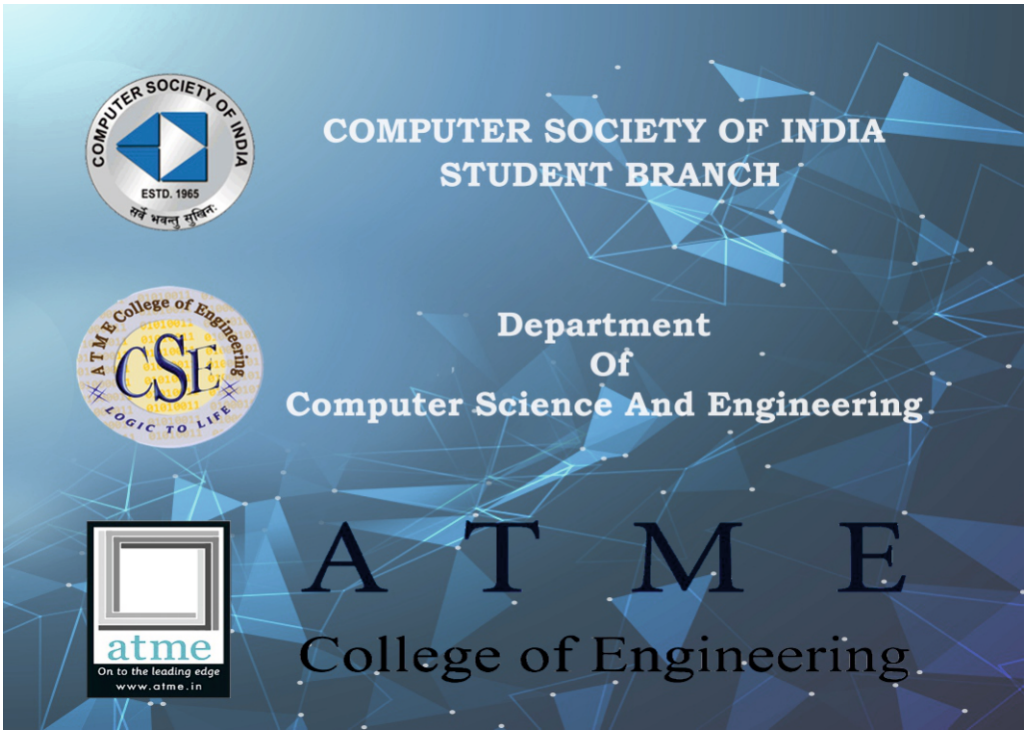


Tech Bits

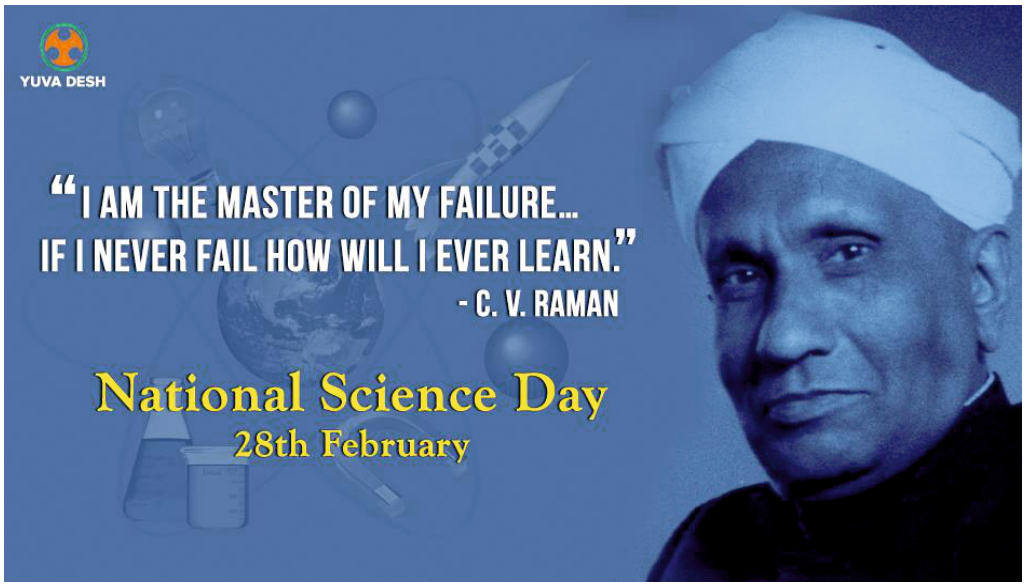
CSI Newsletter

Volume 3
Issue 2
11th May 2019

In This Issue

A tribute to Sir C V Raman

(7 Nov 1888 - 21 Nov 1970)



