



HITech

**Technical magazine of CSE Department,
Heritage Institute of Technology**

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Foreword

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It is our great privilege to announce the publication of the HITech August 2021 issue. HITech is the Technical Magazine of the Department of Computer Science and Engineering, Heritage Institute of Technology, Kolkata.

Our goal is to provide sufficient opportunities to students to understand the upcoming technologies and discover a few new ones with their innovative ideas. We take pride helping them grow and develop as a successful engineer, serving the society admirably.

Students have tried to write various articles, opening the door for Research and Development opportunities in various fronts.

We would encourage our students to contribute on novel and interesting topics, as well as explore and expand the world of creativity. The present issue focuses on the reuse of technology, algorithm design for fun, and optimum utilization of limited computing resources.

Evolution of Modern Music

By Himon Sarkar, 3rd Year, CSE

"Music is my religion." -Jimi Hendrix.

Born in Seattle, Washington, Hendrix was an avid listener of blues but soon found a style all of his own. He could play the guitar behind his head and give the illusion of picking it with his teeth. He turned the guitar into a weapon, rather than an accompaniment. Some of his best hits are: 'Little Wing', 'Bold As Love', and 'Hey Joe Pink Floyd'.

Pop music(1965) is often considered a reflection of changing culture in the United States — and between 1960 and 2010, songs featured in the Billboard Hot 100 varied greatly. England has researchers who recently analyzed almost all the singles that charted during that period to reveal trends in the evolution of popular music. The biggest revolution to occur was the birth of rap in 1991, along with a brief synthesizer-1980s. There is always diversity in American pop. To construct the evolutionary history of American pop, the scientists looked at quantifiable digital elements in the music that correspond with rhythmic, harmonic, and tonal qualities in the songs, and how they changed over time.

There exist some easier-to-understand tonal elements that were tracked, that linked particular artists and songs. Several trends in the team's analysis are also displayed in the graphic below, with each of the approximately 17,000 songs they analyzed represented as a dot. Search by artist and the quality of the tone.

Hip-hop revolution ignited: Ramps up with the rise of rap and hip-hop in the late '80s and into the '90s, with artists like Busta Rhymes, Ludacris, and Snoop Dogg. Based on the parameters: Energetic, speech, brightness.



Ranks high in the year 1985 was "*Follow Your Heart*" - by Triumph. Ranks high: in the year 1991 was *Temptation* - by Corina. One more song *Don't Cry* - by Seal also got the highest average in the Year 1996. Now AI is shaping the aspects of the Music industry. Artificial intelligence (AI) tools such as AI-mediated composition (Amper, Popgun, etc.) and voice synthesis will change the way music distribution works and make it easier and more affordable for thousands of musicians all over the globe to create high-quality, professional-sounding music.

Artists will create professional-quality music easily. Streaming will give millions of people unlimited access to music. Democratization powered by emerging markets rules over the industry today.

Merry-Go-Round

By Protyasha Kundu, 2nd Year, CSE

Modern-day technologies are unapologetic about their new developments if it directly benefits them with user engagement to their product. Why would they be? That can't be raised as a question when it's serving right and helping them expand.

Products are developed with the 'moth drawn to a flame' approach, the more you can get your consumers monomaniacs the more you can have success over it. Not to mention, the transition from clicking to scrolling web pages, was one of the revolutionary developments in recent years, which simulated cognitive human intelligence.

Merry-go-round, the official definition for it goes like a revolving machine with horses and cars on which people ride for amusement, leaving behind several connotations to it though. But we do remember how we wanted it to never stop so that we can go around it over and over again countless times possible. But why does Aza Raskin, now says he's deeply sorry and feels guilty about something that bestowed the congenital craving of a normal human being?

The infinite scroll! The most intuitive feature enables you to endlessly move up or down through content with a simple flick of a finger. But what makes it so powerful and addictive?



