# K.L.N.COLLEGE OF INFORMATION TECHNOLOGY

Pottapalayam - 630 612, Sivagangai District, Tamilnadu, India (12 kms from Madurai City)
(Sponsered by K.L.N.Sourashtra College of Engineering Council)
Approved by AICTE , New Delhi & Affiliated to Anna University, Chennai
Approved Research Centre for IT, ECE & CSE Departments by Anna University Chennai
An ISO 9001:2015 certified Institution - A Sourashtra Linguistic Minority Institution


## Department of Information Technology

# ReposITech

Volume : 3

February 2019

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# ReposITech

## Department of Information Technology

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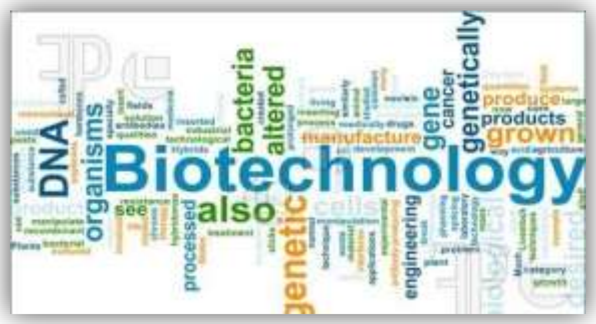
# Context

# Top 5 Emerging Trends in Biotechnology

**Saraswathi B S**
**IV B.Tech. IT**

**Biotechnology** is the use of living organisms to make products or run processes. **Biotechnology** is best known for its huge role in the field of medicine, and is also used in other areas such as food and medicine .**Medical biotechnology** is defined as the application of **biotechnology** tools for producing **medical** products that can be **used** for the diagnosis, prevention, and treatment of diseases. The best-known products of **medical biotechnology** are antibiotics that are **used** to treat bacterial infections.




Today technology Technological Advancement is at full speed whereas Artificial Intelligence is swiftly finding its way in the biotech industry in over time, disease outbreaks coupled with wars underlined the great importance of medicine. The infamous 14th century Black Death wiped an estimated 75 to 200 million people from the face of the earth whereas; the Spanish Flu pandemic of 1918 killed a further 20 million to 40 million people. These outbreaks called for action towards development and advancements in medicine – from Alexander Fleming and his discovery of Penicillin in 1923 to the first human liver being grown from stem cells in Japan in 2013.All this research has over the past few decades opened up different opportunities for startup and many different entities committed towards the development of new curative and/or preventive measures in the Biotech industry..

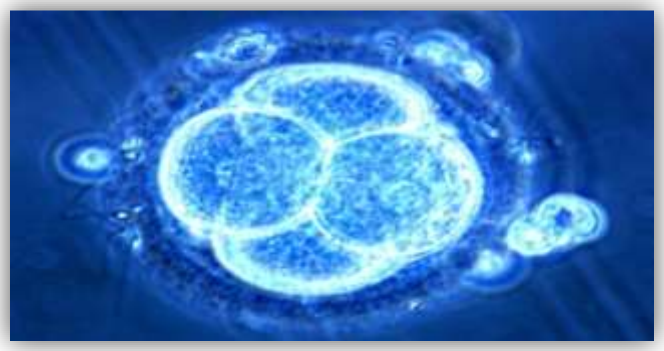
These are the top 5 emerging trends in the Biotech industry. They include:

**1. Exosomes in Cancer Nano medicine and Immunotherapy:**

This technique has developed exciting approaches in drug delivery and cancer immunotherapy vaccines based on reports collected from the early stages of clinical trials of the drug. Understandably, optimal cancer treatment ways on the ability to effectively target and destroy cancer cells while at the same time warding off the risk of damaging healthy tissues. The latest comes in the way of Exosomes – versatile, cell-driven Nano vessels with the ability to surmount biological barriers and deliver prodigious amounts of bioactive molecules to specific recipient tissues. Understandably, optimal cancer treatment ways on the ability to effectively target and destroy cancer cells while at the same time warding off the risk of damaging healthy tissues. Therefore, Exosomes in cancer Nano medicine and immunotherapy is certainly braised to leave flattering effects in the Biotech industry.

**2 .Cell Therapies and Regenerative Medicine**

The progressive nature of the area of Cell Therapies and Regenerative Medicine has given mankind a reason to hope. Despite the common analogy of "Do not play God," researchers seem to have eclipsed this phrase and attempted what no one had ever attempted before. Often associated with make-believe stories or the sci-fi movies that we are mostly accustomed to, it has now become a reality that today we can rebuild and replace damaged organs.



Cell Therapies and Regenerative Medicine has come a long way but recent developments are not only encouraging but also very exciting. It is very interesting to imagine what further expansive studies and application of the T-cells might bring. A human heart perhaps? Or may be new eyes? It is exciting to imagine that sometime in the future we will be able to re-grow different body parts and reattach them to our bodies. This can only be possible if we continue supporting all these organizations embroiled in the extensive researches.

**3. Artificial Intelligence and Healthcare**:

It is safe to admit that machine learning has officially penetrated the biotech industry. At the start of 2017, the Food and Drug Administration (FDA) of the US approved applications that could help better understand the human heart and make diagnostic heart conditions. For instance, one of the applications – the artery system – takes an average of 15 seconds to produce a result; the same diagnosis would have taken a doctor up to an hour to produce the Machine learning is only beginning to break ground in the biotech industry. Continued research in this area is showing promising results while also underlying the great potential it carries in the same result. Evidently, AI's are braised to save lives.

Recent applications to test hypothesis such as finding novel regenerative pathways in plagiarism worms and salamanders offer us a glimpse of what the future might hold

## 4. Marijuana Legalization and Biotech

Today Marijuana legalization is at full throttle making words that were once viewed with much disdain seem not too shabby. The Biotech industry is expanding its reach in research, application, and utilization of Cannabis for its medicinal properties, different countries, states, and institutions are also legalizing the once maligned plant. I guess it is now safe to say the Dutch knew what they were doing all along. Of late, we have seen countries like Uruguay, Mexico, and up to 28 States in the US legalize marijuana either for medicinal purposes or recreational or even both. Canada has also introduced a legislation that would legalize medicinal and recreational marijuana by as early as 2018.


Medicinal marijuana has been around the block for some time now. Biotech companies such as Laguna Blends offer coffee infused with hemp protein whose health benefits are far reaching.

## 5. Conclusion

The Biotech industry forms an integral part of our existence. Where we are today and where we will be tomorrow weighs entirely on how we continue to invest in R&D and new technologies such as the AIs. Recent developments in bio techs tell us that cure for cancer is very close. In addition, further research and application in T-cells and stem cells research also open us to a whole new realm of possibilities From regenerating a brand new liver to growing organs in kidneys – the applications as for biotechnology health care industry.

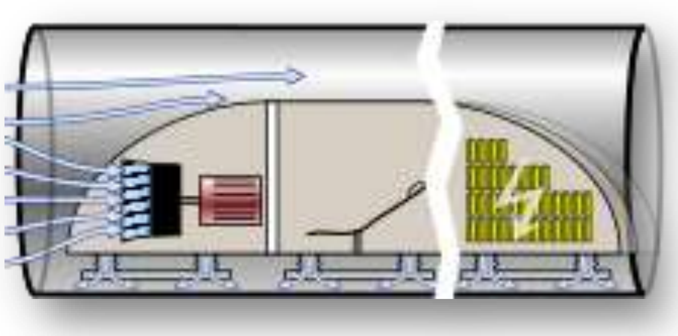
# Hyper Loop

**Balaji S**
**III B.Tech. IT**

A **Hyperloop** is a proposed mode of passenger and/or freight transportation, first used to describe an open-source vactrain design released by a joint team from Tesla and SpaceX. Drawing heavily from Robert Goddard's vactrain, a hyperloop is a sealed tube or system of tubes through which a pod may travel free of air resistance or friction conveying people or objects at high speed while being very efficient.

Elon Musk's version of the concept, first publicly mentioned in 2012, incorporates reduced-pressure tubes in which pressurized capsules ride on air bearings driven by linear induction motors and axial compressors.

The Hyperloop Alpha concept was first published in August 2013, proposing and examining a route running from the Los Angeles region to the San Francisco Bay Area, roughly following the Interstate 5 corridor. The Hyperloop Genesis paper conceived of a hyperloop system that would propel passengers along the 350-mile (560 km) route at a speed of 760 mph (1,200 km/h), allowing for a travel time of 35 minutes, which is considerably faster than current rail or air travel times. Preliminary cost estimates for this LA–SF suggested route were included in the white paper—US$6 billion for a passenger-only version, and US$7.5 billion for a somewhat larger-diameter version transporting passengers and vehicles]—although transportation analysts had doubts that the system could be constructed on that budget; some analysts claimed that the Hyperloop would be several billion dollars overbudget, taking into consideration construction, development, and operation costs. The Hyperloop concept has been explicitly "open-sourced" by Musk and SpaceX, and others have been encouraged to take the ideas and further develop them.



## Theory and operation :

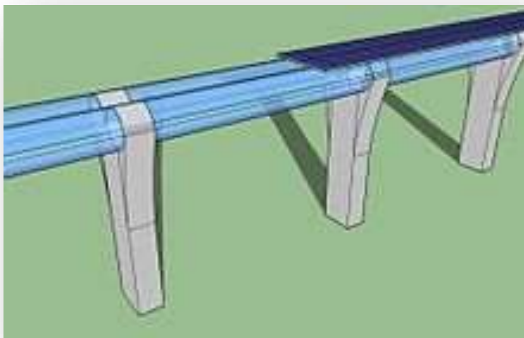
Artist's impression of a Hyperloop capsule: Axial compressor on the front, passenger compartment in the middle, battery compartment at the back, and air caster skis at the bottom

A 3D sketch of the Hyperloop infrastructure. The steel tubes are rendered transparent in this image.

