Patil

CHAIRPERSON
Prashant Bhat

TREASURER
Mandar Chorghe
Kunal Mali

DEPUTY PT
Ruchita Mall

CHIEF EDITOR
Swapnil Mishra

GRAPHICS MANAGER HEAD
Seema Pandey

GRAPHICS MANAGER
Sailee Dalvi

GRAPHICS TEAM
Pooja Bhatkar
Deval Shah

PR HEAD
Radhika Mhatre

PR TEAM
Suyman Yadav

From HOD's Desk

I am immensely proud to present to you **seventh edition** of VCET Information Technology's Departmental Magazine, "**LOGIN…To Explore**". The magazine you are holding in your hands right now is the epitome of the zealous activities and profound involvement of the students as well as the staff of the Information Technology Department.

This Magazine will take you through a thrilling journey of fast paced world of changing and emerging IT industry and technologies thereby acquainting you readers with the hitherto unknown marvels of the world of technology. For second, third and fourth year students, it will provide the invaluable inside into what to be ready for, what skill sets are essential in the industry and thus how to prepare themselves for employment. The department staff, predominantly the Staff-In-Charge of the I-TECH committee Prof. Anagha Patil and the students who have worked tirelessly for this magazine are to be highly congratulated for bringing out such a fine, informative piece of publication. I hope the IT Department and I-TECH Committee will continue to strive and make mammoth efforts to keep up their good work and raise the bar of their soaring ability.

Happy Reading!

Prof.Madhvi Waghmare
Head Of Department, INFT
VCET

From Staff-Incharge's Desk

We are delighted to present the **seventh edition** of "**LOGIN… To** **Explore**", the Annual Technical Magazine of the Department of Information Technology. The magazine that you hold in your hands now is an outcome of grueling efforts of everyone involved by right mix of passion, dedication and determination. The magazine under I-TECH committee was first published in the academic year 2009-2010. The first edition of magazine was named "Dig-It" which was later named as "Login…To Explore".

The Key Purpose of this magazine is to convey to the readers the trends and developments in the field of Information Technology. In this edition of the magazine the I-TECH committee aspires to provide the students with continual exposure to the ever increasing scope of Information Technology, enriching the knowledge based in their chosen field and thereby acquainting them with knowledge pertaining to the IT industry that awaits them for and behalf of I-TECH committee. We would like to extend our sincere gratitude to Dr.A.V.Bhonsale-our honorable principal for his support and guidance as also Prof. Madhavi Waghmare - H.O.D of information Technology Department for constantly encouraging us to make this magazine bigger and better and infusing us with dynamism to succeed in our endeavors. Also a special word of thanks to our dedicated Team of Designers, Editors, and PRs and the entire I-TECH Committee, who have put in their heart and soul to the making of this magazine.

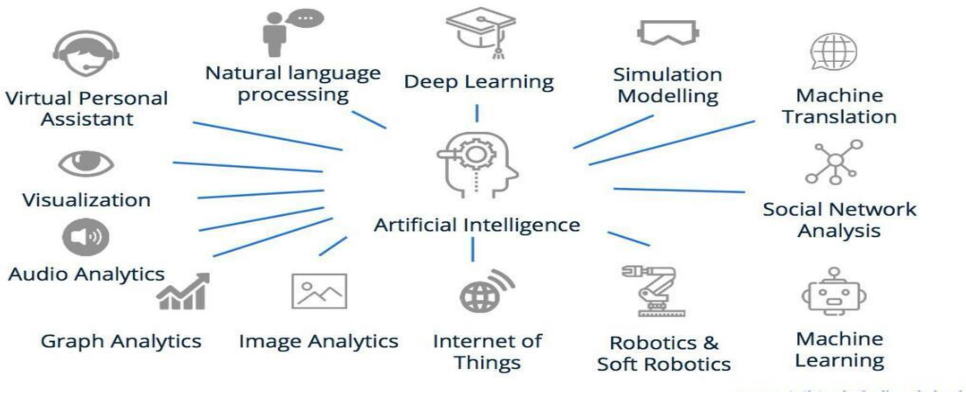
We are sure you will enjoy the technological extravaganza this magazine holds.