A revolving machine with horses and cars

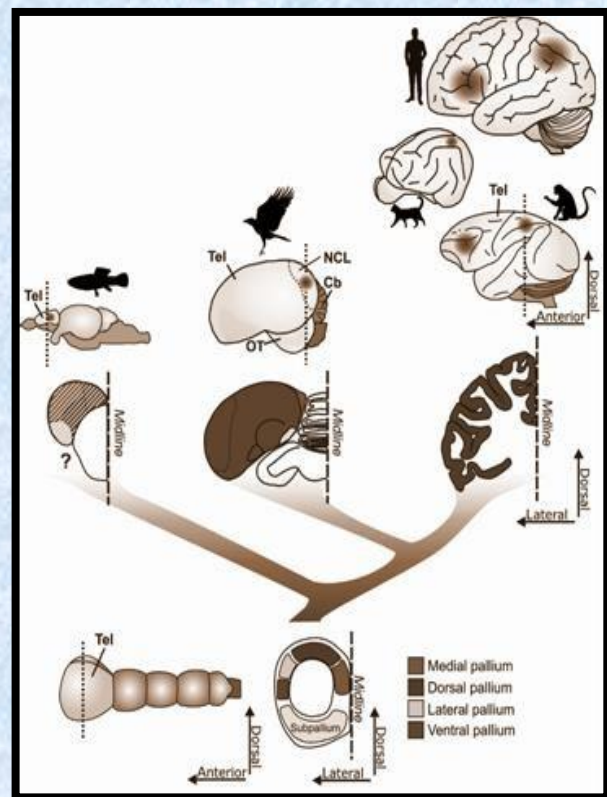
Human brains evolved through the years into incredible prophecy automata, devices in a way that

helps to both cognize and ascertain the environment.

To make correct projections and predictions, the brain accesses memories, which allow us to extrapolate in a nearly instantaneous process of pattern recognition. Brain existed in reptiles, amphibians, and terrestrial animals but in different forms and abilities.

The ability to learn is simply the conditioning of the brain which works like a finite automaton to recognize causes, procedures, and outcomes.

Our species evolved from hunter-gatherers to making human-like robots, from our ability to perceive, retain and make good decisions based on what we know and connecting the dots to what is likely to come up next. It's this conditioning as well as recognition that creates cognitive shortcuts and habits, allowing us to process tremendous amounts of information at once...



The difference in different Species..

Human brains move known causal patterns to long-term storage so that our attention can be devoted to learning new things. In terms of gestures, and use of

tools the species *Homo sapiens* are different from the other species.

Humans are more evolved when comes to the ability to Reasoning, Creativity, Insight, Invention Language, and Rapid Decision Making. As physiological evolution took place biologically, technical evolution took place in terms of memory enhancement, processor speed, parallel processing by time-stamping and multithreaded concepts.

Interestingly, the human brain isn't wired to seek pleasure alone. Much of our motivation comes from alleviating the pain of desire! the desire for scientific innovation. Dopamine levels spike when we're just about to find a reward and plummet after we receive it. To get us to do just about anything, evolution uses this chemical cascade to induce anticipation, motivation, and finally pain alleviation if we are stuck at some point.

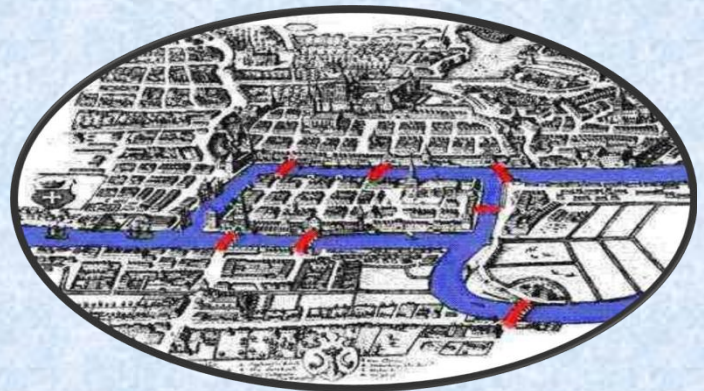
There are many reasons why the field of cyberpsychology has spiraled its way into revolutionary breakthroughs in the field of technological developments. Somehow, considering the algorithm of the 'dopamine seeking reward loop', researchers have successfully imitated the inclination of humans to go around in an endless loop of a merry-go-round.

