COMET 2014

Technical Magazine

Department of Electronics and Communication Engineering

SRM University - Kattankulathur 603-203

COMET 2014

COMmunication Enhances Technology

TECHNICAL MAGAZINE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SRM UNIVERSITY - KATTANKULATHUR 603-203

EDITORIAL

Dear Readers,

On behalf of the entire Electronics and Communication department, I take great pride in presenting to you COMET 2014. This magazine represents the culmination of the collective efforts of the students and faculty of the ECE department. Contributions in the form of articles and factual details have proved invaluable. The magazine has been re-launched after several years and we sincerely hope that COMET 2014 will be informative and thought provoking and that this magazine be carried on successfully in the forthcoming years. Every effort has been made to cover the gamut of topics that the Electronics and Communication field offers. To keep the reader interested, lighter articles in the form of brain teasers along with interesting titbits have also been included. I hope that you enjoy reading the magazine as much as we enjoyed compiling it.

- Chief Editor

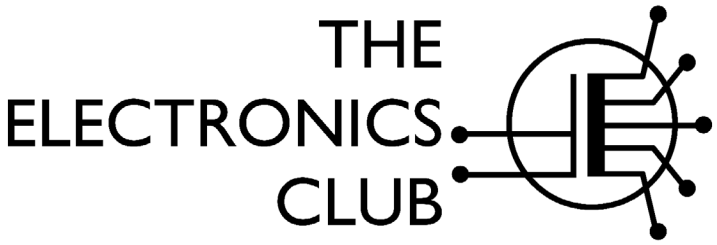
About the Department

Electronics and Communication Engineering (ECE) is a swiftly advancing field, with new ideas emerging every other second. From mobile phones to fiber optics and remote sensing, there are exciting avenues to explore and create. The ECE department at SRM University prepares students for careers in this constantly evolving discipline.

Students pursuing B.Tech. in ECE have a full and flexible undergraduate curriculum. Numerous streams can be tailored to fit every individual's interests, skills and career goals. Students can prepare for technological careers in industry, academia or management.

Most faculty members are accomplished doctorates and postgraduates with considerable research and academic experience. An American professor served as a visiting faculty in our department and there are many industry-savvy professionals. The department has specialists from the fields of device electronics, signal processing, microwave & optical engineering, wireless communication, embedded systems and VLSI design.

The ECE Department holds national and international conferences that function like informal think tanks. Faculty and students benefit from guest lectures on the latest innovations in both established and emerging fields. Professional associations, such as the IEEE student chapter, prove valuable for information gathering and networking. Students are also sponsored to attend conferences abroad.



Electronics club is the student run organization that strives to impart enthusiasm and passion for electronics and allied fields among students of ECE. The club aims to cater to the various needs that are primal to be addressed to keep in pace with the ever evolving field of electronics. The club aims to uncover those key topics that are not part of the curriculum or just grazed upon by the syllabus. The functions of the electronics club are to deal from basics of electronics to the peak of it. This club, for sure, will help the students not only in their studies but also in their career.

Electronics is a modern branch of science which is deeply rooted in to every aspect of human life. It has become a part of our day to day life. Now we can't even expect a day without it. Starting the day with a small alarm till ending the day with a bed lamp involves electronics. "Electronics is clearly the winner of the day", said a famous scientist John Ford. By the demand and production of the electronics we can predict the economy of a nation. It also plays a major role in a development of a nation.

The functions of the electronics club are to deal from basics of electronics to the peak of it. The domains of the club are designed in such a way that it provides all-round development of a student in all aspects. Teaching the students about the various components required to build both basic and complex circuits, helping them design and built complex circuits, giving them hints and tricks to make a circuit work, detecting bugs present in a built circuit are some of the key functions of this club. This indeed helps them not only in their studies but also in their career.

TEAM AAKASH

Team Aakash is an aspiring team from SRM University working on projects based on Aakash tablets and its operating environment. Our team consists of students from various disciplines such as Electronics and Communication engineering, Computer science engineering, Information technology & Mechatronics and headed by our Professor Dr. S. Malarvizhi from Electronics and communication department of SRM University.

Aakash is first in a series of Android-based tablet computers produced by British company DataWind. It is manufactured by the India-based company Quad, at a new production centre in Hyderabad. The tablet was officially launched as the Aakash in New Delhi on 5 October 2011. The Indian Ministry of Human Resource Development announced an upgraded second-generation model called Aakash 2 in April 2012.

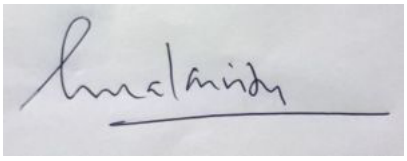
The Aakash-2 is next tablet in line after Aakash. It was Development of Advanced Computing (C-DAC) to replace the original Aakash tablet. Team Aakash enthusiastically involved in designing and developing an android application which helps in improvising the educational methodologies and working hard for the betterment of our nation. Team Aakash dedicated their time in research by interfacing embedded technology with Aakash tablets and providing maximum grade by improvising its efficiency & quality.

MESSAGE FROM THE HOD

Dr. S.Malarvizhi M.E, Ph.D

I am glad to know that the students of the ECE department are bringing out COMET – 2014 this year. This magazine is a reflection of the enthusiasm and desire of our students to bring out a technical magazine dedicated to Electronics and Communication Engineering.

I also take this opportunity to congratulate the COMET magazine committee and the contributors for all their efforts. I wish them all success.



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Electronics and Communication Engineering
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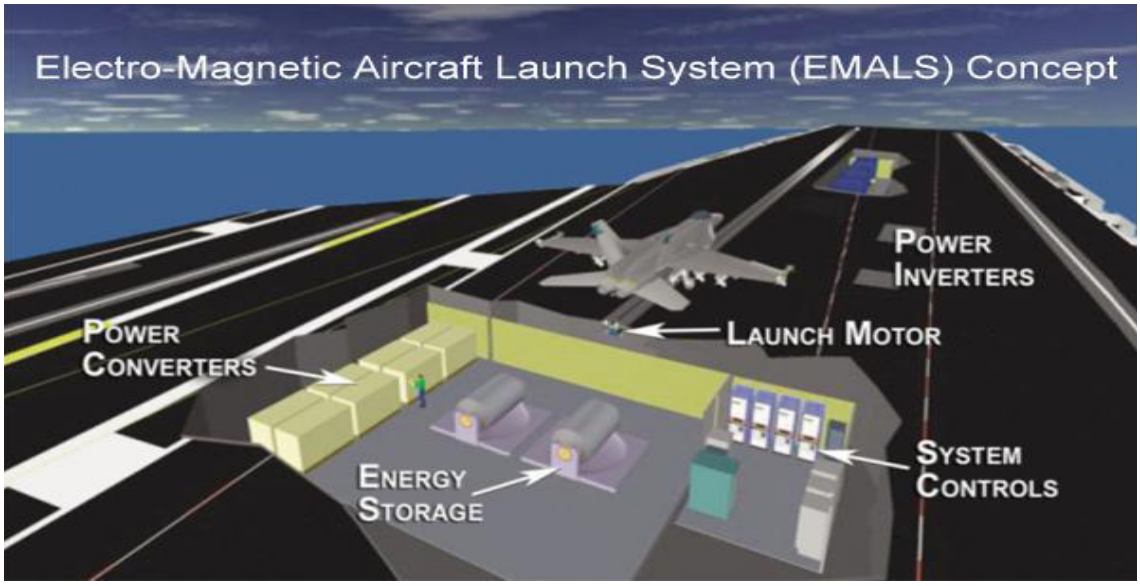
Technology catchment area