Prof. Anagha Patil
Staff-In-Charge,
I-TECH Committee

LOGIN

ARTIFICIAL INTELLIGENCE

Artificial intelligence, sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. Basically, Artificial Intelligence (AI) is the capability of a machine to imitate the intelligent human behavior.



AI can be classified in any number of ways there are two types of main classification.

Type1:

Weak AI or Narrow AI: It is focused on one narrow task, the phenomenon that machines which are not too intelligent to do their own work can be built in such a way that they seem smart. An example would be a poker game where a machine beats human where in which all rules and moves are fed into the machine. Here each and every possible scenario needs to be entered beforehand manually. Each and every weak AI will contribute to the building of strong AI.

Strong AI: The machines that can actually think and perform tasks on its own just like a human being. There are no proper existing examples for this but some industry leaders are very keen on getting close to build a strong AI which has resulted in rapid progress.

Type 2(based on functionalities):

Reactive Machines**:** This is one of the basic forms of AI. It doesn't have past memory and cannot use past information to information for the future actions. **Example:-** IBM chess program that beat Garry Kasparov in the 1990s.

Limited Memory: AI systems can use past experiences to inform future decisions. Some of the decision-making functions in self-driving cars have been designed this way. Observations used to inform actions happening in the not so distant future, such as a car that has changed lanes. These observations are not stored permanently and also Apple's Chabot Sirs.

Theory of Mind: This type of AI should be able to understand people's emotion, belief, thoughts, and expectations and be able to interact socially Even though a lot of improvements are there in this field this kind of AI is not complete yet.

Self-awareness: An AI that has its own conscious, super intelligent, self-awareness and sentient (In simple words a complete human being). Of course, this kind of bot also doesn't exist and if achieved it will be one of the milestones in the field of AI.

Here are five examples:

1. **Automation**: What makes a system or process function automatically? For example, robotic process automation (RPA) can be programmed to perform high-volume, repeatable tasks that human normally performed. RPA is different from IT automation in that it can adapt to changing circumstances.

2. **Machine learning**: The science of getting a computer to act without programming. Deep learning is a subset of machine learning that, in very simple terms, can be thought of as the automation of predictive analytics. There are three types of machine learning algorithms:
    a. <u>Supervised</u> <u>learning</u>: Data sets are labeled so that patterns can be detected and used to label new data sets.
    b. <u>Unsupervised</u> <u>learning</u>: Data sets aren't labeled and are sorted according to similarities or differences.
    c. <u>Reinforcement</u> <u>learning</u>: Data sets aren't labeled but, after performing an action or several actions, the AI system is given feedback.

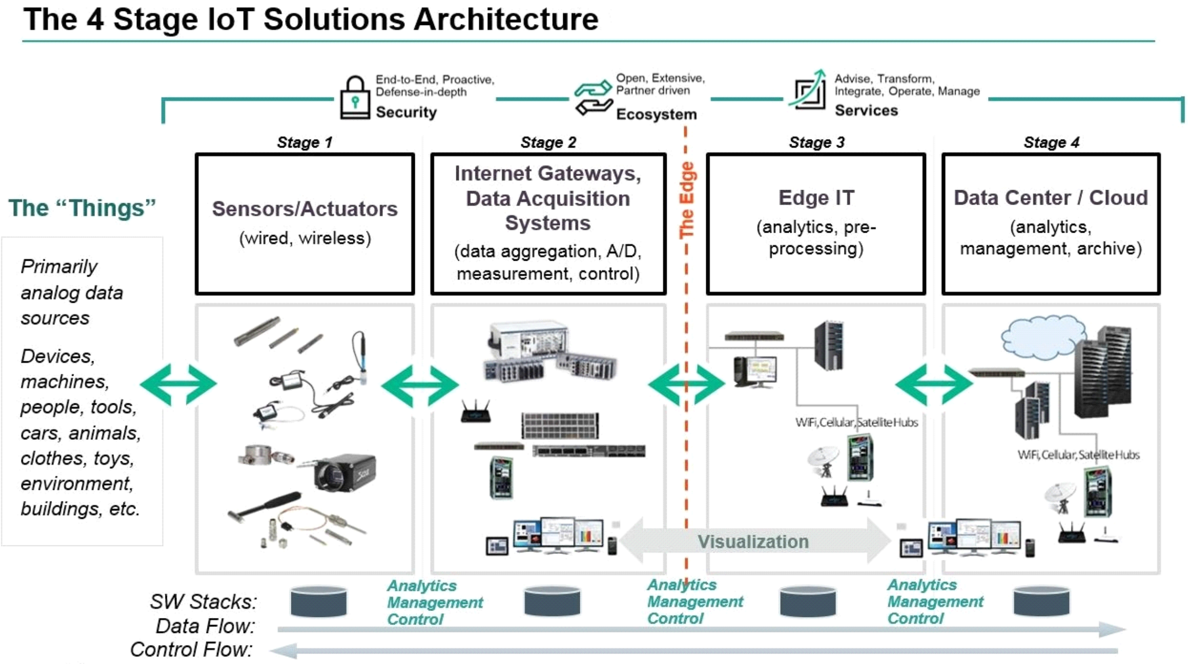
3. **Machine vision**: The science of allowing computers to see. This technology captures and analyzes visual information using a camera, analog-to-digital conversion and digital signal processing. It is often compared to human eyesight, but machine vision isn't bound by biology and can be programmed to see through walls, for example. It is used in a range of applications from signature identification to medical image analysis. Computer vision, which is focused on machine-based image processing, is often conflated with machine vision.