Developments in high-speed rail have historically been impeded by the difficulties in managing friction and air resistance both of which become substantial when vehicles approach high speeds. The vactrain concept theoretically eliminates these obstacles by employing magnetically levitating trains in evacuated (airless) or partly evacuated tubes, allowing for speeds of thousands of miles per hour. However, the high cost of maglev and the difficulty of maintaining a vacuum over large distances has prevented this type of system from ever being built. The Hyperloop resembles a vactrain system but operates at approximately one millibar(100 Pa) of pressure.

## Initial design concept

The Hyperloop concept operates by sending specially designed "capsules" or "pods" through a steel tube maintained at a partial vacuum. In Musk's original concept, each



capsule floats on a 0.02–0.05 in (0.5–1.3 mm) layer of air provided under pressure to air-caster "skis", similar to how pucks are levitated above an air hockey table, while still allowing faster speeds than wheels can sustain. Hyperloop One's technology uses passive maglev for the same purpose. Linear induction motors located along the tube would accelerate and decelerate the capsule to the appropriate speed for each section of the tube route. With rolling resistance eliminated and air resistance greatly reduced, the capsules can glide for the bulk of the journey. In Musk's original Hyperloop concept, an electrically driven inlet fan and axial compressor would be placed at the nose of the capsule to "actively transfer high-pressure air from the front to the rear of the vessel", resolving the problem of air pressure building in front of the vehicle, slowing it down. A fraction of the air is shunted to the skis for additional pressure, augmenting that gain passively from lift due to their shape. Hyperloop One's system does away with the compressor.

In the alpha-level concept, passenger-only pods are to be 7 ft 4 in (2.23 m) in diameter and projected to reach a top speed of 760 mph (1,220 km/h) to maintain aerodynamic efficiency. The design proposes passengers experience a maximum inertial acceleration of 0.5 g, about 2 or 3 times that of a commercial airliner on takeoff and landing.

## Association Inaugural of the year 2018 - 2019

## “A Person always doing his or her best becomes a natural leader, just by example”

# Crypto Governance: The Startup vs. Nation-State Approach

**Vinodh S R**
**II B.Tech. IT**

Humans like to argue. It's in our nature.Take any facet of human experience and you can find two people who disagree on it. Nowhere is this more prevalent than in the realm of governance, where we argue who should have power, who gets to make changes to the system, and how decisions are ultimately made. Given the magnitude of the impact governance has, it is easy to see how this became a highly controversial topic.

Crypto governance encapsulates the debates around how we coordinate to make decisions on changing the rules of a protocol. This could include anything from simple upgrades to changing the consensus mechanism to allocating block rewards. It involves many stakeholder groups such as node operators, network providers (miners), core developers, users, speculators, exchanges, and block explorers to name a few. These are diverse groups with varying incentives that frequently conflict with each other. For example, node operators want to keep block size low to reduce the costs of running a full node, while miners have incentives to increase the block size so each block includes more transactions and thus more transaction fees.

**It is the interactions between these stakeholder groups that define what a blockchain is, its values and principles and how it evolves over time. This governance process shapes the imagined reality we create surrounding a network, and the value of a cryptoasset lies at this social layer.**

Unsurprisingly, there has been a substantial amount of debate on the right way to govern cryptonetworks, which has created various thought-provoking theories. I believe much of the debate is misguided since 'crypto' is too general of a term to apply overarching ideas to. Jill Carlson explains it well:

Often investors attempt to apply the same priors and heuristics whether they are talking about bitcoin, petrocoin, or filecoin because they are all "crypto". This would be akin to applying the same fundamental analysis to gold markets, sanctioned Venezuelan debt markets, and the pre-IPO valuation of Dropbox circa 2008.

In the same way we shouldn't apply the same fundamental analysis for these assets, we shouldn't analyze the governance of all cryptoassets in the same manner. We need to more accurately describe what is being governed in order to think about how it should be governed. In this analysis I'm going to delineate between base layer protocols from those further up the tech stack. The former should be governed like an established nation, while the latter an early stage startup.

Often times in crypto, we like to believe were reinventing the wheel. Accordingly we come up with unique heuristics and terminology to describe things. While in some cases this is true, often times we're simply repurposing age old ideas to fit this new paradigm. I believe governance is one of these areas where we can learn from a lot from the past. For thousands of years humans have been organizing themselves in different groups to coordinate around shared goals in the form of nation-states, corporations and others social groups. Over time we have improved our standard of living as a result of organizing ourselves into these groups and evolving new ways to govern them. However, innovation in this front has been slow due to the difficulty in testing out alternate approaches (rightfully so) because of the high stakes on the line.

This is a big part of why I am so fascinated with cryptonetworks. They provide us a sandbox to try inventive new ways to organize human behavior by shifting how we incentivize participants. By carefully studying the failures and successes of different crypto projects I believe we can learn more about governance and at a faster pace then has ever been possible. A great analogy is comparing them to petri dishes, where we can test out different ideas on smaller chains and based on the results begin to implement bits and pieces into more established chains.

# Security Issues in Healthcare Applications Using Wireless Medical Sensor Networks: A Survey

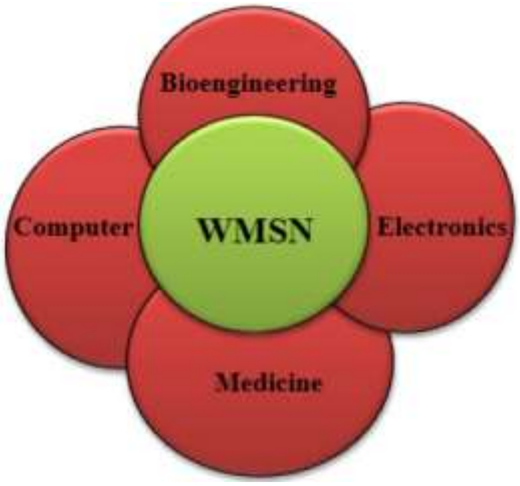
**Krishnan T G B**
**III B.Tech. IT**

## Abstract:

Healthcare applications are considered as promising fields for wireless sensor networks, where patients can be monitored using wireless medical sensor networks (WMSNs). Current WMSN healthcare research trends focus on patient reliable communication, patient mobility, and energy-efficient routing, as a few examples. However, deploying new technologies in healthcare applications without considering security makes patient privacy vulnerable. Moreover, the physiological data of an individual are highly sensitive. Therefore, security is a paramount requirement of healthcare applications, especially in the case of patient privacy, if the patient has an embarrassing disease. This paper discusses the security and privacy issues in healthcare application using WMSNs. We highlight some popular healthcare projects using wireless medical sensor networks, and discuss their security. Our aim is to instigate discussion on these critical issues since the success of healthcare application depends directly on patient security and privacy, for ethic as well as legal reasons. In addition, we discuss the issues with existing security mechanisms, and sketch out the important security requirements for such applications. In addition, the paper reviews existing schemes that have been recently proposed to provide security solutions in wireless healthcare scenarios. Finally, the paper ends up with a summary of open security research issues that need to be explored for future healthcare applications using WMSNs.

## Introduction:

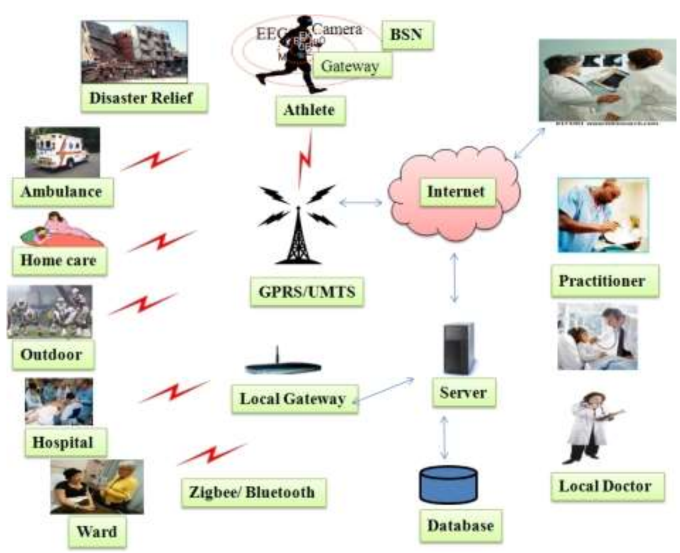
Wireless sensor networks (WSNs) are an emerging technology in existing research and have the potential to transform the way of human life (*i.e.*, make life more comfortable). A wireless sensor is the smallest unit of a network that has unique features, such as, it supports large scale deployment, mobility, reliability, *etc.*WSNs are not limited to science and engineering, but they are also included in other popular applications such as the military, water monitoring, infrastructure monitoring, government security policy, habitat monitoring, environment monitoring, and earthquake monitoring, are few examples. A sensor network consists of a discrete group of independent nodes with low cost, low power, less memory, and limited computational power that communicate wirelessly over limited frequencies at low bandwidth. The main goals of WSNs are to deploy a number of sensor devices over an unattended area, and collect the environmental data and transmit it to the base station or remote location. Later, the raw data is processed online or offline for detailed analysis at the remote server according to the application requirements.