Electromagnetic Aircraft Launch System

Bala Subramanian
IV year

The Electromagnetic Aircraft Launch System (EMALS) is a system under development by the United States Navy to launch carrier-based aircraft from catapults using a linear motor drive instead of conventional steam pistons. This technology reduces stress on airframes because they can be accelerated more gradually to takeoff speed than with steam-powered catapults.

Other advantages includes lower system weight, cost, and maintenance; the ability to launch both heavier and lighter aircraft than conventional systems; and lower requirements for fresh water, reducing the need for energy-intensive desalination. The EMALS uses a linear induction motor (LIM), which uses electric currents to generate magnetic fields that propel a carriage down a track to launch the aircraft.



The induction motor requires a large amount of electric energy in just a few seconds — more than the ship's own power source can provide. EMALS' energy-storage subsystem draws power from the ship and stores it kinetically on rotors of four disk alternators.

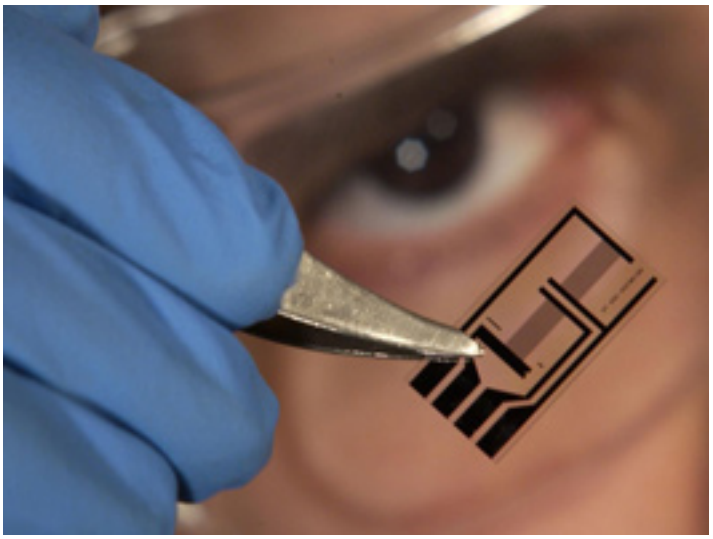
Compared to steam catapults, EMALS can control the launch performance with greater precision, allowing it to launch more kinds of aircraft, from heavy fighter jets to light unmanned aircraft. The EMALS will also be more efficient than the 5-percent efficiency of steam catapults.

The transistor - the origin of the semi-conductor or microelectronics industry - was invented in 1947 by Bell Laboratory scientists William Shockley, John Bardeen and Walter Brattain.

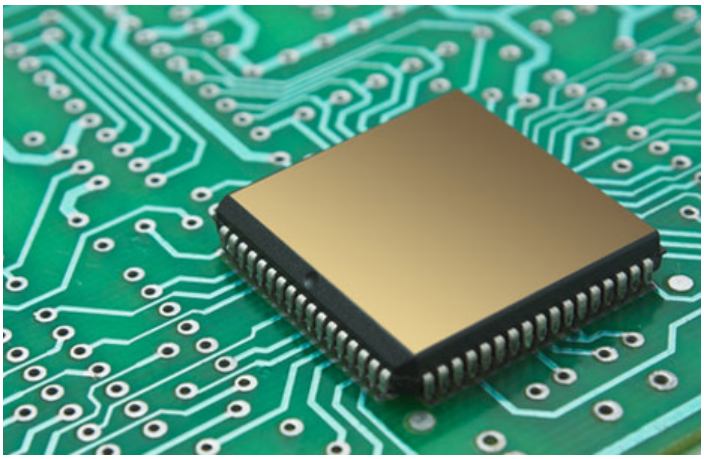
Electronics Everywhere!

V. Gautham Raj
III year

Most of the wonders in this world just emerged up with a spark in human brain, and so did Electronics too! How can we even forget to talk about something which is present in all walks of our life?



Starting from your digital watches, Mobile phones, Music players, EBook readers and it goes on, the world has started shrinking down ever since the usage of semiconductors increased. Human minds designed certain things using electronics which can think and react faster than their own minds. We call these as Robots. Imagine a world without these advancements in electronics; it might be the worst nightmare ever. Electronics stands as the bridge between the human race and the machine world. Those days when man tried using electronics to communicate with another human is no more a noteworthy talk, because nowadays machines have started communicating with humans. Mails, information transfers and many more stuff would have been just a dream without this advancement in the field of electronics. The number of fields which uses electronics for its own welfare and development is uncountable.



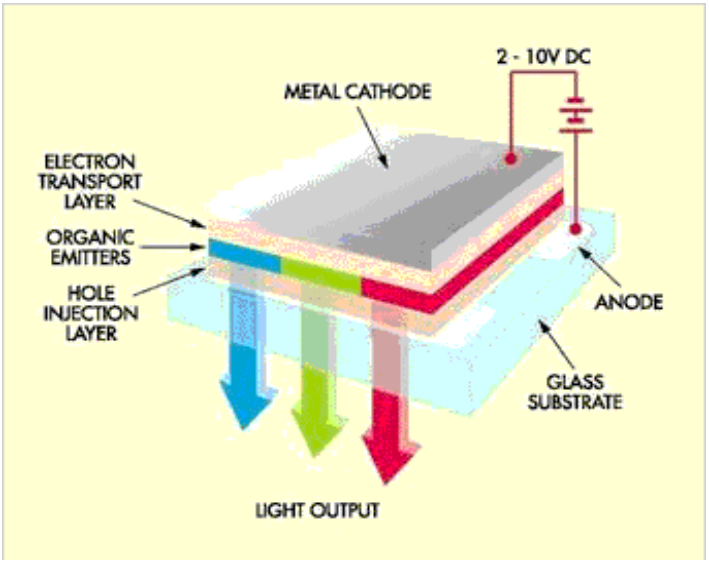
It is believed that computers run the modern era, but actually all our computers are just plastic boxes which are run by electronics!