The Algorithm of Having Fun

By Swarnadeep Saha, 2nd Year, CSE

If you were to visit the city of Königsberg in Prussia around the 17th century, a local might amuse you with a deceptively simple problem.

The river Pregel flowed through the heart of the city, and somewhere in between the river divided the city into four distinct regions. There were seven bridges called: Blacksmith's bridge, Connecting Bridge, Green Bridge, Merchant's Bridge, Wooden Bridge, High Bridge, and Honey Bridge spread across this river, connecting an island to the rest of the city. You have to devise a path in a way that would cross each of the seven bridges only once.



How do I optimize the path?

You might be tempted to waste an entire afternoon bluntly staring at the map of the city, brute-forcing every way in search of a satisfiable solution. But before you tire yourself out in this meaningless pursuit, you might have better luck talking to Leonhard Euler, arguably the most famous mathematician of all time.

Euler was fascinated by this problem. It was clear to him no such path was possible but the proof for the same did not seem trivial. Anybody else would have easily walked away, but Euler was not anybody.



Leonhard Euler

He devised his own technique to solve the problem – converting the landmasses to “nodes” and the bridges to “edges” and subsequently discovering an entire realm of mathematics called Graph Theory.

Today, the real-world applications of Graph Theory are boundless. Every time we search for something in Google, Google replies to us back by scouring millions of pages for relevance in a fraction of a second.

LinkedIn connects you with your potential recruiters, Facebook ties you with friends you had no other way of meeting and Amazon finds you the exact products you need. Had Euler not stumbled upon this odd problem all those years ago, it might have been impossible for you to do any one of the above in a single lifetime.

Beautiful discoveries in most sciences and even other fields did not come in isolation. They came as a solution to a problem. The problem itself does not need to have a herculean impact on the civilization of human beings spreading across multiple dimensions. It just needs to be engaging and stimulating enough for people to sit at a desk for hours on end trying to solve it. In some cases, the inception of a remarkable idea -- helping the world to take leaps at a time -- comes from completely fabricated problems designed to take our brains on a stroll. We engage in these problems not in the hope to change the world, but just to make the world a more fun place.

Harry Houdini, a very famous magician of the early 1900s, especially noted for his escape acts, had a very peculiar, yet fascinating routine in his shows. He used to take a seemingly apathetic piece of paper, and intricately fold it into an interesting shape. Then take a scissor out just to cut the paper exactly once in one straight line. To the bewilderment of his audience, the paper would be cut into a star of 10 edges. The audience thought Houdini had a deal with the devil. But an MIT professor named Eric Demaine proved that you can, in theory, make any polygon of any shape, even with holes in the middle, with one straight cut.

This theorem is known as the fold-and-cut theorem. Much like our previous problem of The Seven Bridges of Konigsberg, it might seem like interesting trivia to be hoarded for quiz shows, but the theorem has priceless practical implications. Car companies and Aeronautical Engineers apply this

theorem in abounding ways to ensure safety in airbags while maximizing space in vehicles and airplanes.

Recreational mathematics is a field of mathematics with increasingly complex research problems. Recreation and mathematics might seem to be on the opposite ends of the spectrum to some, but brilliant minds of our generation are striving to solve these very problems. They come in the form of games and complex puzzles, and the solution to these might have an impact on society that is not yet fathomable. So next time you are afraid to take some time off of your work into doing something which is considered unproductive by most, maybe give it a second thought because you never know when the world is going to need your creativity to turn itself into a better place.

Cloud Computing Management

By Anubhav Majumdar, 2nd Year, CSE

Theories and practices of management often spring from the opportunities created by new technologies. Interchangeable parts spurred ideas about structuring assembly lines and logistics. The complex calculations of the field known as Operations Research were enabled by mainframe computing. Client-server technology begat enterprise resource planning systems and the consequent system-wide visibility that was required for what we call business process management (BPM).