Sir Chandrashekhara Venkata Raman Indian physicist whose work was influential in the growth of science in India. He was the recipient of the Nobel Prize for Physics in 1930 for the discovery that when light traverses a transparent material, some of the light that is deflected changes in wavelength. This phenomenon is now called Raman scattering and is the result of the Raman effect.

C. V. Raman discovered that when light interacts with a molecule the light can donate a small amount of energy to the molecule. As a result of this, the light changes its colour and the molecule vibrates. The change of colour can act as a 'fingerprint' for the molecule.

Today Raman spectroscopy, which relies on these 'fingerprints,' is used in laboratories all over the world to identify molecules and to analyse living cells and tissues to detect diseases such as cancer.

CSI Timeline 2018-2019

The Department of Computer Science and Engineering under Computer society of India Division 1 and Computer Society of India Student Branch had organized Technical Quiz on 17th November 2018 and Code Relay on 5 th April 2019. The Newsletter Volume 3 Issue 1 was released on the day of Technical Quiz by Dr. Manjunath S S, Professor & Head, Department of CSE, Professor Dr. Puttegowda D, Mrs. Sneha N P, Assistant professor, Department of CSE ,Ms. Shruthi P, Assistant professor, Department of CSE and Mr. Charan Bharadwaj ,Chairman ,CSI-SB 2019 joined them on the dias.

Page 2

Student Articles on latest trends in technology

Find articles on Neurotrophic electrode, Li-Fi and A new brain-inspired architecture, IOT submitted by our beloved CSI - SB members.

Neurotrophic Electrode - **Page 4**
Li-Fi - **Page 5**
A New Brain-Inspired Architecture - **Page 6**
Internet Of Things (IOT) - **Page 7**

CSI Timeline 2018-19

Technical Quiz 2018

The Computer Science and Engineering Department under Computer Society of India Division-1 and Computer Society of India Student Branch had organized a Intra Collegiate Technical Quiz on 17th November 2018 where many of the students from pre-final year and second year showed much of their interest in the event for the year 2018. The Newsletter Tech Bits Volume 3, Issue 1 for the year 2018 was released on this day.

The Event was inaugurated by Dr. Manjunath S S, Head of the Department, and Professor, Dr. Puttegowda D. The CSI-SB Newsletter "TECH BITS" Volume 3, Issue 1 was released on this by Dr. Manjunath S S, Head of the Department, and Professor, Dr. Puttegowda D. Mrs. Sneha N P, and Ms. Shruthi P, CSI-SB Counsellors, Mr. Charan Bharadwaj, Chairman; CSI-SB also joined them on the Dias. The Technical Quiz was organized in three rounds i.e., Written, Rapid Fire and Buzzer Round. The Round 1 consisted of 20 questions and out of which Top 12 teams were selected.The Round 2 consisted of 10 questions and out of which Top 5 teams were selected for the further round. The Round 3 consisted of 15 questions and out of 5 teams top 3 were selected and rewarded with cash prize.

The Winners were rewarded with attractive cash prizes by Dr. Manjunath S S, Head ,Dept of CSE . The team winning first prize was awarded to Yogesh k and Prajwal P of 5th semester with cash prize of Rs 1000. The team winning second prize was Bharath J and Anil Kumar Gadega Goudar G of 3rd semester awarded with cash prize of Rs 600. The team winning third prize was Niranjan Gowda M S ,5th semester and Manoj M of 5th semester awarded with cash prize of Rs 400.

CODE RELAY 2019

The Computer Science and Engineering Department under CSI Student Branch Banner had organized an Intra collegiate event called Code Relay on 5th April 2019 where about 32 teams participated from second and third years. The event was conducted in CS Dept Labs. The event was basically like a relay where first person is allowed initially and the next person would join for the second round followed by third person for the third round. If at all the person was not able to code for the given problem statement that team was allowed to take help of another person of his team ,where minus 5 points would be deducted.