Moore's second law - much less quoted - is that the cost of chip manufacturing doubles with each generation of chip.

OLED – The Future of Technology

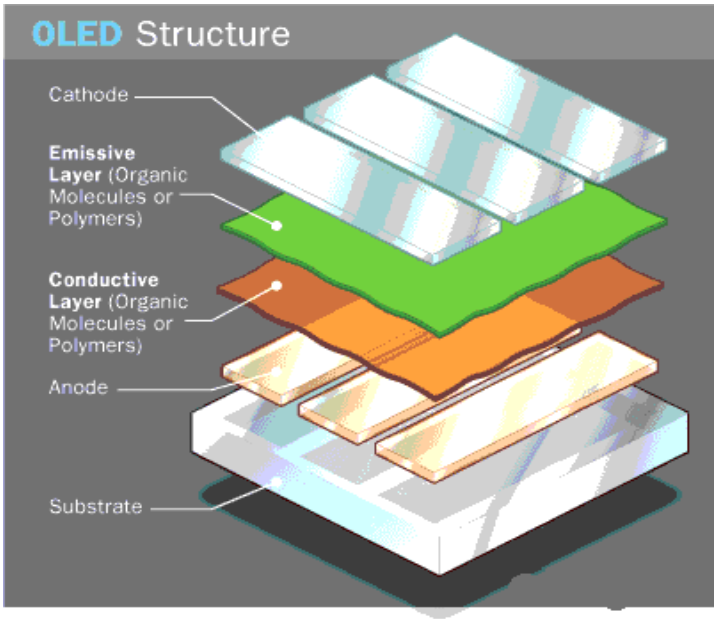
Venkatesh Prasad . B
III year

An OLED (Organic Light Emitting Diode) is more of an LED which consists of very fine films of organic compounds in the electro-luminescent layer. These organic compounds which are being used in OLEDs have a very significant property of creating light when electricity is passed through them . The most commonly used organic compounds are polyflourene,polyaniline,etc. . The thin layer of organic compound is placed in between two electrodes .



OLED – Comparison with LCD and LED :

An OLED has the ability to work without a backlight unlike LED . Thus, it can display deep black levels and can be thinner and lighter than an LCD.



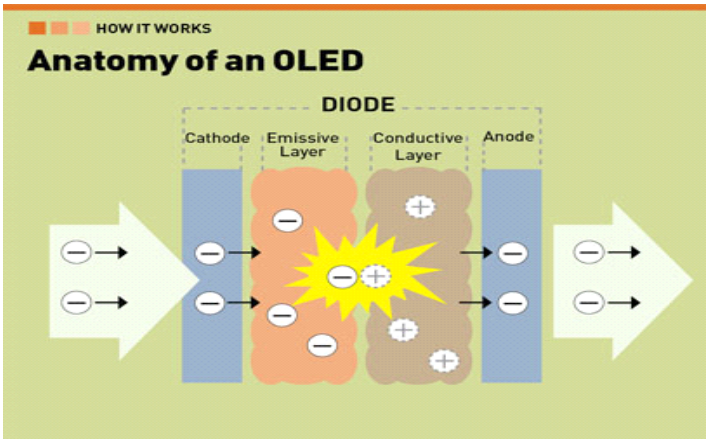
Primary look at the working of an OLED :

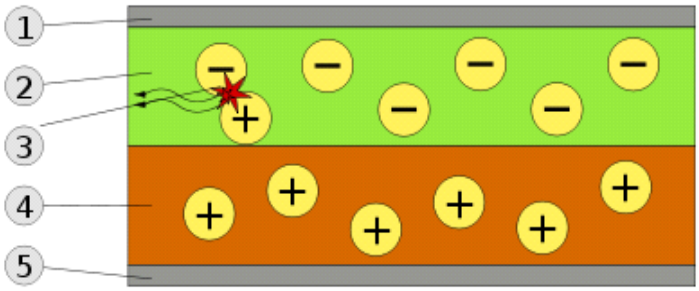
A Layer of organic material is sandwiched between two conductors (an anode and a cathode), which in turn are sandwiched between a glasstop plate (seal) and a glass bottom plate (substrate). When electric Current is applied to the two conductors, a bright, electro-luminescent light is produced directly from the organic material.

When a current is applied across the OLED, the electrons move from cathode to anode .The cathode in turn passes the electrons to the emissive layer , where the anode withdraws these electrons from the conductive layer . The emissive layer becomes rich in negative charge whereas the conductive layer

Optical fibre was invented in 1966 by two British scientists called Charles Kao and George Hockham working for the British company Standard Telecommunication Laboratories ("Power of Speech", Peter Young, 1983).

becomes more positively charged .The two opposite charges get attracted towards each other which leads to their recombination in the emissive layer . This recombination creates a drop in the energy levels of the electrons .The drop in energy levels results in radiation that is on the visible spectrum thus emitting light .





Schematic of a bilayer OLED:

1. Cathode (–),
2. Emissive Layer,
3. Emission of radiation,
4. Conductive Layer,
5. Anode (+)

Types of OLEDs:

There are several types of OLEDs:
Passive-matrix OLED
Active-matrix OLED
Transparent OLED
Top-emitting OLED
Foldable OLED
White OLED
Each type has different uses.

Advantages of OLED's

- The manufacture of OLED is highly economical and is more efficient than LCD and flat panel screens.
- There is much difference in watching a high-definition TV to a OLED display. As the contrast ratio of OLED is very high (even in dark conditions), it can be watched from an angle of about 90 degrees without any difficulty.
- No backlight is produced by this device and the power consumption is also very less.

Applications of OLED:

OLED technology is used in commercial applications such as small screens for mobile phones and portable digital audio players (MP3 players), car radios, digital cameras and high-resolution micro displays for head-mounted displays. Such portable applications favor the high light output of OLEDs for readability in sunlight, and their low power drain. Prototypes have been made of flexible and rollable displays which use OLED's unique characteristics . Since OLEDs can be designed in any shape (even irregular shapes) and very thin , they can be integrated with walls and ceilings offering a wide array of lighting design possibilities.As they are flexible , they fit into any corners of a room offering a new concept to the interior designer.