Cloud computing process enhancing the financial abilities of two Organizations

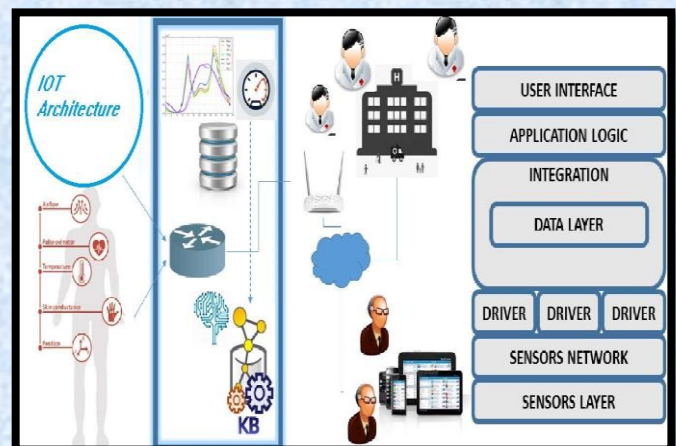
What makes it imperative to start thinking about, how management will be changed by the most impactful information technology of our time: cloud computing. What does it allow us to do differently, and how will that change the way we do things in the future?

History suggests that the main way information technology changes management is through changes in how information is gathered: the large-scale analysis of Operations Research reflected painstaking data collection around a few metrics, which were transferred to punch cards that is the reason Cloud vendor selection is a complex decision-making process and BPM reflects the

interactions of different stakeholders, from product creation through the supply chain to final assembly.

I. How organizations are changing?

With the cloud, information travels rapidly in both directions, across computing systems that, with attributes like virtualization, scaling up or down to handle bigger workloads, or automated security patching across thousands of machines, are far more flexible. This will likely mean a more flexible work structure as well, in the interest of products and services that ideally can be adjusted to anticipate customer needs. Key to the new system is rapid data collection and analysis, followed by over-the-air changes to product software. Collaboration between the corporate IT department and other business units, including sales, finance, and forecasting; and more customer interaction, even to a point of jointly developing products with their consumers. In particular, new ways of writing and deploying software will encourage new types of faster-acting organizational designs. And the best way to anticipate how these changes will occur is to hear from companies already aggressively implementing them.



Collaboration between the corporate IT department and other business units

Likely outcomes of the move to the cloud include changing how products are designed; recent developments are a change in the healthcare system where special attention is the main issue of E-Health and Care at Home. Different types of healthcare services are provided to the patients at home to improve their Quality of life of patients by

letting them stay in their own environments and data is collected through a special type of architecture including sensors, and networking protocols. This transformation offered by the Internet of Things has led the life of people to be comfortable and safe.

“It’s already changing organizations, by moving IT from a cost center to something with a place at the table in a lot of different meetings,” said Chris Jackson, head of cloud platforms at Pearson, a global learning company. If Pearson is looking at, say, a new online learning course, Mr. Jackson is part of early product design meetings, offering tips on what user interaction data should be collected, and how often a course might be tweaked. A job like his used to be concerned only with things that happened later in the process, like launching and maintaining a piece of software.

Public cloud computing, offered by companies like Amazon Web Services, Microsoft Azure, and my employer, Google Cloud, is still viewed by many as a cheaper and more efficient way for companies to store and process data. The cost may be lower, but like traditional computers, it is still a cost. Lower costs have been reason enough for many companies to shut down their proprietary data centers and consume computational power and attendant software as a series of on-demand services. Others use cloud computing software in their own data centers, as a means of increasing resources and working faster.

How it affects product design and customer experience

As cloud technology improves, however, it is becoming easier for companies to create products and services within the cloud, or model new products or marketing campaigns as cloud-based software prototypes. The cloud is also a common repository for the collection and analysis of new data, and the place where an increasing number of artificial intelligence operations, like image and speech recognition, are conducted.

The evidence is already there, as startups increasingly conceive of their goods and services

largely as software-centric entities, from which data is continually derived. Changes and upgrades become part of a continuous process. Organizational functions blur as processes become increasingly iterative. The ride-hailing company Uber has stressed the importance of its hybrid cloud model to ensure not just constant uptime, but an indivisible relationship between product development and deployment. Uber can model a virtual fleet of taxis from private cars through a combination of mobile software, large-scale data analysis, mapping, and social networking.