4. **Natural language processing (NLP)**: The processing of human -- and not computer -- language by a computer program. One of the older and best known examples of NLP is spam detection, which looks at the subject line and the text of an email and decides if it's junk. Current approaches to NLP are based on machine learning. NLP tasks include text translation, sentiment analysis and speech recognition.

5. **Robotics**: A field of engineering focused on the design and manufacturing of robots. Robots are often used to perform tasks that are difficult for humans to perform or perform consistently. They are used in assembly lines for car production or by NASA to move large objects in space. Researchers are also using machine learning to build robots that can interact in social settings.

Radhika Mahtre
TE-IT

IOT Architecture



Stage 1. Sensors/actuators:

Sensors collect data from the environment or object under measurement and turn it into useful data. Think of the specialized structures in your cell phone that detect the directional pull of gravity—and the phone's relative position to the "thing" we call the earth—and convert it into data that your phone can use to orient the device. Actuators can also intervene to change the physical conditions that generate the data. An actuator might, for example, shut off a power supply, adjust an air flow valve, or move a robotic gripper in an assembly process.

The sensing/actuating stage covers everything from legacy industrial devices to robotic camera systems, water-level detectors, air quality sensors, accelerometers, and heart rate monitors. And the scope of the IOT is expanding rapidly, thanks in part to low-power wireless sensor network technologies and Power over Ethernet, which enable devices on a wired LAN to operate without the need for an A/C power source.

In an IOT architecture, some data processing can occur in each of the four stages. However, while you can process data at the sensor, what you can do is limited by the processing power available on each IOT device. Data is at the heart of an IOT architecture, and you need to choose between immediacy and depth of insight when processing that data. The more immediate the need for information, the closer to the end devices your processing needs to be.

Stage 2. The Internet gateway:

The data from the sensors starts in analog form. That data needs to be aggregated and converted into digital streams for further processing downstream. Data acquisition systems (DAS) perform these data aggregation and conversion functions. The DAS connects to the sensor network, aggregates outputs, and performs the analog-to-digital conversion. The Internet gateway receives the aggregated and digitized data and routes it over Wi-Fi, wired LANs, or the Internet, to Stage 3 systems for further processing.

Stage 2 systems often sit in close proximity to the sensors and actuators. For example, a pump might contain a half-dozen sensors and actuators that feed data into a data aggregation device that also digitizes the data. This device might be physically attached to the pump. An adjacent gateway device or server would then process the data and forward it to the Stage 3 or Stage 4 systems.

Stage 3. Edge IT:

Once IOT data has been digitized and aggregated, it's ready to cross into the realm of IT. However, the data may require further processing before it enters the data center. This is where edge IT systems, which perform more analysis, come into play. Edge IT processing systems may be located in remote offices or other edge locations, but generally these sit in the facility or location where the sensors reside closer to the sensors, such as in a wiring closet.