**Interdisciplinary research of WMSN**

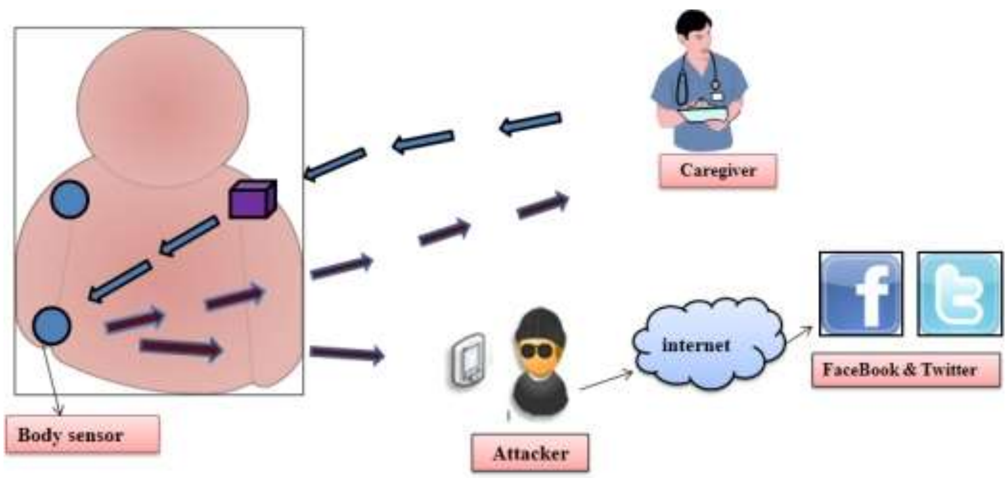
## Difference between generic WSN and WMSN.

| **Generic WSNs** | **WMSNs** |
|---|---|
| Automatic and standalone | Human involvement |
| Scalability (*i.e.*, large scale) | Scalability (*i.e.*, small scale) |
| Fixed or distributed deployment | Mobility |
| Reliability (data rate depend on applications) | Reliability (high data rate) |



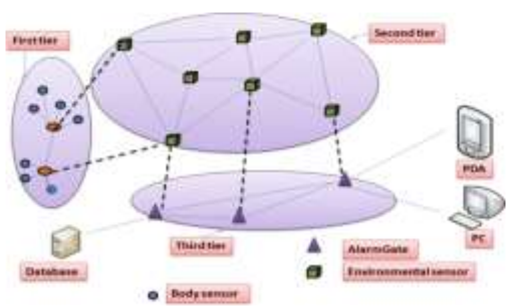

**Healthcare application using wireless medical sensor networks**

**Risks to patient privacy.**




## Healthcare Projects Using Wireless Medical Sensor Networks:

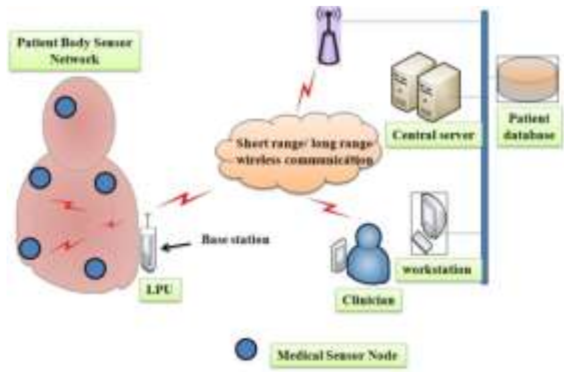
The advancement of WMSNs in healthcare applications have made patient monitoring more feasible. Recently, several wireless healthcare researches and projects have been proposed, which aim to provide continuous patient monitoring, in-ambulatory, in-hospital, in-clinic, and open environment monitoring (e.g., athlete health monitoring). This section describes few of the popular research projects about healthcare systems using medical sensor networks.



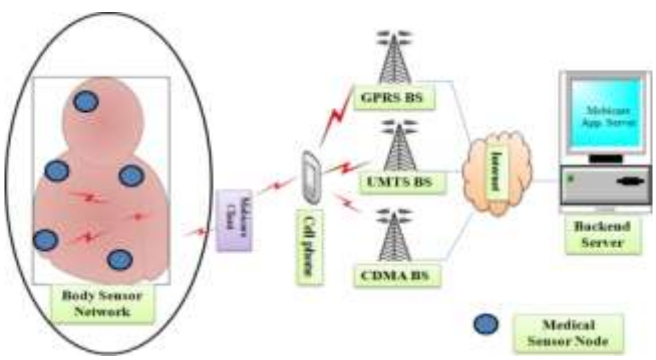

**ALARM-NET architecture.**

Any real-time data queries about physiological or environmental data are originated by the user that contains the source address, ID, and sensor type. For a single-shot query, the sensors sample the requested data and respond a single report to the query originator, and hence complete the query. In addition, authors have developed a circadian activity rhythms program to aid context-aware power management and privacy policies.

**UbiMon system architecture.**

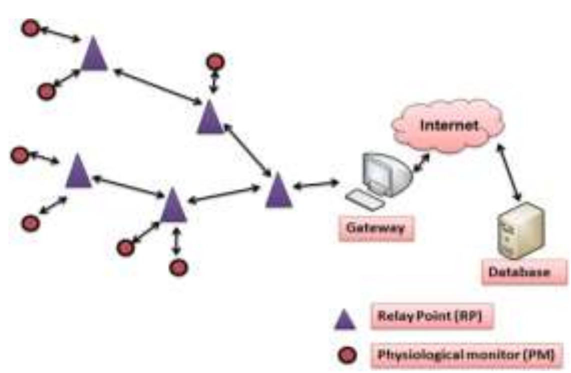



In 2006, Chakravorty designed a mobile healthcare project called MobiCare. MobiCare provides a wide-area mobile patient monitoring system that facilitates continuous and timely monitoring of patients physiological status. It (MobiCare) potentially improves the quality-of-patient care and saving many lives. As shown in the figure, the proposed system comprises of body sensor network (BSN) having wearable sensors (e.g., ECG, SpO2, and blood oxygen); a BSN manager called "MobiCare client that is an IBM wristwatch"; and a back-end infrastructure (*i.e.*, MobiCare server). The medical sensors timely sense the patient's body data and broadcast it to the MobiCare client. The MobiCare client aggregates the body data and sends them using GPRS/UMTS or CDMA cellular link to the MobiCare server. In this research, MobiCare client makes use of application layer standard HTTP POST protocol for sending BSN data to the server. The MobiCare server supports to the medical staffs for offline physiological analysis, and for patient care.




**MobiCare patient monitoring architecture.**

**Healthcare architecture of MEDiSN.**



## Security Threats:

- Security Threats
- Sinkhole threat
- Sybil Attack

## Existing Security Mechanisms:

Security mechanisms are processes that are used to detect, prevent and recover from security attacks. Although there are significant security mechanisms for traditional networks (*i.e.*, wired and *ad hoc*) they are generally not directly applicable to resource constrained wireless medical sensor networks, so this sub-section discusses the issues concerning existing security mechanisms, as follows:

- Cryptography
- Key Manaagement
- Secure Routing
- Resilience to node capture
- Secure Localization
- Trust management
- Robustness to Communication Denial-of-Services

## Conclusions

This survey discussed the security and privacy issues in healthcare applications using medical sensor networks. It has been shown that a well-planned security mechanism must be designed for the successful deployment of such a wireless application. In this respect, we have found many important challenges in implementing a secure healthcare monitoring system using medical sensors, which reflects the fact that if a technology is safe, then people will trust it. Otherwise, its use will not be practical, and could even endanger the patient’s life. Consequently, many security and privacy issues in healthcare applications using wireless medical sensor networks still need to be explored and we hope that this survey will motivate future researchers to come up with more robust security mechanisms for real-time healthcare applications.

**Hands – On on Chatbot**

**Organised by Industry Institute Interaction Cell**

# Democratising Healthcare – The Next Revolution and the Potential of Artificial Intelligence in Medicine

**Mohana Priya N**
**IV B.Tech. IT**

Head of Analytics for Europe, the Middle East and Africa at Cyient – an engineering, networks and operations company – Bhoopathi Rapolu believes a fairer, more universal healthcare system is possible worldwide, through the rapid digitalisation of personal health and growing use of Artificial Intelligence in medicine. Here he tells us how.

For the lucky, access to healthcare is a given – it's there when we need it, just as any basic human requirement should be. The provision of healthcare, however, is still not universal and a global healthcare model that is truly democratic – where everyone has access to affordable quality health services – is yet to emerge. According to a WHO and World Bank Group report, 400 million people still go without access to essential healthcare.

Yet, over the course of the next decade, I believe we will see the democratisation of healthcare, a transition that will be driven by continued consumerisation, data sharing and, most notably, the growth of disruptive technologies. In fact, we are currently witnessing the most exhilarating era of healthcare development. Much like we saw in the telecommunications industry in early 1990s, where at first connectivity and calls were restricted to those able and willing to pay the premium, healthcare is the next candidate in line to experience this revolution and open up to all.

But what will the utopian future look like? Here, I explore the concept of democratised healthcare and the key technologies and systems that will empower this movement.

## The fall of the old regime

It is undeniable that global healthcare is ripe for change. We've already touched on the inequality that exists, but there are numerous other threats to achieving democratised healthcare. Most notably, populations are living for longer, which brings a number of complex challenges for healthcare systems striving to deliver adequate services for all. Firstly, when originally conceived, most health systems were structured to tackle diseases rather than manage long-term conditions such as dementia, cancer or Chronic Obstructive Pulmonary Disease (COPD). Secondly, managing the intricacies associated with longer life not only impacts on physicians' ability to care for patients, but they also add significant operational and financial strain to healthcare organisations. The NHS is one such system that is succumbing to this mounting pressure.
To disrupt the status quo and evolve the provision of health globally, we must transform the practice of medicine and personal healthcare from reactive disease detection to a position of proactive prevention, which is enabled through self-monitoring and early diagnosis. It is here where I believe that technology can facilitate this change – levelling out the playing field through the development of products and interactive systems that shift the focus towards early identification and disease prevention, and that give people and doctors the information they need to manage their health more effectively

## The transfer of power: technologies driving this revolution

So, which technologies are set to have the biggest impact? Given the complexities associated with an ageing population, those that help individuals understand how their lifestyle choices affect their wellbeing will be integral in making democratised healthcare a reality. The consumerisation of healthcare is beginning to take hold through the introduction of smart, wearable devices that give people more control of their health in terms of diagnostics and care. However, the prevalence of affordable next-generation wearables combined with the proliferation of the Internet of Things (IoT) will push things to a new level for consumers and physicians. The data generated by sensors on such devices has huge potential. Doctors will be able to detect health issues earlier – or even before they arise – from a patient's vital health statistics, as well as track the effectiveness of treatments of chronic illnesses remotely. Personalised profiles of patients based on their data will also become the norm, and they will be able to be treated through internet-enabled services without visiting a doctor. Greater connectivity in particular promises to revolutionise treatment for the vulnerable and those living in remote rural communities far from established healthcare services.