The Winners were rewarded with attractive cash prizes by Dr. Manjunath S S, Head ,Dept of CSE . The team winning first prize was Sanjay KM, Pramod N, and Sachin S of 6th Semester were awarded with cash prize of Rs 1700. The team winning second prize was Vinay Kumar Y D, Syed Abdur Rahman , and Syed Asif of fourth semester were awarded with cash prize of Rs 1000. The team winning third prize was Darshini, Bhavana and Chandana M of fourth semester were awarded with cash prize of Rs 700.

The CSI Student Branch Counsellor explainig the rules and regulations of the event to the participants.

Gallery

CSI Crew is seen standing with HOD

HOD Addressing the gathering

Technical Quiz event

Code Relay event

CSI Newsletter Team

Meet Forbes India Under 30 Achievers Of 2019

1. Abhinay Bhasin

Name: Abhinay Bhasin

Category: Advertising, Marketing & Media

Profession: Associate Director (South Asia), Data Sciences, Dentsu Aegis Network, India

Age: 26

4. Keshav Prawasi, Nitin Babel, Shishir Modi

Name: Keshav Prawasi, Nitin Babel, Shishir Modi

Category: Consumer Tech

Profession: Co-Founders, Niki.ai

Age: 28, 28, 29

7. Ninaad Kulkarni

Name: Ninaad Kulkarni

Category: Design

Profession: 3D Artist, Animation, Filmmaker

Age:27

2. Ashutosh, Kartheeswaran

Name: Ashutosh Vikram, Kartheeswaran
Category: Agriculture
Profession: Co-Founders, Ninjacart
Age: 29, 28

5. Pranay Surana, Tushar Saxena

Name: Pranay Surana, Tushar Saxena
Category: Consumer Tech
Profession: Co-Founders, Flyrobe
Age: 28, 26

8. Tanvi Johri

Name: Tanvi Johri
Category: Ecommerce & Retail
Profession: Co-Founder & CEO, Carmesi
Age: 27

3. Prajakta Koli

Name: Prajakta Koli
Category: Entertainment & Music
Profession: YouTuber
Age: 25

6. Aditi Agrawal, Anjali Menon

Name: Aditi Agrawal, Anjali Menon
Category: Design
Profession: Co-Founders, Gudgudee
Age: 29, 28

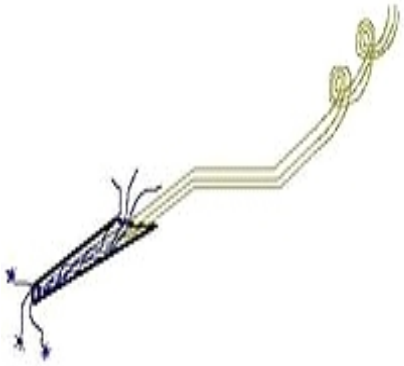
9. Sagar Yarnalkar, Anurag Gupta

Name: Sagar Yarnalkar, Anurag Gupta
Category: E-commerce & Retail
Profession: CEO; COO, DailyNinja
Age: 29, 28

Neurotrophic electrode

By

Sheeban-E-Tamanna, 6th sem



The neurotrophic electrode

Teflon-coated gold wires extend from the back of the glass cone, while neurites (shown in blue) grow through it.

The neurotrophic electrode is an intracortical device designed to read the electrical signals that the brain uses to process information. It consists of a small, hollow glass cone attached to several electrically conductive gold wires. The term neurotrophic means "relating to the nutrition and maintenance of nerve tissue" and the device gets its name from the fact that it is coated with Matrigel and nerve growth factor to encourage the expansion of neurites through its tip. It was invented by neurologist Dr. Philip Kennedy and was successfully implanted for the first time in a human patient in 1996 by neurosurgeon Roy Bakay.

Background:

Motivation for development

Victims of locked-in syndrome are cognitively intact and aware of their surroundings, but cannot move or communicate due to near complete paralysis of voluntary muscles. In early attempts to return some degree of control to these patients, researchers used cortical signals obtained with electro encephalography (EEG) to drive a mouse cursor. However, EEG lacks the speed and precision that can be obtained by using a direct cortical interface.