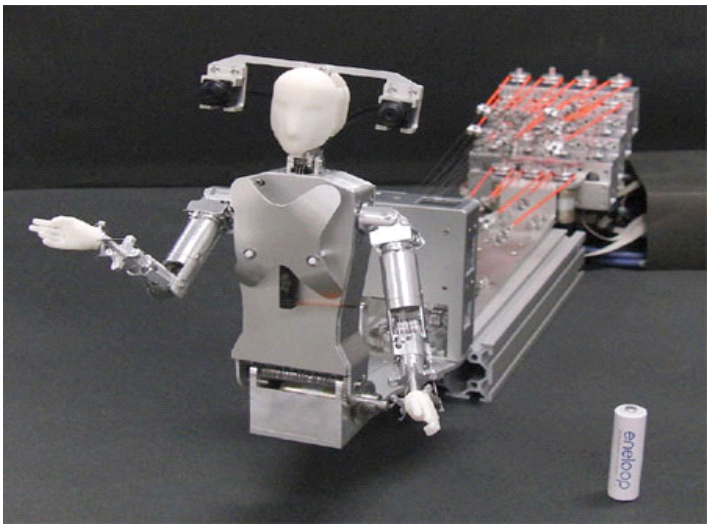
Military Application of OLED.

The mobile phone was invented by a team led by Martin Cooper at Motorola in 1973. It weighed two kilos and the battery life was a mere 20 minutes.

Miniature Humanoid

Kumar Vaibhav
II year

Nobody likes to be alone, and Japanese researchers from Yamagata University are developing a robot to make sure you'll never have to be alone again. It's the MH-2 wearable humanoid which lives on your shoulder and moreover can be remotely inhabited by your friends from anywhere in the world.



MH-2(that's "MH" for "miniature humanoid") is a wearable telepresence robot that acts as an avatar for a remote operator. The number of degrees of freedom it has is simply amazing. With two 7-DOF arms, a 3-DOF head and 2-DOF body, plus one for "realistic breathing", MH-2 is designed to be able to mimic human actions as accurately and realistically as possible.

It might seem a little bit weird at first,but here's the idea: you've got a friend or a relative that you want to share an experience with. Like, you're travelling or something and you want some company. Instead of having said friend come along with you, you can bring along an MH-2 instead. Back home, your friend puts on a 360 degree immersive 3D display and stands in front of some sort of motion capture environment (like a Kinect, for example). Then, they get to see whatever the MH-2 sees..

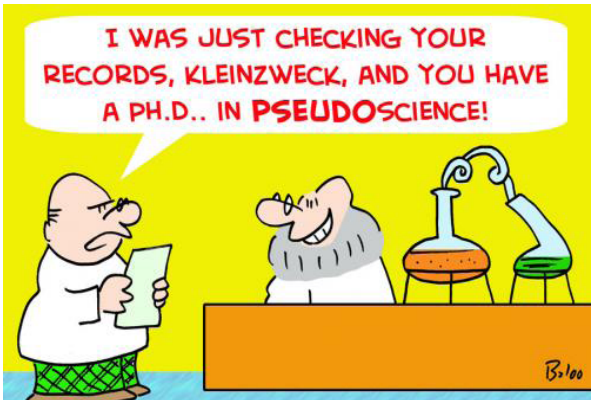
Meanwhile, the robot on your shoulder acts like an avatar, duplicating the speech and gestures of your friend right there for you to interact directly. Ultimately, this is what the MH-2 is going for: For all this to work convincingly, gestures need to be reproduced accurately and quickly, at a speed equivalent to a human being gestures in real time. That is why MH-2 is so complicated and requires that gigantic backpack full of servos, which control its joints by tugging on wires: The whole stuff is quite big and that's why developers are trying now to reduce this bulk. Who knows in near future we might have our own buddy humanoid.

The telephone was invented by Alexander Graham Bell in 1876. He called his assistant Thomas Watson in the next room and announced: "Mr. Watson, come here. I want to see you".

PSEUDOSCIENCE

Chedimala Sathwick
IV year

Pseudoscience is a claim, belief, or practice which is presented as scientific, but does not adhere to a valid scientific method, lacks supporting evidence or plausibility, cannot be reliably tested, or otherwise lacks scientific status. Pseudoscience is often characterized by the use of vague, contradictory, exaggerated or unprovable claims, an over-reliance on confirmation rather than rigorous attempts at refutation, a lack of openness to evaluation by other experts, and a general absence of systematic processes to rationally develop theories.



A field, practice, or body of knowledge can reasonably be called pseudoscientific when it is presented as consistent with the norms of scientific research, but it demonstrably fails to meet these norms. Science is also distinguishable from revelation, theology, or spirituality in that it offers insight into the physical world obtained by empirical research and testing. Commonly held beliefs in popular science may not meet the criteria of science. "Pop science" may blur the divide between science and pseudoscience among the general public, and may also involve science fiction. Pseudoscientific beliefs are widespread, even among public school science teachers and newspaper reporters.

The term pseudoscience is often considered inherently pejorative, because it suggests something is being inaccurately or even deceptively portrayed as science. Accordingly, those labeled as practicing or advocating pseudoscience usually dispute the characterization.

1.Scientific methodology

While the standards for determining whether a body of knowledge, methodology, or practice is scientific can vary from field to field, a number of basic principles are widely agreed upon by scientists. The basic notion is that all experimental results should be reproducible, and able to be verified by other individuals. These principles aim to ensure experiments can be measurably reproduced under the same conditions, allowing further investigation to determine whether a hypothesis or theory related to given phenomena is both valid and reliable. Standards require the scientific method to be applied throughout, and bias will be controlled for or eliminated through randomization, fair sampling procedures, blinding of studies, and other methods. All gathered data, including the experimental or environmental con-

In 1998, for the first time worldwide the number of new mobile telephones exceeded the number of new fixed telephones.

ditions, are expected to be documented for scrutiny and made available for peer review, allowing further experiments or studies to be conducted to confirm or falsify results. Statistical quantification of significance, confidence, and error are also important tools for the scientific method.

2.Falsifiability

In the mid-20th century, Karl Popper put forth the criterion of falsifiability to distinguish science from non-science. Falsifiability means a result can be disproved. For example, a statement such as "God created the universe" may be true or false, but no tests can be devised that could prove it either way; it simply lies outside the reach of science. Popper used astrology and psychoanalysis as examples of pseudoscience and Einstein's theory of relativity as an example of science. He subdivided non-science into philosophical, mathematical, mythological, religious and/or metaphysical formulations on one hand, and pseudoscientific formulations on the other, though he did not provide clear criteria for the differences.

3.Merton's norms

In 1942, Robert K. Merton identified a small set of "norms" which characterized what makes a "real" science. If any of the norms were violated, Merton considered the enterprise to be non-science. These are not broadly accepted in the scientific community. His norms were:

- Originality: The tests and research done must present something new to the scientific community.

- Detachment: The scientists' reasons for practicing this science must be simply for the expansion of their knowledge. The scientists should not have personal reasons to expect certain results.

- Universality: No person should be able to more easily obtain the information of a test than another person. Social class, religion, ethnicity, or any other personal factors should not be factors in someone's ability to receive or perform a type of science.