Because IOT data can easily eat up network bandwidth and swamp your data center resources, it's best to have systems at the edge capable of performing analytics as a way to lessen the burden on core IT infrastructure. If you just had one large data pipe going to the data center, you'd need enormous capacity. You'd also face security concerns, storage issues, and delays processing the data. With a staged approach, you can preprocess the data, generate meaningful results, and pass only those on.

For example, rather than passing on raw vibration data for the pumps, you could aggregate and convert the data, analyze it, and send only projections as to when each device will fail or need service.

Stage 4. The data center and cloud:

Data that needs more in-depth processing, and where feedback doesn't have to be immediate, gets forwarded to physical data center or cloud-based systems, where more powerful IT systems can analyze, manage, and securely store the data. It takes longer to get results when you wait until data reaches Stage 4, but you can execute a more in-depth analysis, as well as combine your sensor data with data from other sources for deeper insights. Stage 4 processing may take place on-premises, in the cloud, or in a hybrid cloud system, but the type of processing executed in this stage remains the same, regardless of the platform.

Sailee Dalvi
SE-IT

Reusable Rockets

Rockets typically are destroyed on their maiden voyage. But now they can make an upright landing and be refueled for another trip, setting the stage for a new era in spaceflight.

Thousands of rockets have flown into space, but not until 2015 did one return like this: it came down upright on a landing pad, steadily firing to control its descent. If this can be done regularly and rockets can be refueled over and over, spaceflight could become a hundred times cheaper.

Two tech billionaires made it happen. Jeff Bezos's Blue Origin first pulled off a landing in November; Elon Musk's SpaceX did it in December. The companies are quite different—Blue Origin hopes to propel tourists in capsules on four-minute space rides, while SpaceX already launches satellites and space station supply missions.

Blasting things into space has been expensive because rockets cost tens of millions of dollars and fly once before burning up in a free fall back through the atmosphere. SpaceX and Blue Origin instead bring theirs down on fold-out legs, a trick that requires onboard software to fire thrusters and manipulate flaps that slow or nudge the rockets at precise moments. SpaceX has the harder job because Blue Origin's craft go half as fast and half as high and stay mostly vertical, whereas SpaceX's rockets have to switch out of a horizontal position.
The rise of the reusable rocket is ushering in a new era of spaceflight. In the past, rockets were typically single-use and discarded after carrying their payload into space. The rocket parts either fell back to Earth or went into orbit; either way, they were typically not recovered or reused. However, the rocket itself is the most expensive component of a space launch. Reusable rockets could potentially cut the cost of spaceflight by a hundredfold.

The Space Shuttle was in fact partially reusable, but the cost of refurbishment made it no more cost-effective than expendable rockets. After launch, its boosters parachuted into the ocean and were retrieved for refurbishment, which was a very involved and expensive process because salt water corroded the material. The company SpaceX is currently developing and testing cost-effective reusable rocket technology, with an eye towards the company's ultimate mission of making life multi-planetary. SpaceX designs rockets with a built-in extra fuel margin to provide the rockets with enough power to deliver a payload into space and safely land the first stage back on Earth.

On December 21, 2015, SpaceX made history by successfully re-landing the first stage of its two-stage Falcon 9 rocket. The rocket sent 11 communications satellites into orbit before returning and landing at Landing Zone 1 in Cape Canaveral, marking the first successful orbital rocket landing in history. On April 8, 2016, SpaceX launched a Falcon 9 rocket that delivered cargo to the International Space Station. The first stage of the rocket returned to Earth and successfully landed on an autonomous drone ship off the coast of Florida, achieving another important milestone. In total, SpaceX has successfully re-landed eight

Falcon 9 rockets, three on land and five at sea.

The Falcon 9 rocket employs many cutting edge technologies including a restartable ignition system, grid fins, and deployable landing gear . When the rocket is launched, it is placed on a trajectory heading out of Earth's atmosphere and into orbit. To land the first stage of the rocket back on Earth, it must be placed on a return trajectory heading back to the landing site. The restartable ignition system provides the rocket with the power to decelerate and perform this turnaround maneuver before landing. The Falcon 9 rocket also employs grid fins during atmospheric reentry to enable precision landing. Grid fins are attached to the side of the rocket and consist of intersecting planar surfaces that form cube shaped cells. At hypersonic speeds, the orientation of the fins can be adjusted to control the rocket's lift vector, which allows for precise steering of the rocket as it descends through Earth's atmosphere. Landing gear is mounted on the bottom of the rocket and consists of four carbon fiber and aluminum deployable landing legs that allow the rocket to land in a stable, upright position. The rocket also has an autonomous vehicle control system and a suite of navigation sensors that help guide and control the landing.