A similar dynamic of redefined processes and constant iteration is happening with industrial products. Oden Technologies is a New York-based startup that builds sensor systems for factories, enabling continuous, precise monitoring of large and complex processes. One recent project involved building a tablet-based system for carrying out complex calculations in real time. The product, which might normally take six months to a year to create, was finished in 10 weeks, thanks to accelerated testing, and direct communication with the customer about needs and specifications during design and construction. In effect, over time the initial design and the prototype incrementally became the product, with the customer participating in its creation.

“The relationship with the customers tightens,” said James Maidment, the team leader of the project. “We deployed faster, we got new requirements directly, and we iterated more quickly. In a way, we don’t have a final product, we have a customer relationship involved with a product.”

What else needs to change?

The constant relationship between management theory and applied technology shouldn’t be too surprising. William Hewlett, a founding father of Silicon Valley, famously said “you cannot manage what you cannot measure.” It seems to logically follow that the opposite also holds— what and how you measure something influences the way it is managed. How soon will the cloud be as influential for management as the mainframe or client-server computing?

In a recent paper, Erik Brynjolfsson, Daniel Rock, and Chad Syverson found that major technology improvements may lag productivity gains for years, even decades. Brynjolfsson, a professor at MIT's Sloan School of Management, thinks software-based advances like AI and cloud-style software will find a place faster than many of the earlier advances. For one thing, lower costs mean they can be quickly adopted by start-ups unencumbered by legacy costs and practices. And, unlike hardware-based advances, the influence this time will be from software – in particular, what happens when teams throughout the corporation build products and services using what is termed cloud-native software.



Managing Tools required for Cloud-native Application

The most tantalizing reason why: An ecosystem of other changes has to arise, along with new thinking about how the technology should be used, for it to have the full impact. “With the cloud, we can replicate processes more quickly,” he said. “But you still need three things to be updated before you fully take advantage: Organizational innovation, trained human capital, and social institutions, like infrastructure and regulation, that accommodate new technologies.” He added, “the biggest issue now is that important new technologies are moving ahead, and people aren’t thinking enough about the big implications.”

Escape

By Shubham Jha, 2nd Year, CSE

Sunday Morning, actually it's almost afternoon. This losing track of time is just another baneful effect of hostel life. It's been months since I've been in this hostel, and honestly, my preconceptions about hostel life were that "a hostel is a weird place full of weird human beings," and I guess I was correct. A hostel is a strange place or I should use the word 'interesting'. Anything and everything under the range of the *bizarreness capacity* of humans can happen here (PS- I don't think there exists a word 'bizarreness capacity' in the extreme depth of the human lexicon). I usually enjoy the wide range of possible human interactions under a single roof of the hostel (I don't interact with almost 80% of them but, just the fact that how different varieties of people with different personalities live with each under one roof fascinates me). But sometimes it's just exhausting, it's exhausting to see people all around you, just the fact that in this long-lost area, there isn't a place to hide, a place to escape. It's Sunday afternoon, I just woke up and the first thing I do is to move out of the hostel in my pajamas and chappals. I have no idea where I am going, maybe I just left in search of an escape, an escape that I knew I was never going to find, an escape I knew I would only find in my daydreams. But still, I left. A few steps later, I saw a bus numbered '3'. I find myself looking at this bus almost daily, it is because of its derelict look. This bus was fairly empty in comparison to other days. I got on the bus, I didn't know where it was going even though I used to see this old and not-so-good condition bus and passengers traveling on it almost daily. It was always a mystery to me where this bus used to go. maybe it goes to 9 and 3/4th platform of the Harry Potters or maybe it made a round trip to the Bermuda triangle or maybe just another shopping mall where every wannabe "cool" teenager went to flex his father's hard-earned money on some overpriced cup of coffee just for some *instagramable* pictures....okay, enough of my rant on Instagram influencers. I got onto the bus, not knowing where I was going. I just wanted to escape from reality and escape from the monotonous lifestyle. I just wanted to for once exist

on the corner of the earth, doing nothing, having nothing in mind, no emotions, no memories, no feelings. The bus conductor breaks my wave of thoughts and asks me where I wanted to go? Bewildered me, thinking of a good place to go to.