- Skepticism: Scientific facts must not be based on faith. One should always question every case and argument and constantly check for errors or invalid claims.

- Public accessibility: Any scientific knowledge one obtains should be made available to everyone. The results of any research should be openly published and shared with the scientific.

Techniques of pseudoscience:

1.Precognition

Most experiments on precognition have involved a forced-choice procedure. The first such ongoing and organized research program on precognition was instituted by J. B. Rhine in the 1930s at Duke University's Parapsychology Laboratory. Rhine used a method of forced-choice matching in which participants recorded their guesses as to the order of a deck of 25 cards, each five of which bore one of five geometrical symbols. The test of precognition was based on the fact that these "guesses" were made before the deck was shuffled by the experimenter. In an effort to distinguish between different parapsychological accounts of precognition, and to better understand its conditions, experiments were conducted in which the order of the target deck of cards was determined by hand versus machine, or by reference to macroscopic events, such as randomly selected meteorological readings, or by complex algorithms. Early experiments also sought to determine the temporal scope of precognition by organizing the target deck only 1-2 versus 10 days, or even a year, after responses had been recorded and secured.

Before Johannes Gutenberg invented the printing press in 1438, there were only about 30,000 books throughout the whole of Europe, nearly all Bibles or biblical commentary.

Experiments by Samuel G. Soal ran forced-choice ESP experiments in which someone attempted to identify which of five animal pictures a subject in another room was looking at. Their performance on this task was at chance, but when the scores were matched with the card that came after the target card, three of the thirteen subjects showed a very high hit rate. Rhine described Soal's work as "a milestone in the field". Research chemist George Price who reviewed Soal and Bateman's book Modern Experiments in Telepathy for the journal Science in 1955. It was suggested that the positive results not attributable to error were more likely the result of deliberate fraud. This prompted several replies that Price's criticism was unfair, resting on the mere possibility of fraud rather than actual proof. In 1978, the experiments were exposed as fraudulent. The statistician and paragnost Betty Markwick, while seeking to vindicate Soal, discovered that he had altered his data to create all the extra hits and give the study its statistical significance. The untainted experimental results showed no evidence of precognition in the hits or the ratios.

Other researchers, including Smithsonian Executive Secretary Charles Greeley Abbot and British psychologist R. H. Thouless, introduced the study of precognition in the displacement of guesses to targets. This involved a set of target symbols, and "guesses" as to their identity, but, rather than precognizing the order of a whole deck of symbols, scored for precognition by checking the correspondence between each response and the target assigned to one or more trials ahead of that to which the response was originally assigned. Several studies using this method have continually offered displacement as reliable evidence for precognition.

Following these experiments, a more automated technique of experimentation was introduced that did not rely on hand-scoring of equivalence between targets and guesses, and in which the targets could be more reliably and readily tested as random. This involved testing for precognition with the use of high-speed random event generators (REG), as introduced by Helmut Schmidt in 1969[32] and further conducted, in particular, at the Princeton Engineering Anomalies Research Lab (1979–2007). In this procedure, participants indicate when they believe (by whatever means available to them) that the REG has produced an event that either conforms or differs from one of two target events. In comparison to the card-guessing type of experiments, this procedure permits much more data to be collected in an experimental session, while reducing the number of alternatives that need to guessed.

2.Teleportation

The word teleportation was coined in 1931 by American writer Charles Fort to describe the strange disappearances and appearances of anomalies, which he suggested may be connected. He joined the Greek prefix tele- (meaning "distant") to the Latin verb portare (meaning "to carry"). Fort's first formal use of the word was in the second chapter of his 1931 book, Lo!: "Mostly in this book I shall specialize upon indications that there exists a transportable force that I shall call Teleportation." Fort added "I shall be accused of having assembled lies, yarns, hoaxes, and superstitions. To some degree I think so myself. To some degree, I do not. I offer the data." Fort suggested that teleportation might explain various allegedly paranormal phenomena, although it is difficult to say whether Fort took his own "theory" seriously or instead used it to point out what he saw as the inadequacy of mainstream science to account for strange phenomena.

The word teletransportation, which simply expands Charles Fort's abbreviated term, was first employed by Derek Parfit as part of a thought exercise on identity.

The printing press was introduced to Britain by William Caxton in 1468.

3.Suspended animation

Suspended animation is the slowing of life processes by external means without termination. Breathing, heartbeat, and other involuntary functions may still occur, but they can only be detected by artificial means. Extreme cold can be used to precipitate the slowing of an individual's functions; use of this process has led to the developing science of cryonics. Cryonics is another method of life preservation but it cryopreserves organisms using liquid nitrogen that will preserve the organism until reanimation. Two-celled embryos have been kept in suspended animation for as long as 13 years.

Placing astronauts in suspended animation has been proposed as one way for an individual to reach the end of an interstellar or intergalactic journey, avoiding the necessity for a gigantic generation ship; occasionally the two concepts have been combined, with generations of "caretakers" supervising a large population of frozen passengers.

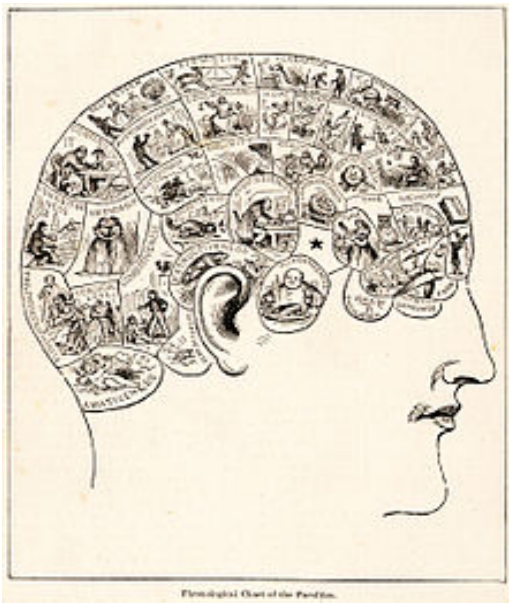
Since the 1970s, induced hypothermia has been performed for some open-heart surgeries as an alternative to heart-lung machines. Hypothermia, however, provides only a limited amount of time in which to operate and there is a risk of tissue and brain damage for prolonged periods.

4.Psycho-kinesis

Psycho-kinesis (from the Greek "psyche", meaning mind, soul, spirit, heart, or breath; and "kinesis", meaning motion, movement; literally "mind-movement"), also referred to as tele-kinesis ("distant-movement") with respect to strictly describing mental movement or motion of solid matter, abbreviated as PK and TK respectively, is a term coined by publisher Henry Holt to refer to the direct influence of mind on a physical system that cannot be entirely accounted for by the mediation of any known physical energy. Examples of psycho-kinesis could include distorting or moving an object, and influencing the output of a random number generator.