Patients with other motor diseases, such as amyotrophic lateral sclerosis and cerebral plasy, as well as those who have suffered a severe stroke or spinal cord injury, also can benefit from implanted electrodes. Cortical signals can be used to control robotic limbs, so as the technology improves and the risks of the procedure are reduced, direct interfacing may even provide assistance for amputees.

Design development

When Dr. Kennedy was designing the electrode, he knew he needed a device that would be wireless, biologically compatible, and capable of chronic implantation. Initial studies with Rhesus monkeys and rats demonstrated that the neurotrophic electrode was capable of chronic implantation for as long as 14 months (human trials would later establish even greater robustness). This longevity was invaluable for the studies because while the monkeys were being trained at a task, neurons that were initially silent began firing as the task was learned, a phenomenon that would not have been observable if the electrode was not capable of long term implantation.

Components

Glass cone

The glass cone is only 1–2 mm long, and is filled with trophic factors in order to encourage axons and dendrites to grow through its tip and hollow body. When the neurites reach the back end of the cone, they rejoin with the neurophil on that side, which anchors the glass cone in place. As a result, stable and robust long-term recording is attainable. The cone sits with its tip near layer five of the cortex, among corticospinal tract cell bodies, and is inserted at an angle of 45° from the surface, about 5 or 6 mm deep.

Gold wires

Three or four gold wires are glued to the inside of the glass cone and protrude out the back. They record the electrical activity of the axons that have grown through the cone, and are insulated with Teflon. The wires are coiled so as to relieve strain.

Wireless transmitter

One of the greatest strengths of the neurotrophic electrode is its wireless capability, because without transdermal wiring, the risk of infection is significantly reduced. As neural signals are collected by the electrodes, they travel up the gold wires and through the cranium, where they are passed on to the bioamplifiers (usually implemented by differential amplifiers). The amplified signals are sent through a switch to a transmitter, where they are converted to FM signals and broadcast with an antenna. The amplifiers and the transmitters are powered by a 1 MHZ induction signal that is rectified and filtered. The antenna, amplifiers, analog switches, and FM transmitters are all contained in a standard surface amount printed circuit board that sits just under scalps. . The whole ensemble is coated in protective gels, Parylene, Elvex, and Silastic, to make it biocompatible and to protect the electronics from fluids.

Data acquisition system

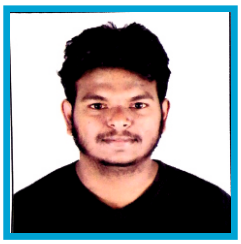
On the outside of the patient's scalp rests the corresponding induction coil and an antenna that sends the FM signal to the receiver. These devices are temporarily held in place with a water-soluble paste. The receiver demodulates the signal and sends it to the computer for spike sorting and data recording.

Implementation

Computer cursor control

One of Dr. Kennedy's patients, Johnny Ray, was able to learn how to control a computer cursor with the neurotrophic electrode. Three distinct neural signals from the device were correlated with cursor movement along the x-axis, along the y-axis, and a "select" function, respectively. Movement in a given direction was triggered by an increase in neuron firing rate on the associated channel.

Li-Fi



By

Paul Crispin, 6th sem

Li-Fi is a technology for wireless communication between devices using light to transmit data and position. In its present state only LED lamps can be used for the transmission of visible light. The term was first introduced by Harald Haas during a 2011 TEDGlobal talk in Edinburgh. In technical terms, Li-Fi is a visible light communications system that is capable of transmitting data at high speeds over the visible light spectrum, ultraviolet and infrared radiation.

In terms of its end use the technology is similar to Wi-Fi. The key technical difference is that Wi-Fi uses radio frequency to transmit data. Using light to transmit data allows Li-Fi to offer several advantages like working across higher bandwidth, working in areas susceptible to electromagnetic interference (e.g. aircraft cabins, hospitals) and offering higher transmission speeds. The technology is actively being developed by several organizations across the globe.

Light Fidelity or Li-Fi is a Visible Light Communications (VLC) system running wireless communications travelling at very high speeds. Li-Fi uses common household LED (light emitting diodes) light bulbs to enable data transfer, boasting speeds of up to 224 gigabits per second.

Professor Harald Haas coined the term "Li-Fi" at his 2011 TED Global Talk where he introduced the idea of "wireless data from every light". He is a Chair Professor of Mobile Communications at the University of Edinburgh, and the co-founder of the pureLiFi.