I end up asking the conductor to drop me at the last stoppage and pay the fare for it. In just a few minutes, I was outside the city and surrounded by mountains and empty land. I was confused and everything appeared unrecognizable- the streets, people around me everything around me appeared unfamiliar but this unfamiliarity gave me a little sense of relief, a strange sense of security, I was glad that I do not have to interact with anyone and the fact that I knew no one all around me made me feel less conscious about their judgments. We were riding by a mountain on a thin road and by the left was a long fall, a fall that just seemed endless and horrifying. I was enjoying the cool breeze on my window seat when I heard a tire squeaking sound while the bus took a sharp left, and suddenly we found ourselves falling off the mountain.

Chaos and screams surrounded us, everyone was panicking and shouting. But I was abnormally quiet, it's not that I was not scared...I WAS TERRIFIED but still wasn't able to move my lips to shout or just speak. I thought to myself "Maybe this is how it ends, maybe this is the ultimate escape I was desperately looking for", I closed my eyes and tried to shout, gathering all my energy and focusing on my vocal cords, but I still can't utter a word. I tried and tried and finally, words came out of my mouth. "THIS IS NOT HOW IT ENDS PLEASE!" My roommate: Hey! What happened? Just chill bro...today is a Sunday you don't need to go to college today. Me(to myself): "Woosh! Shit It was a nightmare". I thought I ran away in my dreams in search of an escape from the variety, but in retrospect, I guess there isn't one, there isn't any escape from this real world. Maybe it's meant to be like this, maybe we are meant to be trapped inside this giant piece of matter called the universe.

Maybe these concepts of 'escapism' or a 'purpose of life are something that's never meant to be thought about. We are born on this beautiful planet for whatever small amount of time, and the pressure of 'living your life to the fullest' or 'enjoying every moment' are just concepts made by society that

unnecessarily adds more pressure on humans. Ultimately the most important point is contentment. The moment before your life is going to end in front of your eyes, you must be content and satisfied with the life you lived in this universe. Anyways! I asked my roommate to wake me up by 12 noon and went to sleep again.

How artificial intelligence is transforming the world

By Niswarga Nag, 2nd Year ,CSE

AI has the potential to greatly increase the accessibility and affordability of healthcare. In addition to saving healthcare providers money, patients may quickly receive an accurate, secure, and easy response.

The idea that his invention will one day be wiser and more brilliant than he has long been feared by man. Humanity does not need to be terrified, even though artificial intelligence and machine learning are quickly altering our environment and driving the Fourth Industrial Revolution.

The workforce will eventually alter due to artificial intelligence and the pessimistic perception that AI will eliminate employment is only one side of the story; although up to 133 million new tasks that are more interesting and less routine will likely be created, 75 million jobs may be lost.

Workers now have the chance to concentrate on the aspects of their professions that may also be the most rewarding to them thanks to AI.



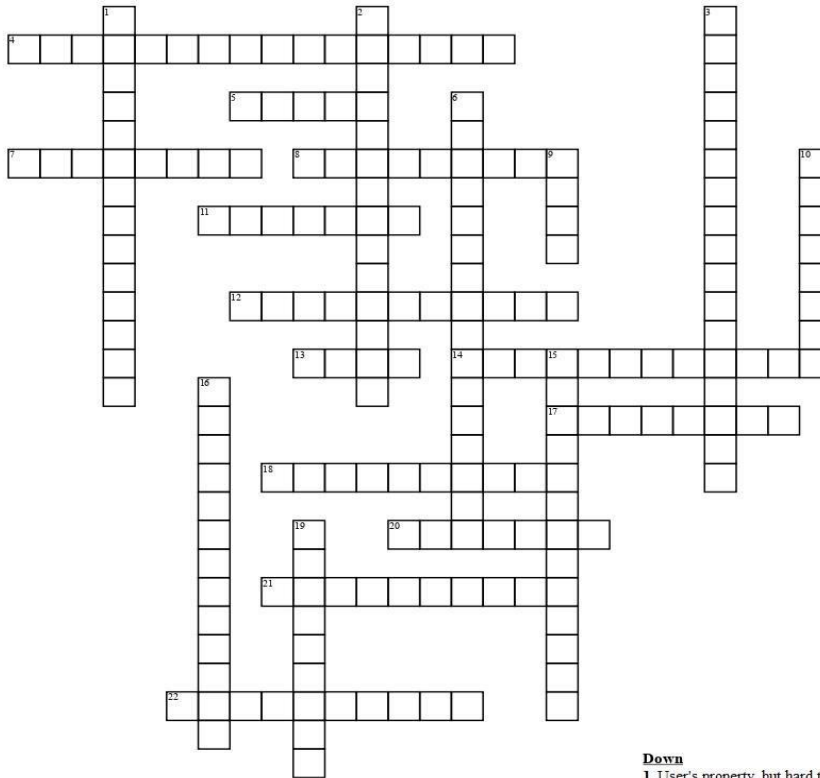
AI-powered language programs like Duolingo and Skype are overcoming social and cultural gaps in our jobs, classrooms, and daily lives via individualized language instruction and real-time speech and text translation. Although not flawless, digital translation services provide a way to communicate that would not be otherwise feasible.