The study of phenomena said to be psychokinetic is part of parapsychology. Some psycho-kinesis researchers claim psycho-kinesis exists and deserves further study, although the focus of research has shifted away from large-scale phenomena to attempts to influence dice and then to random number generators.

Most scientists believe that the existence of psycho-kinesis has not been convincingly demonstrated. A meta-analysis of 380 studies in 2006 found a "very small" effect which could possibly be explained by publication bias. PK experiments have historically been criticised for lack of proper controls and repeatability. However, some experiments have created illusions of PK where none exists, and these illusions depend to an extent on the subject's prior belief in PK.

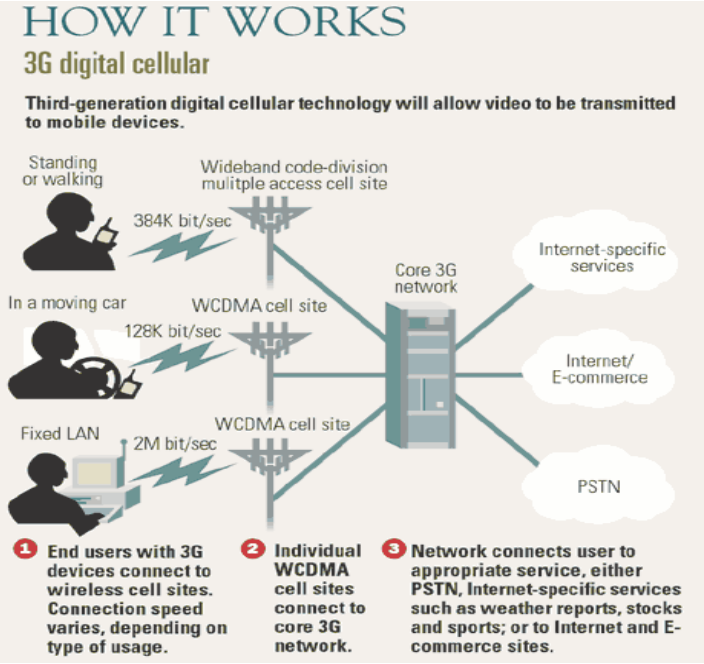


Paper as we know it was invented in AD 185 by a Chinaman called Cai Lun who used the inner bark of the mulberry tree for fibre.

3G

S. Adithya
IV year

3G, short for third Generation, is a term used to represent the 3rd generation of mobile telecommunications technology. Also called Tri-Band 3G. This is a set of standards used for mobile technology and mobile telecommunication services and networks that comply with the International Mobile Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union.



Several telecommunications companies market wireless mobile Internet services as 3G, indicating that the advertised service is provided over a 3G wireless network. Services advertised as 3G are required to meet IMT-2000 technical standards, including standards for reliability and speed (data transfer rates). The cell phones are typically UMTS and GSM hybrids. Several radio interfaces are offered, sharing the same infrastructure:

- The original and most widespread radio interface is called W-CDMA.

- The TD-SCDMA radio interface was commercialised in 2009 and is only offered in China.

- The latest UMTS release, HSPA+, can provide peak data rates up to 56 Mbit/s in the downlink in theory (28 Mbit/s in existing services) and 22 Mbit/s in the uplink.

Overview:

The following common standards comply with the IMT2000/3G standard:

- EDGE, a revision by the 3GPP organization to the older 2G GSM based transmission methods, utilizing the same switching nodes, base station sites and frequencies as GPRS, but new base station and cell-phone RF circuits. It is based on the three times as efficient 8PSK modulation scheme as supplement to the original GMSK modulation scheme. EDGE is still used extensively due to its ease of upgrade from existing 2G GSM infrastructure and cell-phones.

- EDGE combined with the GPRS 2.5G technol-

The most famous headline in the "New York Post" was "Headless Body Found In Topless Bar".

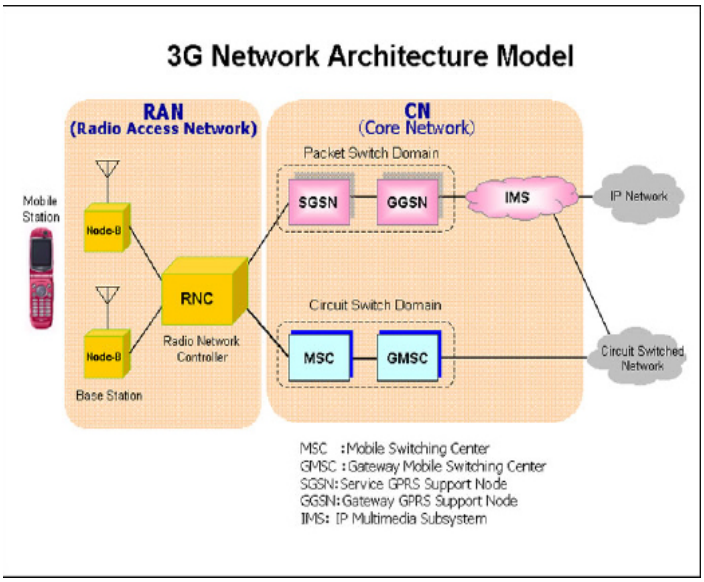
ogy is called EGPRS, and allows peak data rates in the order of 200 kbit/s, just as the original UMTS WCDMA versions, and thus formally fulfills the IMT2000 requirements on 3G systems. EDGE was also a mode in the IS-135 TDMA system, today ceased.

- Evolved EDGE, the latest revision, has peaks of 1 Mbit/s downstream and 400 kbit/s upstream, but is not commercially used.

- The Universal Mobile Telecommunications System, created and revised by the 3GPP. The family is a full revision from GSM in terms of encoding methods and hardware, although some GSM sites can be retrofitted to broadcast in the UMTS/W-CDMA format.

Detailed breakdown of 3G systems:

The 3G (UMTS and CDMA2000) research and development projects started in 1992. In 1999, ITU approved five radio interfaces for IMT-2000 as a part of the ITU-R M.1457 Recommendation;WiMAX was added in 2007.



There are evolutionary standards (EDGE and CDMA) that are backwards-compatible extensions to pre-existing 2G networks as well as revolutionary standards that require all-new network hardware and frequency allocations. The cell phones used utilise UMTS in combination with 2G GSM standards and bandwidths, but do not support EDGE.

A Lookback...

3G technology is the result of ground-breaking research and development work carried out by the International Telecommunication Union (ITU) in the early 1980s. 3G specifications and standards were developed after fifteen years of persistence and hard work. The technical specifications were made available to the public under the name IMT-2000. The communication spectrum between 400 MHz to 3 GHz was allocated for 3G. Both the government and communication companies unanimously approved the 3G standard.