Technology details

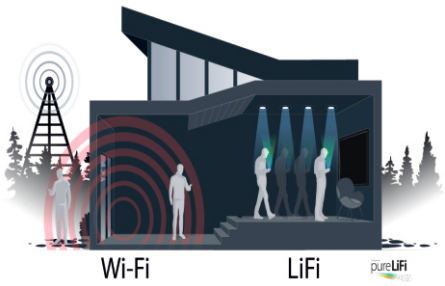
This optical wireless communications (OWC) technology uses light from light-emitting diodes (LEDs) as a medium to deliver networked, mobile, high-speed communication in a similar manner to Wi-Fi. The Li-Fi market is projected to have a compound annual growth rate of 82% from 2013 to 2018 and to be worth over $6 billion per year by 2018.

Visible light communications (VLC) works by switching the current to the LEDs off and on at a very high rate, too quick to be noticed by the human eye. Although Li-Fi LEDs would have to be kept on to transmit data, they could be dimmed to below human visibility while still emitting enough light to carry data. The light waves cannot penetrate walls which makes a much shorter range, though more secure from hacking, relative to Wi-Fi. Direct line of sight is not necessary for Li-Fi to transmit a signal; light reflected off the walls can achieve 70 Mbit/s.

Li-Fi has the advantage of being useful in electromagnetic sensitive areas such as in aircraft cabins, hospitals and nuclear power plants without causing electromagnetic interference. Both Wi-Fi and Li-Fi transmit data over the electromagnetic spectrum. but whereas Wi-Fi utilizes radio waves, Li-Fi uses visible light, Ultraviolet and Infrared. While the US Federal Communications Commission has warned of a potential spectrum crisis because Wi-Fi is close to full capacity, Li-Fi has almost no limitations on capacity. The visible light spectrum is 10,000 times larger than the entire radio frequency spectrum. Researchers have reached data rates of over 224 Gbit/s, which was much faster than typical fast broadband in 2013.

Li-Fi is expected to be ten times cheaper than Wi-Fi. Short range, low reliability and high installation costs are the potential down sides. Pure LiFi demonstrated the first commercially available Li-Fi system, the Li-1st, at the 2014 Mobile World Congress in Barcelona.

Bg-Fi is a Li-Fi system consisting of an application for a mobile device, and a simple consumer product, like an IOT devices, with color sensor, microcontroller, and embedded software.



Standards

Like Wi-Fi, Li-Fi is wireless and uses similar 802.11 protocols, but it uses ultraviolet, infrared and visible light communication, which has much bigger bandwidth.

One part of VLC is modeled after communication protocols established by the IEEE 802 workgroup. However, the IEEE 802.15.7 standard is out-of-date: it fails to consider the latest technological developments in the field of optical wireless communications, specifically with the introduction of optical orthogonal frequency-division multiplexing (O-OFDM) modulation methods which have been optimized for data rates, multiple-access and energy efficiency.

A New Brain-Inspired Architecture

By

Nabeela Akram , 8th sem

IBM researchers are developing a new computer architecture, better equipped to handle increased data loads from artificial intelligence. Their designs draw on concepts from the human brain and significantly outperform conventional computers in comparative studies. They report on their recent findings in the Journal of Applied Physics, from AIP Publishing.

Today's computers are built on the von Neumann architecture, developed in the 1940s. Von Neumann computing systems feature a central processer that executes logic and arithmetic, a memory unit, storage, and input and output devices. Unlike the stovepipe components in conventional computers, the authors propose that brain-inspired computers could have coexisting processing and memory units.

Abu Sebastian, an author on the paper, explained that executing certain computational tasks in the computer's memory would increase the system's efficiency and save energy.

"If you look at human beings, we compute with 20 to 30 watts of power, whereas AI today is based on supercomputers which run on kilowatts or megawatts of power," Sebastian said. "In the brain, synapses are both computing and storing information. In a new architecture, going beyond von Neumann, memory has to play a more active role in computing."

The IBM team drew on three different levels of inspiration from the brain. The first level exploits a memory device's state dynamics to perform computational tasks in the memory itself, similar to how the brain's memory and processing are co-located. The second level draws on the brain's synaptic network structures as inspiration for arrays of phase change memory (PCM) devices to accelerate training for deep neural networks. Lastly, the dynamic and stochastic nature of neurons and synapses inspired the team to create a powerful computational substrate for spiking neural networks.