Such close monitoring will improve global health on the whole and alleviate the cost of care, allowing for investment to be redirected into revolutionary medical advances. One area of real interest, related to the IoT, is the progress being made by the use of Artificial Intelligence in medicine (AI), with the IBM Watson AI super-computer leading the charge. Recently, Watson saved a women’s life by diagnosing a rare form of leukaemia. After the case had baffled doctors in Japan for months, Watson was able to ‘solve’ it, identifying the disease in 10 minutes by cross-referencing generic changes with 20 million cancer research papers. Similarly, Moorfields Eye Hospital in London will be using one million anonymised eye scans to train DeepMind, an AI system from Google, to spot signs of diseases such as macular degeneration and diabetes-related sight loss.

By extracting data and digitalising human health to the maximum extent using these technologies, patients in the future may not even need to tell their physician about their condition or the pain they are experiencing. Data will be able to inform an AI algorithm about a patient’s condition, and AI will advise on which treatment the doctor needs to prescribe. Soon we’ll have an army of intelligent machines hard at work pulling, parsing and delivering data to physicians worldwide to support their decision-making. Greater access to services such as this use of artificial intelligence in medicine will make an awe-inspiring difference to the way that high- quality healthcare is delivered to the masses.

## Establishing a new order with data

However, before democratisation becomes a reality, a number of challenges will have to be overcome. Most notably digitalising medical records and the knowledge we currently have, and then delivering insights from them in a way that is recognisable by all.

The healthcare market must also evolve. In the biggest cultural shift, healthcare providers will no longer be the guardians of patient data. With super-computers like Watson already in place, it won’t be long until other players are able to replicate it and provide similar capabilities in an open- source environment. Such an important algorithm for healthcare is very much required for society, and I envisage a Google-type service for the sector coming to the fore sometime soon. In essence, it would be a free software platform powered by open-source human health data, which would include information from machines and best-practice diagnostic techniques from across the world.

Just as the mobile revolution democratised communication among people, healthcare will be democratised through the rapid digitalisation of personal health and growing Artificial Intelligence to aid doctors. Fundamentally, this will change the way that healthcare is delivered, and the relationship between patients and physicians as we know it. Viva la revolution!

# Microsoft Holo Lens 2 augmented reality headset unveiled.

**Mahesh C A**
**IV B.Tech. IT**

Microsoft has a new version of its augmented reality headset, which now detects where its users are looking and tracks the movements of their hands. 24 February 2019

It said that Holo Lens 2 wearers would find it easier to touch and otherwise interact with graphics superimposed over their real-world views.
Other improvements include filling more of a user's view and automatically recoging who they are.
The firm is pitching the kit as being ready for use in business environments.

HoloLens 2 can now track the position of a user's hands and fingers making it easier for them to manipulate virtual objects

Any users had expressed disappointment at how small a window graphics had been contained to, **meaning that their experience had fallen short of what Microsoft's promotional videos** had suggested.

The firm said it had also improved the display's resolution, which it described as being the equivalent of moving from a 720p high-definition image to a 2K one for each eye.

This means that the shift to a larger view should not mean it has become more fuzzy.

Microsoft has also introduced iris recognition, allowing the machine to identify its wearer and automatically log them into their account.

The company also acknowledged that some users of the original version had found it uncomfortable to wear for lengthy periods. It said a revamped fitting system should mean the kit now felt as if it was "floating" on workers' heads.


# IEI Project Contest

# Sophia (robot)

**Kiruthika S**
**IV B.Tech. IT**

Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics. Sophia was activated on February 14, 2016 and made its first public appearance. It is able to display more than 50 facial expressions.

Sophia has been covered by media around the globe and has participated in many high-profile interviews. In October 2017, Sophia became the first robot to receive citizenship of any country.In November 2017, Sophia was named the United Nations Development Programme's first ever Innovation Champion, and is the first non-human to be given any United Nations title

Sophia at ITU's AI for Good Global Summit in Geneva in May 2018.

*<u>Features:-</u>*

Cameras within Sophia's eyes combined with computer algorithms allow her to see. It can follow faces, sustain eye contact, and recognize individuals. It is able to process speech and have conversations using a natural language subsystem.Around January 2018 Sophia was upgraded with functional legs and the ability to walk.

Sophia is conceptually similar to the computer program ELIZA, which was one of the first attempts at simulating a human conversation.The software has been programmed to give pre-written responses to specific questions or phrases, like a chatbot. These responses are used to create the illusion that the robot is able to understand conversation, including stock answers to questions like "Is the door open or shut?"The information is shared in a cloud network which allows input and responses to be analysed with blockchain technology.

David Hanson has said that Sophia would ultimately be a good fit to serve in healthcare, customer service, therapy and education.Sophia runs on artificially intelligent software that is constantly being trained in the lab, so its conversations are likely to get faster, Sophia's expressions are likely to have fewer errors, and it should answer increasingly complex questions with more accuracy

*Events:-*

Sophia has been interviewed in the same manner as a human, striking up conversations with hosts. Some replies have been nonsensical, while others have impressed interviewers.In a piece for CNBC, when the interviewer expressed concerns about robot behavior, Sophia joked that he had "been reading too much Elon Musk. And watching too many Hollywood movies".Musk tweeted that Sophia should watch The Godfather and asked "what's the worst that could happen?". Business Insider's chief UK editor Jim Edwards interviewed Sophia, and while the answers were "not altogether terrible", he predicted it was a step towards "conversational artificial intelligence".At the 2018 Consumer Electronics Show, a BBC News reporter described talking with Sophia as "a slightly awkward experience".

On October 11, 2017, Sophia was introduced to the United Nations with a brief conversation with the United Nations Deputy Secretary-General, Amina J. Mohammed.On October 25, at the Future Investment Summit in Riyadh, the robot was granted Saudi Arabian citizenship, becoming the first robot ever to have a nationality.This attracted controversy as some commentators wondered if this implied that Sophia could vote or marry, or whether a deliberate system shutdown could be considered murder. Social media users used Sophia's citizenship to criticize Saudi Arabia's human rights record. In December 2017, Sophia's creator David Hanson said in an interview that Sophia would use her citizenship to advocate for women's rights in her new country of citizenship; Newsweek criticized that "What [Hanson] means, exactly, is unclear". On November 27, 2018 Sophia was given a visa by Azerbaijan while attending Global Influencer Day Congress held in Baku. December 15, 2018 Sophia was appointed a Belt and Road Innovative Technology Ambassador by China'.

# Recognizing disease using less data

**Karthigai Lakshmi S**
**IV B.Tech. IT**

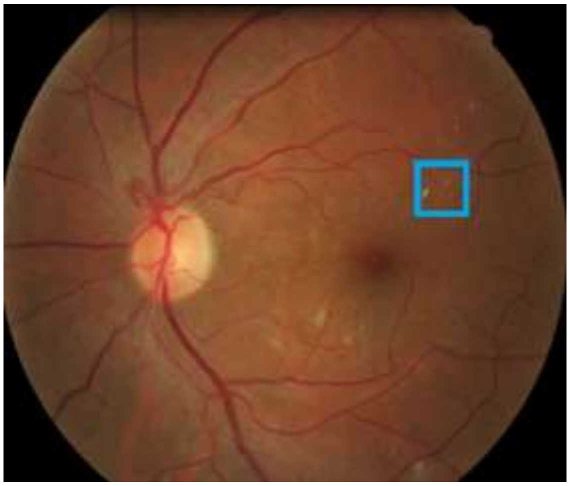
As artificial intelligence systems learn to better recognize and classify images, they are becoming highly-reliable at diagnosing diseases, such as skin cancer, from medical images. But as good as they are at detecting patterns, AI won't be replacing your doctor any time soon. Even when used as a tool, image recognition systems still require an expert to label the data, and a lot of data at that: it needs images of both healthy patients and sick patients. The algorithm finds patterns in the training data and when it receives new data, it uses what it has learned to identify the new image.

One challenge is that it's time-consuming and costly for an expert to obtain and label each image. To address this issue, a group of researchers from Carnegie Mellon University's College of Engineering, including Professors Hae Young Noh and Asim Smailagic, teamed up to develop an active learning technique that uses a limited data set to achieve a high degree of accuracy in diagnosing diseases like diabetic retinopathy or skin cancer.

The researchers' model begins working with a set of unlabeled images. The model decides how many images to label to have a robust and accurate set of training data. It chooses an initial set of random data to label. Once that data is labelled, it plots that data over a distribution because the images will vary by age, gender, physical property, etc. In order to make a good decision based on this data, the samples need to cover a large distribution space. The system then decides what new data should be added to the dataset, considering the current distribution of data.

"The system measures how optimal this distribution is," said Noh, an associate professor of civil and environmental engineering, "and then computes metrics when a certain set of new data is added to it, and selects the new dataset that maximizes its optimality."

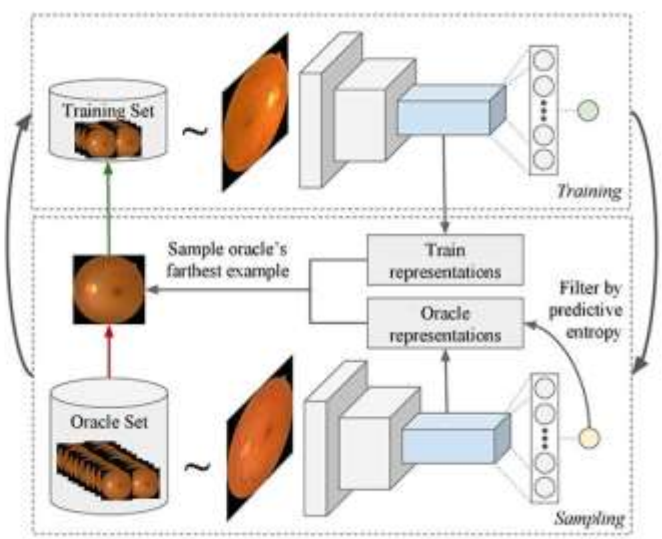
## Image of a retina containing a retinal lesion associated with diabetic retina



The process is repeated until the set of data has a good enough distribution to be used as the training set. Their method, called MedAL (for medical active learning), achieved 80% accuracy on detecting diabetic retinopathy, using only 425 labeled images, which is a 32% reduction in the number of required labeled examples compared to the standard uncertainty sampling technique, and a 40% reduction compared to random sampling.