Artificial intelligence (AI) has the potential to fundamentally alter public administration, but are governments ready for this change? It's important to recognize and weigh the dangers and opportunities associated with this technology.

The Crossword Puzzle

Collected by Somenath Sengupta, Assistant Professor, CSE

Tech Crossword Puzzle



Across

4. Identity and Privacy Protection
 5. A form of malware that often attaches itself to a host file or the MBR (Master Boot Record) as a parasite. When the host file or MBR is accessed, it activates the virus enabling it to infect other objects. Most viruses spread through human activity within and between computers
 7. A security tool, which may be a hardware or software solution that is used to filter network traffic.
 8. Someone attempting to create Identity fraud
 11. Any code written for the specific purpose of causing harm, disclosing information or otherwise violating the security or stability of a system. Malware includes a wide range of types of malicious programs including: virus, worm, Trojan horse, logic bomb, backdoor, Remote Access Trojan (RAT), rootkit, ransomware and spyware/adware.
 12. an over the internet attempt by hackers to damage a computer network or system.

13. A form of unwanted or unsolicited messages or communications typically received via e-mail but also occurring through text messaging, social networks or VoIP. Most SPAM is advertising, but some may include malicious code, malicious hyperlinks or malicious attachments.
 14. types of malware widely used in email attacks
 17. The act of falsifying the identity of the source of a communication or interaction. It is possible to spoof IP address, MAC address and email address.
 18. the ultimate call control center that gives customers full control of all T-Mobile's scam protection options.
 20. A form of malware that monitors user activities and reports them to an external party.
 21. The occurrence of disclosure of confidential information, access to confidential information, destruction of data assets or abusive use of a private IT environment. Generally, a data breach results in internal data being made accessible to external entities without authorization.
 22. Something that shows up in a email

Down

1. User's property, but hard to remember
 2. The likelihood or potential that an outside entity, such as an ex-employee, competitor or even an unhappy customer, may pose a risk to the stability or security of an organization. An outsider must often gain logical or physical access to the target before launching malicious attacks.
 3. An attack focusing on people rather than technology
 6. a specific aspect of broader concepts such as cybersecurity and computer security, being focused on the specific threats and .
 9. a dishonest scheme; a fraud.
 10. Alerts for warning.
 15. he likelihood or potential that an employee or another form of internal personnel may pose a risk to the stability or security of an organization
 16. A form of identity theft in which a transaction, typically financial, is performed using the stolen identity of another individual. The fraud is due to the attacker impersonating someone else.
 19. A security mechanism prohibiting the execution of those programs on a known malicious or undesired list of software

Word Bank

Spoofting	Firewall	Blacklist	Spyware	InsiderThreat	Scam
BadActors	InternetSecurity	Virus	Malware	EmailThreats	Suspicious
CyberAttack	InternetSecurity	socialengineering	ScamShield	Securepassword	DataBreach
IdentityFraud	SPAM	OutsiderThreat	RedFlags		

Crossword Solution

Tech Crossword Puzzle Solutions