Phase change memory is a nanoscale memory device built from compounds of Ge, Te and Sb sandwiched between electrodes. These compounds exhibit different electrical properties depending on their atomic arrangement. For example, in a disordered phase, these materials exhibit high resistivity, whereas in a crystalline phase they show low resistivity.

By applying electrical pulses, the researchers modulated the ratio of material in the crystalline and the amorphous phases so the phase change memory devices could support a continuum of electrical resistance or conductance. This analog storage better resembles nonbinary, biological synapses and enables more information to be stored in a single nanoscale device.

Sebastian and his IBM colleagues have encountered surprising results in their comparative studies on the efficiency of these proposed systems. "We always expected these systems to be much better than conventional computing systems in some tasks, but we were surprised how much more efficient some of these approaches were."

Last year, they ran an unsupervised machine learning algorithm on a conventional computer and a prototype computational memory platform based on phase change memory devices. "We could achieve 200 times faster performance in the phase change memory computing systems as opposed to conventional computing systems." Sebastian said. "We always knew they would be efficient, but we didn't expect them to outperform by this much." The team continues to build prototype chips and systems based on brain-inspired concepts.

A computer built to mimic the brain's neural networks produces similar results to that of the best brain-simulation supercomputer software currently used for neural-signaling research, finds a new study published in the open-access journal Frontiers in Neuroscience. Tested for accuracy, speed and energy efficiency, this custom-built computer named SpiNNaker, has the potential to overcome the speed and power consumption problems of conventional supercomputers. The aim is to advance our knowledge of neural processing in the brain, to include learning and disorders such as epilepsy and Alzheimer's disease.

The human brain is extremely complex, comprising 100 billion interconnected brain cells. We understand how individual neurons and their components behave and communicate with each other and on the larger scale, which areas of the brain are used for sensory perception, action and cognition. However, we know less about the translation of neural activity into behavior, such as turning thought into muscle movement.

Supercomputer software has helped by simulating the exchange of signals between neurons, but even the best software run on the fastest supercomputers to date can only simulate 1% of the human brain.

Internet of Things (IoT)

By

Salman Mustafa, 6th sem

Is The Convenience Worth The Risk?

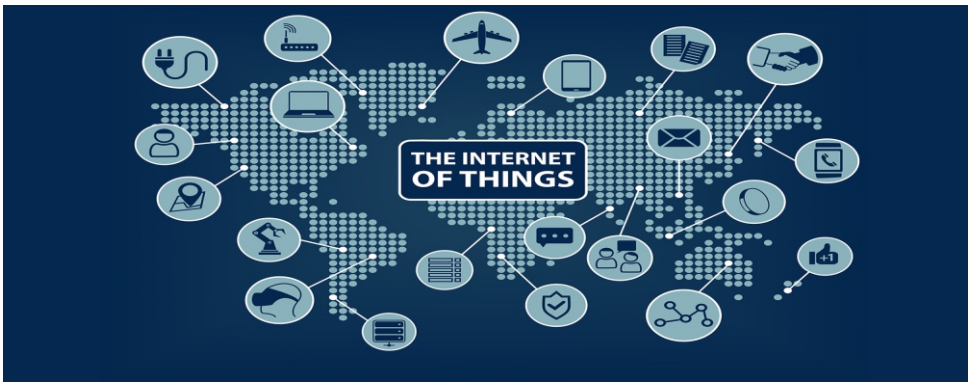
Our world is dominated by technology. From our smart phones to our smart watches, almost every device we own is connected to the internet. This growing connectivity is loyally referred to as Internet of Things and it's quickly reshaping our lives. Need to dim the lights or adjust the thermostat? Simply use your phone. Need to make a run to the grocery store because you're getting low on eggs? Your fridge can order more for you. While smart home gadgets have definitely seen a surge in popularity, it's only the beginning. In fact, we're already starting to see a whole new line of internet-enabled devices, including smart pet feeders, smart water bottles, and even smart coffee pots. (Yes, it's a thing.)

There's no denying Internet of Things (IoT) has reshaped our daily lives, but what about our work?