What's next? Although SpaceX has successfully landed many rockets, they have not yet reused any of the re-landed rocket boosters. However, at the end of March 2017, SpaceX plans to launch the SES 10 communications satellite to space aboard a reused Falcon 9 booster. This launch will provide valuable information about the performance of the reused rocket, and if all goes smoothly, will mark a major step towards making space more accessible for commercial clients and push the boundaries of space exploration and discovery.

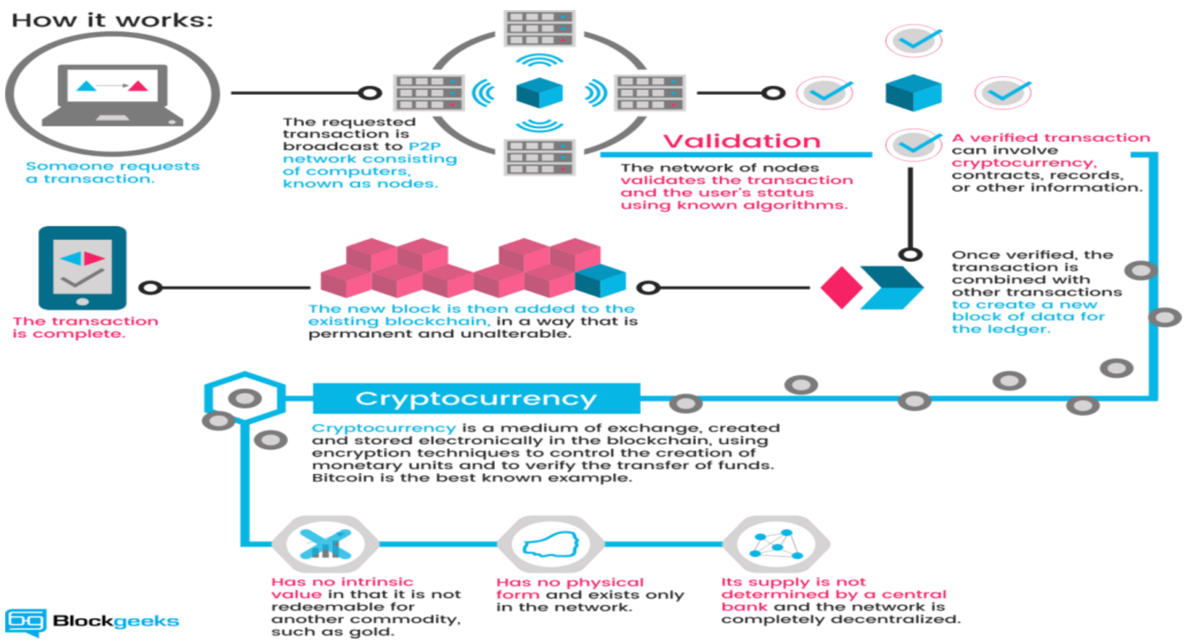
Neha Raut
TE-IT

Cryptocurrency

Cryptocurrency is an encrypted, a network for facilitating digital barter which was developed eight years ago a disruptive technology to long standing and unchanged financial payment systems that have been in place for many decades.

While cryptocurrencies are not likely to replace traditional fiat currency, they could change the way Internet-connected global markets interact with each other, clearing away barriers surrounding normative national currencies and exchange rates. Technology advances at a rapid rate, and the success of a given technology is almost solely dictated by the market upon which it seeks to improve. Cryptocurrencies may revolutionize digital trade markets by creating a free flowing trading system without fees.

"Virtual currencies, perhaps most notably Bitcoin, have captured the imagination of some, struck fear among others, and confused the heck out of the rest of us." – Thomas Carper, US-Senator



Blockchain and Cryptocurrency:

The transaction is known almost immediately by the whole network. But only after a specific amount of time it gets confirmed. Confirmation is a critical concept in cryptocurrencies.