The first commercial United States 3G network was by Monet Mobile Networks, on CDMA2000 1x EV-DO technology, but this network provider later shut down operations.

Adoption:

3G was relatively slow to be adopted globally. In some instances, 3G networks do not use the same radio frequencies as 2G so mobile operators must build entirely new networks and license entirely new frequencies, especially so to achieve high data transmission rate. Roll-out of 3G networks was delayed in some countries by the enormous costs of additional spectrum licensing fees. The license fees in some European countries were particularly high, bolstered by government auctions of a limited number of licenses and sealed bid auctions, and initial excitement over 3G's potential.

Our current notational system for music was developed by Guido d'Arrezo in the 10th century.

Features:

Data rates:

ITU has not provided a clear definition of the data rate users can expect from 3G equipment or providers. Thus users sold 3G service may not be able to point to a standard and say that the rates it specifies are not being met.

Security:

3G networks offer greater security than their 2G predecessors. By allowing the UE (User Equipment) to authenticate the network it is attaching to, the user can be sure the network is the intended one and not an impersonator.

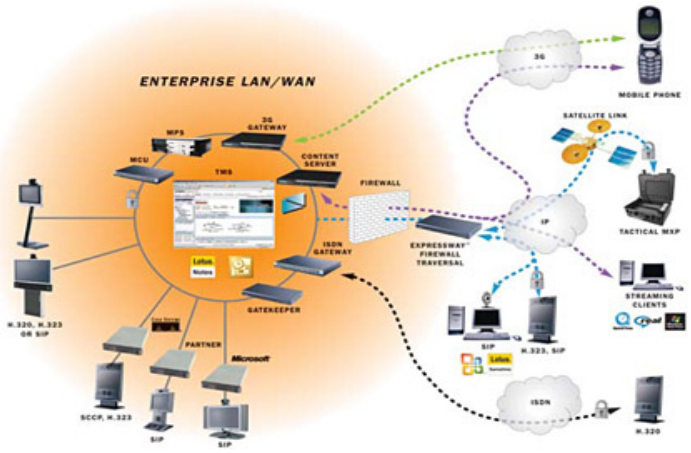
Applications of 3G:

The bandwidth and location information available to 3G devices gives rise to applications not previously available to mobile phone users. Some of the applications are:

- Mobile TV
- Video on demand
- Video Conferencing
- Telemedicine
- Location-based services
- Global Positioning System (GPS)

Evolution:

Both 3GPP and 3GPP2 are working on extensions to 3G standard that are based on an all-IP network infrastructure and using advanced wireless technologies such as MIMO. These specifications already display features characteristic for IMT-Advanced (4G), the successor of 3G.



The phonograph - the first machine that could both record and reproduce sound - was invented by Thomas Edison in 1877.

BRAIN TEASERS

Harish Rao
III year

1. Johnny's mother had three children. The first child was named April. The second child was named May. What was the third child's name?

2. A clerk at a butcher shop stands five feet ten inches tall and wears size 13 sneakers. What does he weigh?

3. Before Mt. Everest was discovered, what was the highest mountain in the world?

4. How much dirt is there in a hole that measures two feet by three feet by four feet?

5. What word in the English language is always spelled incorrectly?

6. Billie was born on December 28th, yet her birthday always falls in the summer. How is this possible?

7. In British Columbia you cannot take a picture of a man with a wooden leg. Why not?

8. If you were running a race and you passed the person in 2nd place, what place would you be in now?

9. Which is correct to say, "The yolk of the egg is white" or "The yolk of the egg are white?"

10. A farmer has five haystacks in one field and four haystacks in another. How many haystacks would he have if he combined them all in one field?

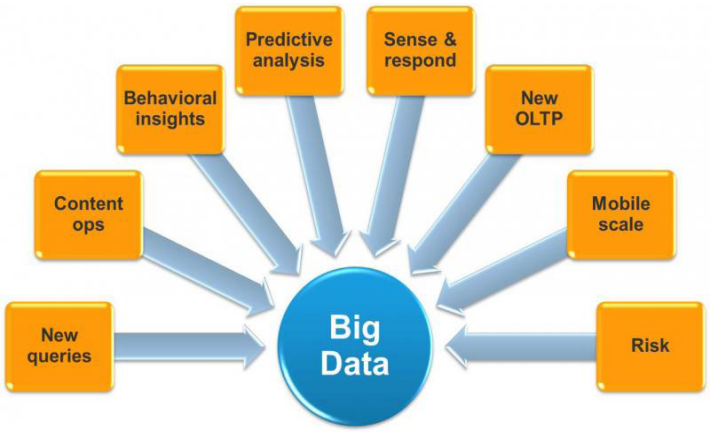
(Solutions on pg 26)

Google takes its name from the word 'googol' which is the number represented by one followed by 100 zeros, a term coined by the American mathematician E. Kasner.

Big data

R. Abhilash Vaidhya
IV year

In Informationtechnology, big data is a collection of data sets, so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications. The challenges include capture, curation, storage, search, sharing, analysis, and visualization. The trend to larger data sets is due to the additional information derivable from analysis of a single large set of related data, as compared to separate smaller sets with the same total amount of data, allowing correlations to be found.



Definition:

Big data usually includes data sets with sizes beyond the ability of commonly-used software tools to capture, curate, manage, and process the data within a tolerable elapsed time. Big data sizes are a constantly moving targets, as of 2012 ranging from a few dozen terabytes to many petabytes of data in a single data set.

Examples:

Examples include Big science, web logs, RFID, sensor networks, social networks, social data (due to the Social Data Revolution), Internet text and documents, Internet search indexing, call detail records, astronomy, atmospheric science, genomics, biogeochemical, biological, and other complex and often interdisciplinary scientific researches.

Big Science:

The Large Hadren Collider (LHC) experiments represent about 150 million sensors delivering data 40 million times per second. There are nearly 600 million collisions per second.

- As a result, only working with less than 0.001% of the sensor stream data, the data flow from all four LHC experiments represents 25 petabytes annual rate before replication (as of 2012). If all sensor data were to be recorded in LHC, the data flow would be extremely hard to work with.

Science and research:

- When the Sloan Digital Sky Survey (SDSS) began collecting astronomical data in 2000, it amassed more in its first few weeks than all data collected in

The first film presented publicly on screen was "La Sortie des Ouvriere des l'Usine Lumière" which was shown by Auguste and Louis Lumiere in Paris in 1895.

the history of astronomy.

- Computational social science — Tobias HYPERLINK "http://en.wikipedia.org/wiki/Tobias_Preis"Preis et al. used Google Trends data to demonstrate that Internet users from countries with a higher per capita gross domestic product (GDP) are more likely to search for information about the future than information about the past

Private sector:

- Facebook handles 40 billion photos from its user base.