The growing emergence of IoT in the workplace Many businesses have been quick to adapt to these emerging technologies, revamping their floor plans and enacting smart devices wherever and however they can. In fact, according to a recent IT survey, nearly three-quarters of respondents said they would welcome a fully automated workplace. Already, smart office assistants like Alexa for Business help make every day work assignments easier by giving users the ability to not only set up shared network devices across the office but also use these networks to adjust the room temperature, change the lighting, and more. With so much new technology being incorporated in the workspace, it's even getting to the point that businesses are expected to use the most up-to-date internet technologies or risk falling behind the times.

How Internet of Things is changing the way we work?

Instead of simply making our lives a little easier, workplace IoT is primed to reshape how we work. This doesn't just include automated reports, taking lunch orders, or utilizing autonomous assistants instead, Internet of Things will make every device more intelligent—giving employees more tools to conduct their business at a faster and more efficient rate than ever before.



And though the idea of robotic assistants is still a ways off, we're already starting to see the budding effects of this interconnectivity at the office. Company-wide fitness initiatives, which typically use digital trackers to chart staff health goals, have become commonplace among businesses hoping to engage with employees by offering more health-conscious incentive programs. There's no denying IoT has improved productivity. With the amalgamation of machines and new technologies, employees have never had more resources at their disposal. Unfortunately, this new connectivity has left our personal information incredibly exposed. Unfortunately, this new connectivity has occurred at the risk of our personal information incredibly exposed.

More automation, more privacy problems

Because IoT is so new, most companies haven't taken the time to address the potential risks involved. In fact, many of the newer internet-enabled devices have been found to have very weak privacy settings, with some having none at all. Man-in-the-middle attacks, which occur when hackers take control of one network and then gain access to others, has been a prime concern among privacy advocates for years. With so many common household devices having access to our private and sensitive information, the overall probability of these devices getting hacked has exponentially increased. What's more, because these devices work in tandem, a hacker could, in theory, gain access to a common backdoor vulnerability in your watch's software and with that information access your email, social media accounts, bank info, and more. But that's just on the digital side.

The potential real-life implications are equally as terrifying. Because IoT devices are constantly sharing and storing information, your risk of privacy exposure has never been higher. Imagine your health app sharing your personal information with your insurance company, or current employer using your online application to access your browser history. There are currently no laws in place to help prevent this type of over sharing from occurring, which means the only way to prevent your information from being abused is to protect it yourself.

How to safeguard your sensitive information

Although IoT has made our lives easier, the added convenience carries an extremely high risk of privacy exposure. Fortunately, there are ways you can help stay secure. First off, remember to use strong passwords and update your devices whenever a new one becomes available. While it's easy to get into the habit of using the same password for every service, it makes it incredibly easy for hackers or snoops to gain access to your online network. Try to use a combination of letters and numbers and keep your pets, beaus, and family members out of it. Password managers like Last Pass are safe and effective ways to keep track of your various accounts. Plus, most offer their own robust password suggestions and store them all under a single master password. So instead of having to keep track of 30 different passwords, you only need to know one. It's also worth taking the time to go over your various app settings and check which services they have access to. While it's normal for Instagram to have access to your photo library, there's really no need for your gaming app to have access to your contact list.

Message from Executive Comittee

Mr. Charan Bharadwaj K
Chariman

"I am honoured to be taking over as the chairman of the Computer Society of India student branch ATMECE, Mysuru, for the year 2018-2019. The strength of our student branch is its members. I wish all members to take active part in the activities of our student branch."

Mr. Vishnutej K
Vice Chairman

I'm deeply honoured for being elected as the vice-chairman of Computer Society of India-Student branch ATME College of Engineering.I will make sure that the responsibilities shouldered upon me will be dealt with immense dedication and zeal."

Ms. Nabeela Akram
Secretary

"The CSI-SB ATMECE is emerging as one of the most active SB chapter in the region. I feel proud to be serving as a part of the executive committee. Through your support, we can together achieve great heights. I would also like to acknowledge your participation in our activities."

Mr. Paul Crispin
Treasurer

"I feel immensley proud to be elected as the Treasurer of the esteemed Computer Society of India - Student Branch of our college. I would dedicate myself for the betterment of our SB and also grow personally. Being the treasurer I will perform my duties faithfully and with dedication."