As long as a transaction is unconfirmed, it is pending and can be forged. When a transaction is confirmed, it is set in stone. It is no longer forgeable, it can't be reversed, it is part of an immutable record of historical transactions: of the so-called blockchain.

For this job, the miners get rewarded with a token of the cryptocurrency, for example with Bitcoins. Since the miner's activity is the single most important part of cryptocurrency-system we should stay for a moment and take a deeper look on it.

Pooja Bhatkar
TE-IT

TESLA AUTO PILOT

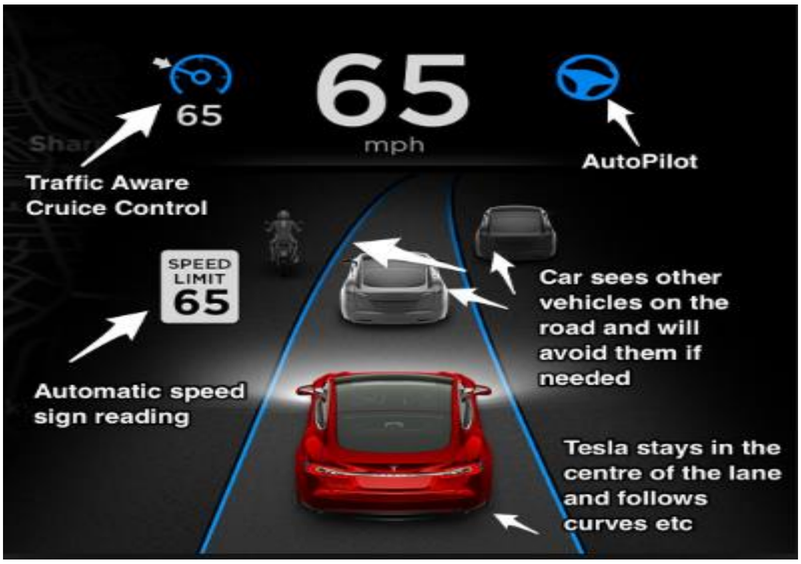
TESLA has always been about pushing full speed toward a tech-tastic future. CEO Elon Musk wouldn't settle for making a luxurious, sexy, environmentally-friendly electric car. He made one that could hit 60 mph in 3.2 seconds. Then 2.8 seconds. Then 2.5—all the while ratcheting up the range, from the original 265 miles per charge to the current, top of the line 335.

Then, in October, Tesla took what looked like a rare step backward: A year after turning on Autopilot and letting its cars drive themselves (on the highway, and with human supervision), it started selling cars with zero autonomous or active safety capabilities. Drivers had to do all the work themselves, just as if they had bought—gasp—a non-Tesla.

Fear not, Tesla fans. Musk hasn't dropped his self-driving dream. He has rebooted it to be grander than ever. The October retreat marked the launch of a long-term, one-step-back-two-leaps-forward strategy to go far beyond the limited vision of autonomy it had previously delivered. By investing in seriously upgraded sensors, software, and hardware, Tesla has said, forget the highway, forget needing humans in the loop. It wants its cars to drive themselves, everywhere and anywhere.

“All you will need to do is get in and tell your car where to go,” Musk said in October.

And then, the owners of newer cars finally got to turn that vision on, thanks to an over-the-air software update.



Well, they got to turn some of it on. Since October, Tesla has been equipping every new Model S sedan and Model X SUV with the necessary tech (in exchange for about $8,000) for full self-driving capability—eventually. Until a few days ago though, those cars didn't even have adaptive cruise control. Now, they can steer themselves at speeds up to 45 mph.