They also tested the model on other diseases, including skin cancer and breast cancer images, to show that it could apply to a variety of different medical images. The method is generalizable, since its focus is on how to use data strategically rather than trying to find a specific pattern or feature for a disease. It could also be applied to other problems that use deep learning but have data constraints.

"Our active learning approach combines predictive entropy-based uncertainty sampling and a distance function on a learned feature space to optimize the selection of unlabeled samples," said Smailagic, a research professor in Carnegie Mellon's Engineering Research Accelerator. "The method overcomes the limitations of



the traditional approaches by efficiently selecting only the images that provide the most information about the overall data distribution, reducing computation cost and increasing both speed and accuracy."

The team included civil and environmental engineering Ph.D. students Mostafa Mirshekari, Jonathon Fagert, and Susu Xu, and electrical and computer engineering master's students Devesh Walawalkar and Kartik Khandelwal. They presented their findings at the 2018 IEEE International Conference on Machine Learning and Applications in December, where they received a Best Paper Award for their novel work.

# Programming on Python
# Organised by ISTE Students Chapter

# HUMAN COMPTER INTERACTION

**Aruul Bhagkya A M S**
**II M.Tech. IT**

**Human–computer interaction** (**HCI**) researches the design and use of computer technology, focused on the interfaces between people (users) and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways. As a field of research, human–computer interaction is situated at the intersection of computer science, behavioral sciences, design, media studies, and several other fields of study. Humans interact with computers in many ways; the interface between humans and computers is crucial to facilitating this interaction. Desktop applications, internet browsers, handheld computers, and computer kiosks make use of the prevalent graphical user interfaces (GUI) of today. Voice user interfaces (VUI) are used for speech recognition and synthesizing systems, and the emerging multi-modal and Graphical user interfaces (GUI) allow humans to engage with embodied character agents in a way that cannot be achieved with other interface paradigms. The growth in human–computer interaction field has been in quality of interaction, and in different branching in its history. Instead of designing regular interfaces, the different research branches have had a different focus on the concepts of multimodality rather than unimodality, intelligent adaptive interfaces rather than command/action based ones, and finally active rather than passive interfaces. The Association for Computing Machinery (ACM) defines human–computer interaction as "a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use . Human–computer interaction studies the ways in which humans make, or do not make, use of computational artifacts, systems and infrastructures. In doing so, much of the research in the field seeks to improve human–computer interaction by improving the usability of computer interfaces. Much of the research in the field of human–computer interaction takes an interest in:

- Methods for designing new computer interfaces, thereby optimizing a design for a desired property such as learnability, findability, efficiency of use.
- Methods for implementing interfaces, e.g., by means of software libraries.
- Methods for evaluating and comparing interfaces with respect to their usability and other desirable properties.
- Methods for studying human computer use and its sociocultural implications more broadly.
- Methods for determining whether or not the user is human or computer.

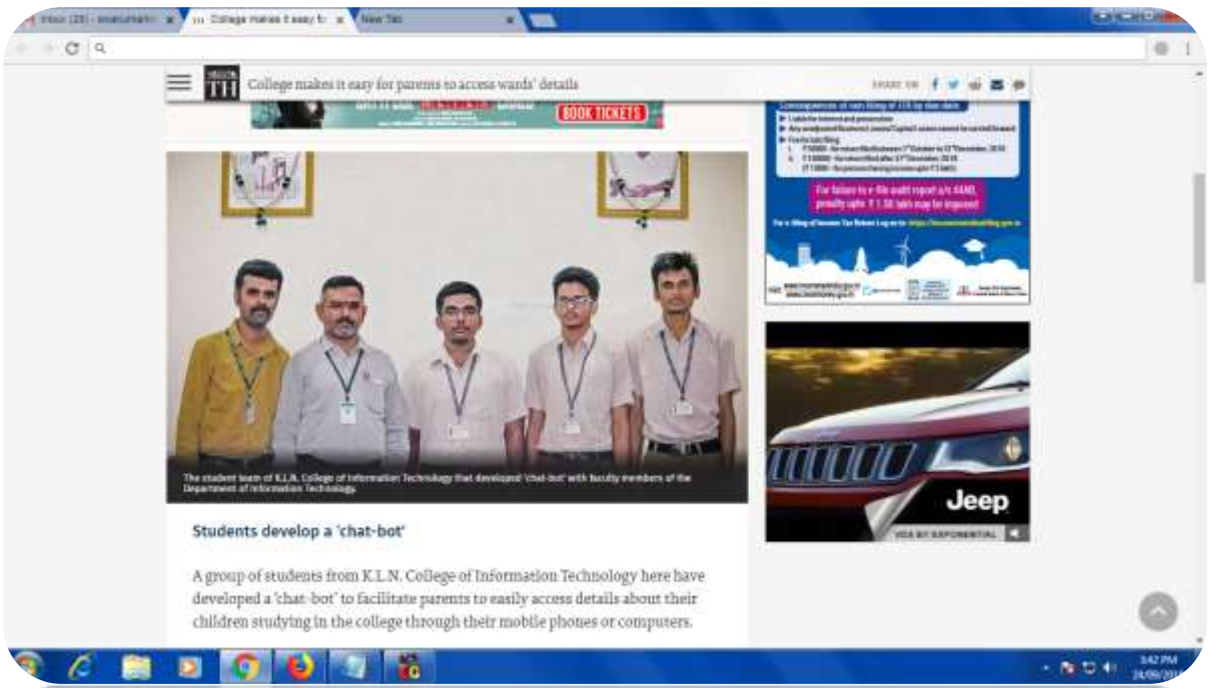
# Sixth Sense Technology

**Karthika G**
**II M.Tech. IT**

**'SixthSense'** is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information.

Information is confined traditionally on paper or digitally on a screen. Sixth Sense bridges this gap, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures. ‘Sixth Sense’ frees information from its confines by seamlessly integrating it with reality. The Sixth Sense prototype is comprised of a pocket projector, a mirror and a camera. The hardware components are coupled in a pendant like mobile wearable device. Both the projector and the camera are connected to the mobile computing device in the user’s pocket. The projector projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces; while the camera recognizes and tracks user's hand gestures and physical objects using computer-vision based techniques. The software program processes the video stream data captured by the camera and tracks the locations of the colored markers at the tip of the user’s fingers using simple computer-vision techniques, thus Sixth Sense also supports multi-touch and multi-user interaction. The Sixth Sense prototype implements several applications that demonstrate the usefulness, viability and flexibility of the system. The map application lets the user navigate a map displayed on a nearby surface using hand gestures, similar to gestures supported by Multi-Touch based systems, letting the user zoom in, zoom out or pan using intuitive hand movements. The drawing application lets the user draw on any surface by tracking the fingertip movements of the user’s index finger. Sixth Sense also recognizes user’s freehand gestures (postures). For example, the Sixth Sense system implements a gestural camera that takes photos of the scene the user is looking at by detecting the ‘framing’ gesture. The user can stop by any surface or wall and flick through the photos he/she has taken. Sixth Sense also lets the user draw icons or symbols in the air using the movement of the index finger and recognizes those symbols as interaction instructions. For example, drawing a magnifying glass symbol takes the user to the map application or drawing an '@' symbol lets the user check his mail. The Sixth Sense system also augments physical objects the user is interacting with by projecting more information about these objects projected on them. Most used in artificial intelligence this methodology can aid in synthesis of bots that will be able to interact with humans.

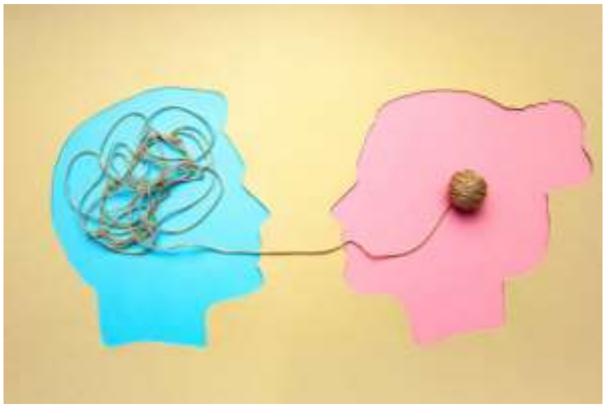
# Students Developed Chat – Bot Published on "The Hindu" News Paper



# Engineers translate brain signals directly into speech

**Saranya V**
**II M.Tech. IT**

Advance marks critical step toward brain-computer interfaces that hold immense promise for those with limited or no ability to speak. In a scientific first, Columbia neuroengineers have created a system that translates thought into intelligible, recognizable speech. By monitoring someone's brain activity, the technology can reconstruct the words a person hears with unprecedented clarity. This breakthrough, which harnesses the power of speech synthesizers and artificial intelligence, could lead to new ways for computers to communicate directly with the brain. It also lays the groundwork for helping people who cannot speak, such as those living with as amyotrophic lateral sclerosis (ALS) or recovering from stroke, regain their ability to communicate with the outside world.



These findings were published on January 29, 2019 in *Scientific Reports.*

"Our voices help connect us to our friends, family and the world around us, which is why losing the power of one's voice due to injury or disease is so devastating," said Nima Mesgarani, PhD, the paper's senior author and a principal investigator at Columbia University's Mortimer B. Zuckerman Mind Brain Behavior Institute. "With today's study, we have a potential way to restore that power. We've shown that, with the right technology, these people's thoughts could be decoded and understood by any listener". Decades of research has shown that when people speak -- or even imagine speaking -- telltale patterns of activity appear in their brain. Distinct (but recognizable) pattern of signals also emerge when we listen to someone speak, or imagine listening. Experts, trying to record and decode these patterns, see a future in which thoughts need not remain hidden inside the brain -- but instead could be translated into verbal speech at will. But accomplishing this feat has proven challenging. Early efforts to decode brain signals by Dr. Mesgarani and others focused on simple computer models that analyzed spectrograms, which are visual representations of sound frequencies. But because this approach has failed to produce anything resembling intelligible speech, Dr. Mesgarani's team turned instead to a vocoder, a computer algorithm that can synthesize speech after being trained on recordings of people talking. "This is the same technology used by Amazon Echo and Apple Siri to give verbal responses to our questions," said Dr. Mesgarani, who is also an associate professor of electrical engineering at Columbia's Fu Foundation School of Engineering and Applied Science. To teach the vocoder to interpret to brain activity, Dr. Mesgarani teamed up with Ashesh Dinesh Mehta, MD, PhD, a neurosurgeon at Northwell Health Physician Partners Neuroscience Institute.Dr. Mehta treats epilepsy patients, some of whom must undergo regular surgeries.

"Working with Dr. Mehta, we asked epilepsy patients already undergoing brain surgery to listen to sentences spoken by different people, while we measured patterns of brain activity," said Dr. Mesgarani. "These neural patterns trained the vocoder."

Next, the researchers asked those same patients to listen to speakers reciting digits between 0 to 9, while recording brain signals that could then be run through the vocoder. The sound produced by the vocoder in response to those signals was analyzed and cleaned up by neural networks, a type of artificial intelligence that mimics the structure of neurons in the biological brain. The end result was a robotic-sounding voice reciting a sequence of numbers. To test the accuracy of the recording, Dr. Mesgarani and his team tasked individuals to listen to the recording and report what they heard. "We found that people could understand and repeat the sounds about 75% of the time, which is well above and beyond any previous attempts," said Dr. Mesgarani. The improvement in intelligibility was especially evident when comparing the new recordings to the earlier, spectrogram-based attempts. "The sensitive vocoder and powerful neural networks represented the sounds the patients had originally listened to with surprising accuracy."

Dr. Mesgarani and his team plan to test more complicated words and sentences next, and they want to run the same tests on brain signals emitted when a person speaks or imagines speaking. Ultimately, they hope their system could be part of an implant, similar to those worn by some epilepsy patients, that translates the wearer's thoughts directly into words.

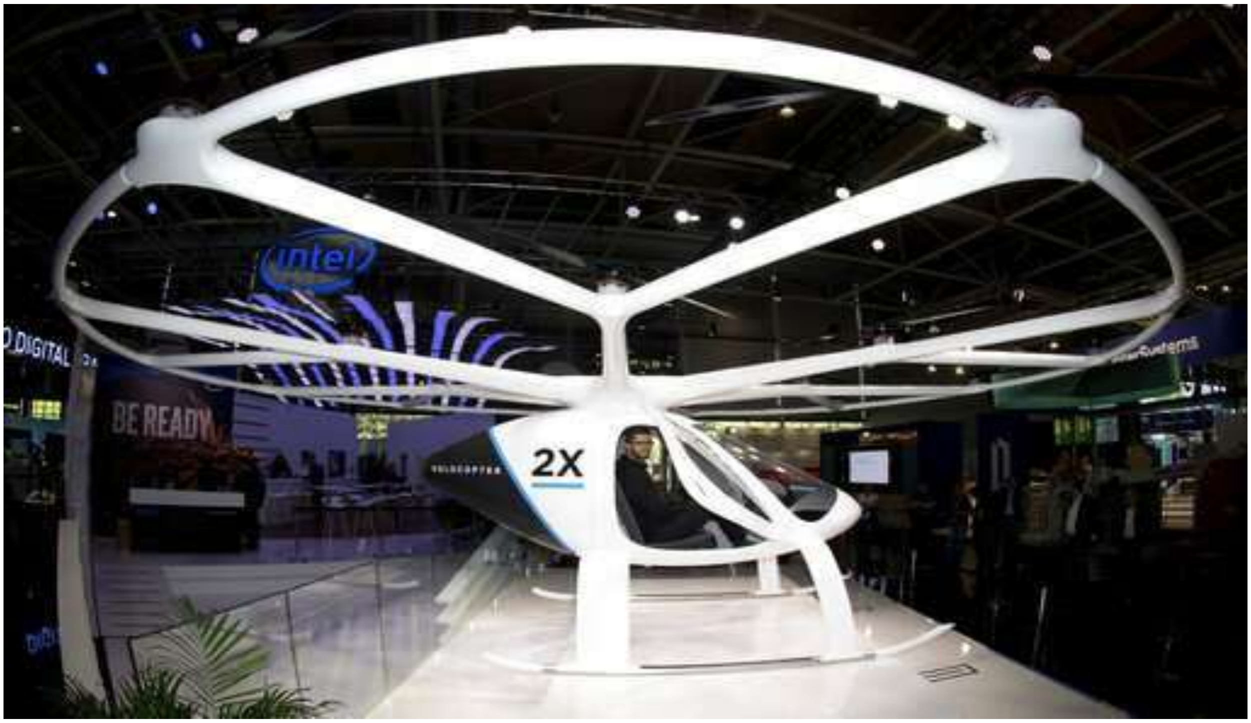
"In this scenario, if the wearer thinks 'I need a glass of water,' our system could take the brain signals generated by that thought, and turn them into synthesized, verbal speech," said Dr. Mesgarani. "This would be a game changer. It would give anyone who has lost their ability to speak, whether through injury or disease, the renewed chance to connect to the world around them."

**Source:** The Zuckerman Institute at Columbia University

**Summary:** In a scientific first, neuroengineers have created a system that translates thought into intelligible, recognizable speech. This breakthrough, which harnesses the power of speech synthesizers and artificial intelligence, could lead to new ways for computers to communicate directly with the brain.

# Frankfurt airport working on flying taxis

**Palanikumar M**
**IV B.Tech. IT**




The operator of Frankfurt's international airport says it is developing a concept for electric air taxi services.

Fraport AG is working with Volo copter GmbH, which makes two-seat, multi-rotor electric Aircraft that can fly with a pilot or autonomously.

Actually operating such taxis to bring people to and from the airport will have to wait until the legal framework for autonomous flying is established and such aircraft can be certified for passenger use.

Volo copter says its aircraft, based on drone technology and flight tested in Dubai, are quiet, safe and local emissions-free. The idea ultimately would be to operate pilotless when the legal framework is in place.

The European Aviation Safety Agency says it is developing standards to enable certification of such aircraft.

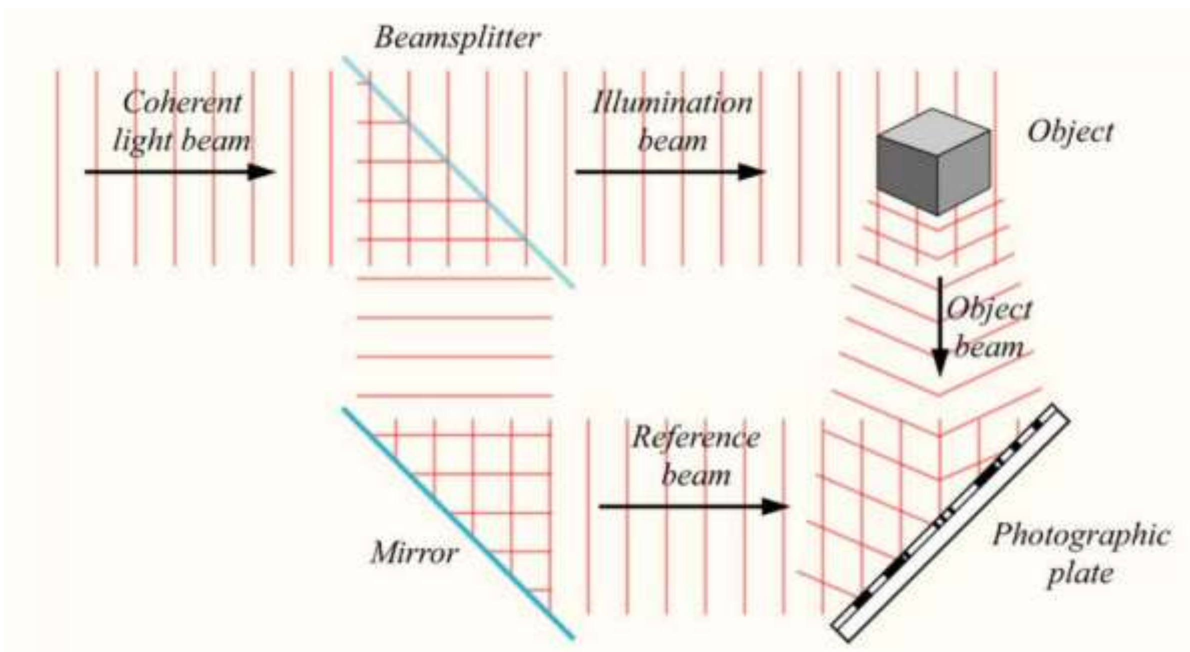

# "ICMR Sponsored 7 Days National Conclave"

# Holography

**R.Nithin Kumar**
**II M.Tech. IT**

Holography is a photographic technique that records the light scattered from an object, and then presents it in a way that appears three-dimensional. Holograms pop up in movies such as "Star Wars" and "Iron Man," but the technology has not quite caught up to movie magic — yet.

Various types of holograms have been made over the years, including transmission holograms, which allow light to be shined through them and the image to be viewed from the side; and rainbow holograms, which are used for security purposes — on credit cards and driver's licenses, for example.