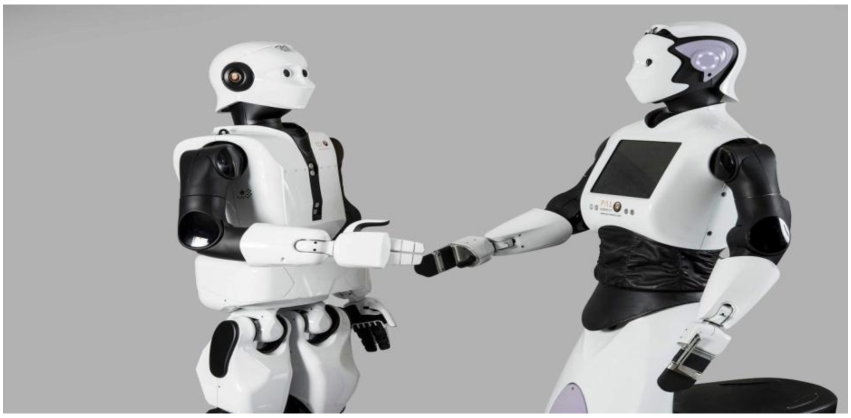
Sure, that sounds lame, especially compared to Tesla cars with the original version of Autopilot, but soon it should be much better. It's a new approach in a safety critical area, so traditionally bullish Tesla is moving carefully. Musk even urged drivers to be careful with their new powers.

Seema Pandey
TE-IT

Robots That Teach Each Other

What if robots could figure out more things on their own and share that knowledge among themselves ?

Many of the jobs humans would like robots to perform, such as packing items in warehouses, assisting bedridden patients, or aiding soldiers on the front lines, aren't yet possible because robots still don't recognize and easily handle common objects. People generally have no trouble folding socks or picking up water glasses, because we've gone through "a big data collection process" called childhood, says Stefanie Tellex, a computer science professor at Brown University. For robots to do the same types of routine tasks, they also need access to reams of data on how to grasp and manipulate objects. Where does that data come from? Typically it has come from painstaking programming. But ideally, robots could get some information from each other.



That's the theory behind Tellex's "Million Object Challenge." The goal is for research robots around the world to learn how to spot and handle simple items from bowls to bananas, upload their data to the cloud, and allow other robots to analyze and use the information.

Tellex's lab in Providence, Rhode Island, has the air of a playful preschool. On the day I visit, a Baxter robot, an industrial machine produced by Rethink Robotics, stands among oversized blocks, scanning a small hairbrush. It moves its right arm noisily back and forth above the object, taking multiple pictures with its camera and measuring depth with an infrared sensor. Then, with its two-pronged gripper, it tries different grasps that might allow it to lift the brush. Once it has the object in the air, it shakes it to make sure the grip is secure. If so, the robot has learned how to pick up one more thing.

The robot can work around the clock, frequently with a different object in each of its grippers. Tellex and her graduate student John Oberlin have gathered—and are now sharing—data on roughly 200 items, starting with such things as a child's shoe, a plastic boat, a rubber duck, a garlic press and other cookware, and a sippy cup that originally belonged to her three-year-old son. Other scientists can contribute their robots' own data, and Tellex hopes that together they will build up a library of information on how robots should handle a million different items. Eventually, robots confronting a crowded shelf will be able to “identify the pen in front of them and pick it up,” Tellex says.

Projects like this are possible because many research robots use the same standard framework for programming, known as ROS. Once one machine learns a given task, it can pass the data on to others—and those machines can upload feedback that will in turn refine the instructions given to subsequent machines. Tellex says the data about how to recognize and grasp any given object can be compressed to just five to 10 megabytes, about the size of a song in your music library.

Tellex was an early partner in a project called RoboBrain, which demonstrated how one robot could learn from another’s experience. Her collaborator Ashutosh Saxena, then at Cornell, taught his PR2 robot to lift small cups and position them on a table. Then, at Brown, Tellex downloaded that information from the cloud and used it to train her Baxter, which is physically different, to perform the same task in a different environment.