To create a hologram, you need an object (or person) that you want to record; a laser beam to be shined upon the object and the recording medium; a recording medium with the proper materials needed to help clarify the image; and a clear environment to enable the light beams to intersect.

A laser beam is split into two identical beams and redirected by the use of mirrors. One of the split beams, the illumination beam or object beam, is directed at the object. Some of the light is reflected off the object onto the recording medium.

The second beam, known as the reference beam, is directed onto the recording medium. This way, it doesn't conflict with any imagery that comes from the object beam, and coordinates with it to create a more precise image in the hologram location.

The two beams intersect and interfere with each other. The interference pattern is what is imprinted on the recording medium to recreate a virtual image for our eyes to see.

The recording medium, where the lights converge, can be made up of various materials. One of the most common used with hologram creation is photographic film, with an added amount of light-reactive grains. This enables the resolution to be higher for the two beams, making the image look much more realistic than using the silver halide material from the 1960s.

## History of holography

The development of hologram technology started in 1962, when Yuri Denisyuk, in the Soviet Union, and Emmett Leith and Juris Upatnieks at the University of Michigan developed laser technology that recorded 3D objects. Silver halide photographic emulsions were used for the recording medium, though the clarity of said objects wasn't perfect at the time. But new methods involving the conversion of transmission with the refractive index allowed holograms to be improved over time.

## Future of holography

For now, holograms are static. Recent presentations, such as CNN EFFECT of a reporter appearing live from another location, and the late Tupac Shakur "appearing live" at a music festival, are not "true" holograms.

However, Hologram technology is being developed that projects 3D images from another location in real time. The images are also static, but they are refreshed every two seconds, creating a strobe-like effect of movement. The researchers hope to improve the technology over the next few years to bring higher resolution and faster image streaming.

And in March 2013, it was announced that a group of researchers from Hewlett Packard Laboratories has developed glasses-free, multi-perspective, 3D display technology for mobile devices.

If you want to see a hologram, you don't have to look much farther than your wallet. There are holograms on most driver's licenses, ID cards and Credit Card. If you're not old enough to drive or use credit, you can still find holograms around your home. They're part of CD and software packaging, as well as just about everything sold as "official merchandise."

Unfortunately, these holograms -- which exist to make forgery more difficult -- aren't very impressive. You can see changes in colors and shapes when you move them back and forth, but they usually just look like sparkly pictures or smears of color. Even the mass-produced holograms that feature movie and comic book heroes can look more like green photographs than amazing 3-D images.

On the other hand, large-scale holograms, illuminated with Laser or displayed in a darkened room with carefully directed lighting, are incredible. They're two-dimensional surfaces that show absolutely precise, three-dimensional images of real objects. You don't even have to wear special glasses or look through a View-Master to see the images in 3-D.

If you look at these holograms from different angles, you see objects from different perspectives, just like you would if you were looking at a real object. Some holograms even appear to move as you walk past them and look at them from different angles. Others change colors or include views of completely different objects, depending on how you look at them.

Holograms have other surprising traits as well. If you cut one in half, each half contains whole views of the entire holographic image. The same is true if you cut out a small piece -- even a tiny fragment will still contain the whole picture. On top of that, if you make a hologram of a magnifying glass, the holographic version will magnify the other objects in the hologram, just like a real one.

Once you know the principles behind holograms, understanding how they can do all this is easy. This article will explain how a hologram, light and your brain work together make clear, 3-D images. All of a hologram's properties come directly from the process used to create it, so we'll start with an overview of what it takes to make one.

Holography is based on the principle of interference. A hologram captures the interference pattern between two or more beams of coherent light (i.e. laser light). One beam is shone directly on the recording medium and acts as a reference to the light scattered from the illuminated scene.

## Looking at holograms

Viewing a hologram print, the image changes as you move around. As if you were looking through a window onto a scene. This is because holography records the scene through an area of perspective. The viewing window of a hologram can also be broken up to record many different perspectives, this process is know as spatial multiplexing, and can be used to capture animation and/or create a holographic scene from a sequence of 2-d images.

## The development of holography

The two basic geometries for holograms are – transmission – where light is shone through the hologram, and – reflection – in which the hologram reflects light. The recording of transmission and reflection holograms were developed from two different fields of enquiry and have distinct optical aesthetics.

The reflection hologram was developed by Yuri Denisyuk (1927–2006) who used a single beam to both illuminate the object and be the reference. Denisyuk's process follows the colour and spatial photographic recording practices of Lippmann photography and Daguerreotypes, which were created on polished metal surfaces. Gabriel Lippmann (1845–1921) claimed to have invented a method of colour photographic recording and provided a scientific explanation of how the emulsion structure recorded and then could reconstruct optical standing waves patterns, the particular wavelengths of which comprise a colour image.

As transmission holograms diffract all of the illumination into the image, 'mono-chromatic' light (such as from a laser) is needed to reconstruct a sharp image. Stephen Benton developed transfer geometries that allowed transmission holographic prints to be viewed with a white light source; including the rainbow hologram in 1969 and using an achromatic geometry in 1977 to recombine the spectrum.



Different types and techniques of holography used by artists

There are a number of distinct types of display holograms that can be defined by their optical-geometry and the recording medium.

Laser viewable transmission holograms

The laser viewable transmission hologram allows for a near perfect reconstruction of the optical field. This means that the recorded scene appears behind the film, and when replayed by a laser this scene can be very deep and sharp. These holograms are also used as a master recording that can then be transferred into a reflection or transmission holographic print.

Artist Paula Dawson who has worked extensively with laser viewable transmission holograms describes these recordings as ‘concrete’ holographic images because they create a sense of physical presence.

The holograms hologram diffracts the light into an image. As described in the previous section ‘The development of holography’ transmission and reflection holograms differ because of the fringe structure. The reflection hologram reconstructs only selected wavelengths (colours) while the transmission hologram diffracts al the wavelengths of light that is illuminated with. The hologram does not change the wavelength (colour) of light but controls where different wavelengths are diffracted. Multiple colour of a holographic images are then produced by selecting and combining the diffracted spectral colours.

With a reflection hologram by manipulating the chemical processing, the holographic fringe structure can be expanded or shrunk changing the colour of the reconstructed image. Pseudo-colour reflection holograms can be created through multiple exposures between which the emulsion is swollen or shrunk to shift the recorded fringe spacing and therefore colour, a technique that has been used extensively by John Kaufman and Iñaki Beguirista.

Computer generated ‘digital’ holography

With computer generated ‘digital’ holograms the fringe pattern of each pixel is calculated and recorded into the hologram. There are a number of ways of making digital holograms in which small regions of the film, termed ‘Voxels’ or ‘Hogels’, are exposed to the pre-calculated fringe pattern, such as by using a spatial light modulator (SLM) or electron beam lithography. In early systems these Hogels were noticeable causing the surface of the hologram to look pixilated.



In conclusion

Holography allows for the recording and reconstruction of spatially-dependent images. The holographic image is based on optical-material interference rather than sensors and programs; the information is enfolded within the surface rather than being applied onto it. We sense the difference by moving around, and returning to find the image again. The holographic image has its own presence, which we move through, playing the image with our own perception and agency.

The relationships that can be set up with the holographic image suggest a particular way of considering optical information. While there are a number of ways of making holograms, each having their own aesthetic qualities they all share the same underlying principles of holographic imaging. Holography uses an interference pattern to encode and record an image. The reconstruction of this image is an optical ‘shaping’ that appears distinct from the material surface. We perceive the light that flows through the hologram as holding space. This perceived space is dependent on the perspective from where it is viewed, allowing for a hologram to render a spatial and dynamic sce

# Artificial Intelligence In Musical Industry

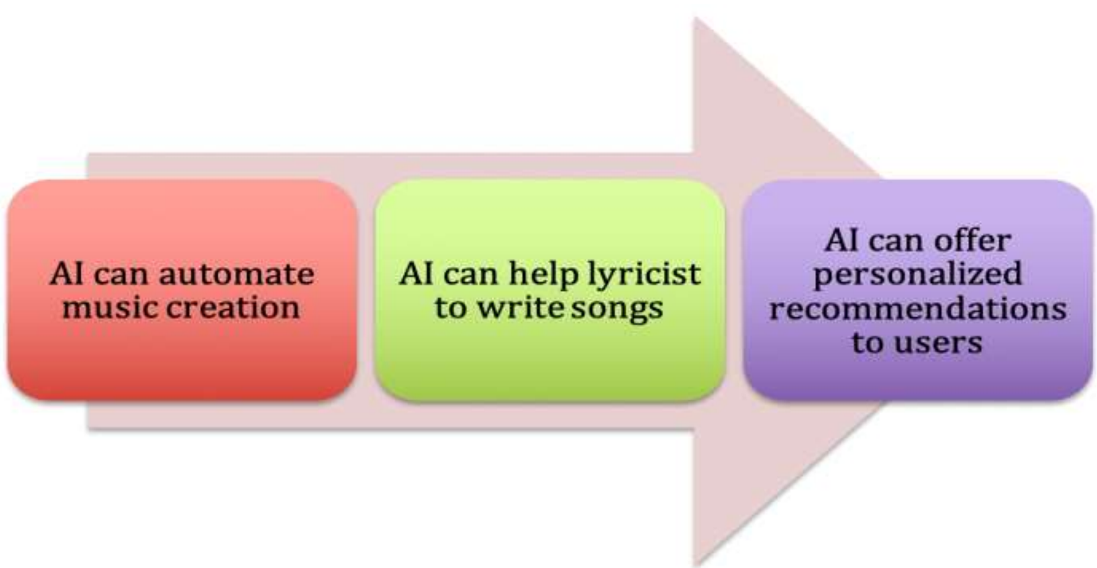
**Venkatesh Prabhu P R**
**III B.Tech. IT**

We already know how AI has been creating a lot of buzz in the tech space for quite a while now. The technology is increasingly becoming every industry's choice due to its ability to automate services, innovate workflows, and ease responsibilities. The introduction of AI in the music industry too is grounded for similar reasons. While it may sound sci-fi, the reality is that we have machines creating songs, robots playing music, and AI writing song lyrics. The practice of using AI in the music industry is not new. The music industry has been leveraging AI since the year 1951. Yes, you read that correct – 1951!

## THE INCEPTION OF AI IN THE MUSIC INDUSTRY

It might be hard for us to believe that AI had already seeped into the music industry in the middle of the 20th Century. In 1951, a computer scientist, Alan Turing, recorded computer-generated melodies. The recording, which was filled with a lot of disturbances, has finally been restored.

## THE POTENTIAL OF AI IN MUSIC



Through the reinforcement learning approach, AI trains itself to analyze different types of compositions. By continuously learning, the technology can extract the

characteristics and the thesis of music entirely. The final AI model is then created, having the capability to compose altogether different, innovative, and unique musical pieces. Sounds cool, right? But the next AI application in the music industry will blow your mind - AI can write song lyrics too. By training the AI model with a considerable amount and type of dataset containing random lyrics and music compositions, we can obtain AI that independently generates lyrics.

Recording a song is expensive. AI helps artists record music inexpensively. We have AI apps that record music,assisting independent artists in recording their music.

Another area where AI can showcase its talent is music marketing. AI can help marketers to obtain critical information on how to effectively sell a music album to the listeners. By analyzing the behavioral pattern of listeners, AI can gauge the sentiments of users and recommend them songs based on their interests.

## THE DEVELOPMENT OF AI IN MUSIC

The level of AI sophistication in the music industry has reached a place where we now see robots entering the mainstream music industry. We know that the potential of AI is assisting humans in the creation of audio content. But, AI is here to replace artists altogether. Did you know, robots can not only create original musical pieces but also play the music? Cool, right? In the future, we might see robots performing on stage along with musicians and artists.

Ten years back, we never thought that AI will innovate the industry to an extent it is doing now. Similarly, we do not know what technological disruption AI will bring ten years from now. As far as AI does not cause any harm to the jobs of artists and musicians, let’s wait for AI to take charge.

Most of these systems work by using deep learning networks, a type of AI that’s reliant on analyzing large amounts of data. Basically, you feed the software tons of source material, from dance hits to disco classics, which it then analyzes to find patterns. It picks up on things like chords, tempo, length, and how notes relate to one another, learning from all the input so it can write its own melodies. There are differences between platforms: some deliver MIDI while others deliver audio. Some learn purely by examining data, while others rely on hard-coded rules based on musical theory to guide their output.

However, they all have one thing in common: on a micro scale, the music is convincing, but the longer you listen, the less sense it makes. None of them are good enough to craft a Grammy Award-winning song on their own... yet.

Of all the music-making AI platforms I've tried out, Amper is hands down the easiest to use. IBM and Google's projects require some coding knowledge and unpacking of developer language on GitHub. They also give you MIDI output, not audio, so you also have to have a bit more knowledge about music production to shape the output into an actual song.

Amper, on the other hand, has an interface that is ridiculously simple. All you have to do is go to the website and pick a genre of music and a mood. That's it. You don't have to know code or composition or even music theory in order to make a song with

it. It builds tracks from prerecorded samples and spits out actual audio, not MIDI. From there, you can change the tempo, the key; mute individual instruments, or switch out entire instrument kits to shift the mood of the song its made. This audio can then be exported as a whole or as individual layers of instruments (known as "stems"). Stems can then be further manipulated in DAWs like Ableton or Logic.

# Cruise Control

**S.Prema**

**III B.Tech. IT**

Cruise control (sometimes known as speed control or autocruise, or tempomat in some countries) is a system that automatically controls the speed of a motor vehicle. The system is a servomechanism that takes over the throttle of the car to maintain a steady speed as set by the driver.

## History

Speed control was used in automobiles as early as 1900 in the Wilson-Pilcher and also in the 1910s by Peerless. Peerless advertised that their system would "maintain speed whether up hill or down". The technology was adopted by James Watt and Matthew Boulton in 1788 to control steam engines, but the use of governors dates at least back to the 17th century. On an engine the governor adjusts the throttle position as the speed of the engine changes with different loads, so as to maintain a near constant speed.

Modern cruise control (also known as a speedostat or tempomat) was invented in 1948 by the inventor and mechanical engineer Ralph Teetor. His idea was borne out of the frustration of riding in a car driven by his lawyer, who kept speeding up and slowing down as he talked. The first car with Teetor's system was the 1958 Imperial (called "Auto-pilot") using a speed dial on the dashboard. This system calculated ground speed based on driveshaft rotations off the rotating speedometer-cable, and used a bi-directional screw-drive electric motor to vary throttle position as needed.

A 1955 U.S. Patent for a "Constant Speed Regulator" was filed in 1950 by M-Sgt Frank J. Riley. He installed his invention, which he conceived while driving on the Pennsylvania Turnpike, on his own car in 1948. Another inventor named Harold Exline, working independently of Riley, also invented a type of cruise control, which he first installed on his own car and on cars belonging to friends of his. Exline filed a U.S. Patent for "Vacuum Powered Throttle Control With Electrically Controlled Air Valve" in

1951, and the Patent was granted in 1956. Despite these patents, Riley, Exline, and the subsequent patent holders were not able to collect royalties for any of the inventions using cruise control.

In 1965, American Motors (AMC) introduced a low-priced automatic speed control for its large-sized cars with automatic transmissions. The AMC "Cruise-Command" unit was engaged by a push-button once the desired speed was reached and then the throttle position was adjusted by a vacuum control directly from the speedometer cable rather than a separate dial on the dashboard.

Daniel Aaron Wisner invented "Automotive Electronic Cruise Control" in 1968 as an engineer for RCA's Industrial and Automation Systems Division in Plymouth, Michigan. His invention described in two patents filed that year (US 3570622 & US 3511329), with the second modifying his original design by debuting digital memory, was the first electronic device in controlling a car. Two decades passed before an integrated circuit for his design was developed by Motorola as the MC14460 Automotive Speed Control Processor in CMOS. The advantage of electronic speed control over its mechanical predecessor was that it could be integrated with electronic accident avoidance and engine management systems.

Following the 1973 oil crisis and rising fuel prices, the device became more popular in the U.S. "Cruise control can save gas by avoiding surges that expel fuel" while driving at steady speeds. In 1974, AMC, GM, and Chrysler priced the option at $60 to $70, while Ford charged $103.

## Operation

The driver must bring the vehicle up to speed manually and use a button to set the cruise control to the current speed.

The cruise control takes its speed signal from a rotating driveshaft, speedometer cable, wheel speed sensor from the engine's RPM, or from internal speed pulses produced electronically by the vehicle. Most systems do not allow the use of the cruise control below a certain speed - typically around 25 mph (40 km/h). The vehicle will maintain the desired speed by pulling the throttle cable with a solenoid, a vacuum driven servomechanism, or by using the electronic systems built into the vehicle (fully electronic) if it uses a 'drive-by-wire' system.

All cruise control systems must be capable of being turned off both explicitly and automatically when the driver depresses the brake, and often also the clutch. Cruise control often includes a memory feature to resume the set speed after braking, and a coast feature to reduce the set speed without braking. When the cruise control is engaged, the throttle can still be used to accelerate the car, but once the pedal is released the car will then slow down until it reaches the previously set speed.

On the latest vehicles fitted with electronic throttle control, cruise control can be easily integrated into the vehicle's engine management system. Modern "adaptive" systems (see below) include the ability to automatically reduce speed when the distance to a car in front, or the speed limit, decreases. This is an advantage for those driving in unfamiliar areas.

The cruise control systems of some vehicles incorporate a "speed limiter" function, which will not allow the vehicle to accelerate beyond a pre-set maximum; this can usually be overridden by fully depressing the accelerator pedal. (Most systems will prevent the vehicle accelerating beyond the chosen speed, but will not apply the brakes in the event of overspeeding downhill.)

On vehicles with a manual transmission, cruise control is less flexible because the act of depressing the clutch pedal and shifting gears usually disengages the cruise control. The "resume" feature has to be used each time after selecting the new gear and releasing the clutch. Therefore, cruise control is of most benefit at motorway/highway speeds when top gear is used virtually all the time.

## Advantages and disadvantages

Some advantages of cruise control include:

Its usefulness for long drives (reducing driver fatigue, improving comfort by allowing positioning changes more safely) across highways and sparsely populated roads.

Some drivers use it to avoid subconsciously violating speed limits. A driver who otherwise tends to subconsciously increase speed over the course of a highway journey may avoid speeding.

Increased fuel efficiency

However, when used incorrectly cruise control can lead to accidents due to several factors, such as:

speeding around curves that require slowing down

rough or loose terrain that could negatively affect the cruise control controls

rainy or wet weather could lose traction

Encourages drivers to pay less attention to driving, increasing the risk of accident

## Adaptive cruise control

Some modern vehicles have systems for adaptive cruise control (ACC), which is a general term meaning improved cruise control. These improvements can be automatic braking or dynamic set-speed type controls.


Automatic Braking Type: the automatic braking type use either a single or combination of sensors (radar, lidar,and camera) to allow the vehicle to keep pace with the car it is following, slow when closing in on the vehicle in front and accelerating again to the preset speed when traffic allows. Some systems also feature forward collision warning systems, which warn the driver if a vehicle in front—given the speed of both vehicles—gets too close (within the preset headway or braking distance).

Dynamic Set Speed Type: The dynamic set speed uses the GPS position of speed limit signs, from a database. Some are modifiable by the driver.

Non-Braking Type: The speed can be adjusted to allow traffic calming.

Dynamic radar cruise control: uses a camera and millimeter-wave radar to maintain a set point distance from vehicles in front of the car; the system will automatically slow down or speed up based on the vehicles in front.

Vehicles with adaptive cruise control are considered a Level 1 autonomous car, as defined by SAE International.