Swapnil Mishra
SE-IT

IMAGE PROCESSING

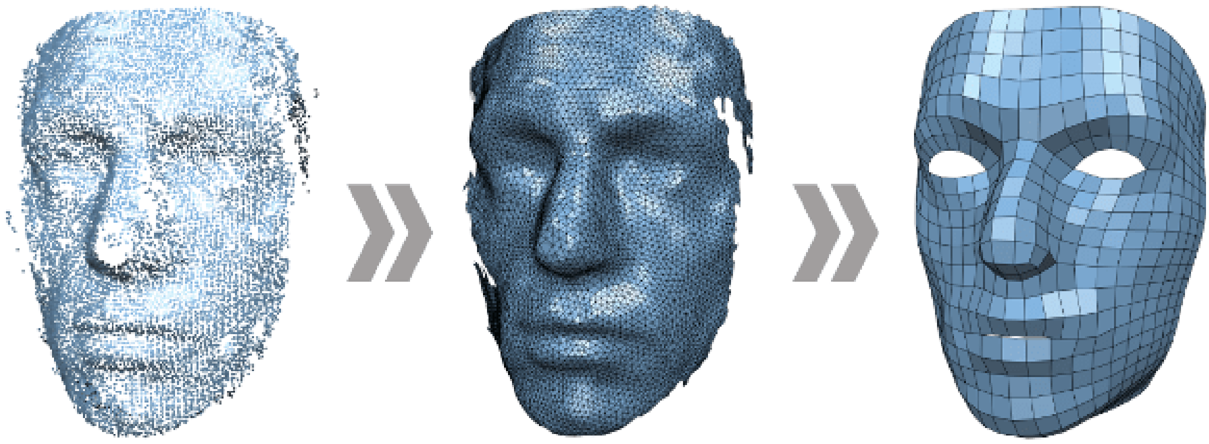


Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too.

The two types of methods used for Image Processing are Analog and Digital Image Processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies, to get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction.

Image processing and analysis is fundamental to extract useful information from images. To achieve this end, open source image analysis software, exemplified by the Java application

ImageJ, can be used very flexibility to create workflows and is open to customization due to its open source architecture. ImageJ has a strong academic community with many macros, Java scripts and plug-ins available online, a help forum, regular updates and face to face conferences.

Recently German company Knorr-Bremse has used the technology of image processing to prevent train accidents. This company has bought a 21.3% stake in rail vision. Rail Vision, founded in 2015, develops accident prevention and autonomous driving system for trains. The company has developed an innovative cognitive vision system based on image processing technology. The

system is designed to warn locomotive drivers about obstacles on the railway tracks in any weather and lighting conditions, using special cameras to identify objects. Since the average stopping distance of a train moving at high speed is 800-1,200 meters, detecting obstacles in advance is very important for reducing the number of accidents and casualties in global railway activity.

Researchers at MIT’s Computer Science and Artificial Intelligence Laboratory (CSAIL) have developed a new programming language for image processing algorithms yields code that’s much shorter and clearer – but also faster. In tests, the MIT researchers used Halide to rewrite several common image-processing algorithms whose performance had already been optimized by seasoned programmers. The Halide versions were typically about one-third as long but offered significant performance gains — two-, three-, or even six-fold speedups. In one instance, the Halide program was actually longer than the original — but the speedup was 70-fold.

Deval Shah
TE-IT

Cyber Security

What Is Cyber security?

Cyber security is the practice of protecting systems, networks, and programs from digital attacks. These cyber attacks are usually aimed at accessing, changing, or destroying sensitive information; extorting money from users; or interrupting normal business processes.

Today, implementing effective cyber security measures is particularly challenging because there are more devices than people, and attackers are becoming more innovative. A successful cyber security approach has multiple layers of protection spread across the computers, networks, programs, or data that one intends to keep safe. In an organization, the people, processes, and technology must all complement one another to create an effective defense from cyber attacks.

Technology:

Technology is essential to give organizations and individuals the computer security tools needed to protect themselves from cyber attacks. Three main entities must be protected: endpoint devices like computers, smart devices, and routers; networks; and the cloud. Common technology used to protect these entities include next-generation firewalls, DNS filtering, malware protection, antivirus software, and email security solutions.

Why is cyber security important?

In today's connected world, everyone benefits from advanced cyber defense programs. At an individual level, a cyber security attack can result in everything from identity theft, to extortion attempts, to the loss of important data like family photos. Everyone relies on critical infrastructure like power plants, hospitals, and financial service companies. Securing these and other organizations is essential to keep our society functioning.

Everyone also benefits from the work of cyber threat researchers, like the team of 250 threat researchers at Talos, who investigate new and emerging threats and cyber attack strategies. They reveal new vulnerabilities, educate the public on the importance of cyber security, and strengthen open source tools. Their work makes the Internet safer for everyone.

Suyman Yadav
TE-IT

Department of
INFORMATION TECHNOLOGY

Department of
Information Technology