- FICO Falcon Credit Card Fraud Detection System protects 2.1 billion active accounts world-wide.

For Development:

Following decades of work in the area of the effective usage of information and communication technologies for development (or ICT4D), it has been suggested that Big Data can make im+portant contributions to international development. On the one hand, the advent of Big Data delivers the cost-effective prospect to improve decision-making in critical development areas such as health care, employment, economic productivity, crime and security, and natural disaster and resource management.

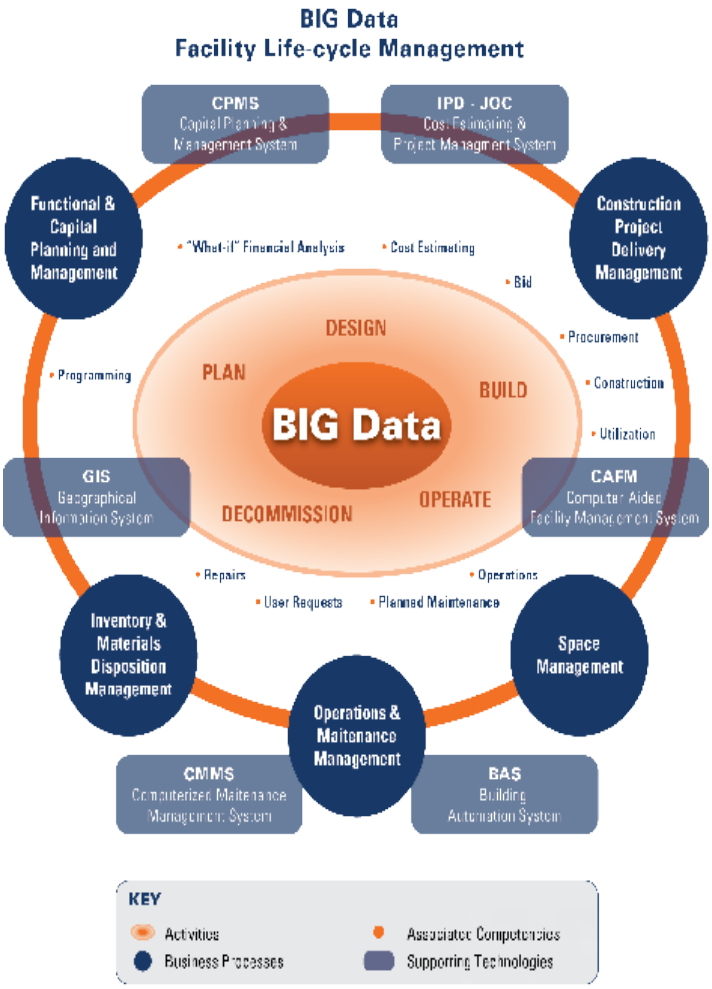
Market:

"Big data" has increased the demand of information management specialists in that Software AG, Oracle Corporation, IBM, Microsoft, SAP, EMC, and HP have spent more than $15 billion on software firms only specializing in data management and analytics. Developed economies make increasing use of data-intensive technologies.

Critique:

Critiques of the Big Data paradigm

Broad critiques have been leveled at Chris Anderson's assertion that big data will spell the end of theory: focusing in particular on the notion that big data will always need to be contextualized in their social, economic and political contexts. To overcome this insight deficit, "big data", no matter how comprehensive or well analyzed, needs to be complemented by "big judgment".



Around 50% of the films made in the USA never achieve a cinema release.

DATA STRUCTURE

Prithvi. M
III year

In computer science, a data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.Data structures provide a means to manage huge amounts of data efficiently, such as large databases and internet indexing services. Usually, efficient data structures are a key to designing efficient algorithms. Some formal design methods and programming languages emphasize data structures, rather than algorithms, as the key organizing factor in software design. Storing and retrieving can be carried out on data stored in both main memory and in secondary memory.

OVERVIEW :

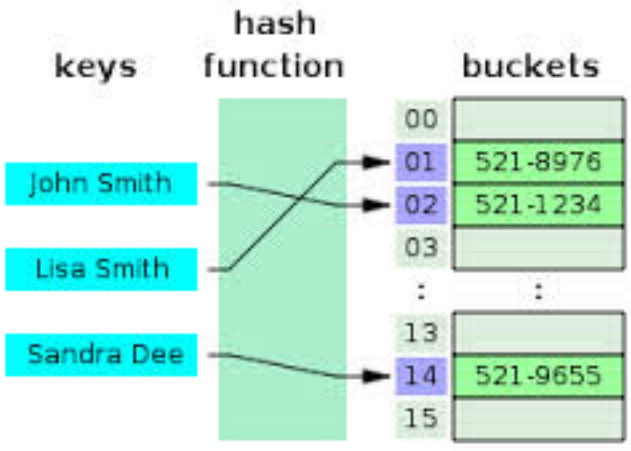
• An array data structure stores a number of elements of the same type in a specific order. They are accessed using an integer to specify which element is required . Arrays may be fixed-length or expandable.

• Record is the simplest data structure. A record is a value that contains other values, typically in fixed number and typically indexed by names.The elements of records are usually called fields or members.

• A union type definition will specify the number of permitted primitive types that may be stored in its instances, e.g. "float or long integer". Contrast with a record, which could be defined to contain a float and an integer; whereas, in a union, there is only one value at a time.

• A tagged union (also called a variant, variant record, discriminated union, or disjoint union) contains an additional field indicating its current type, for enhanced type safety.

• A set is an abstract data structure that can store specific values, without any particular order, and no repeated values. Values themselves are not retrieved from sets, rather one tests a value for membership to obtain a boolean "in" or "not in".



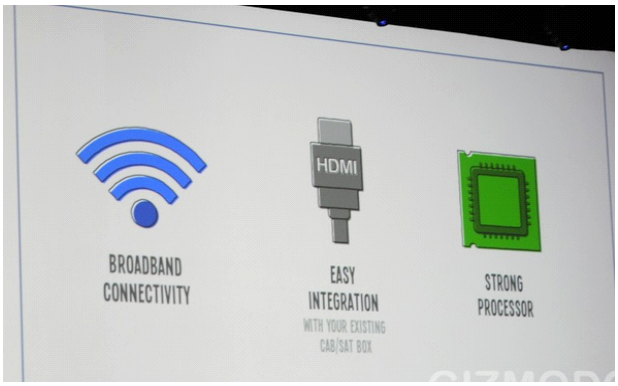
The first real electronic game - on a digital computer with a CRT - was called Spacewars and it was programmed in 1961 by Steve Russell at the Massachusetts Institute of Technology.

GOOGLE TV

Kumar Vaibhav
II year

Google TV is a smart TV platform from google co-developed by intel, sony and Logitech first launched in October 2010. Google TV integrates the Android operating system and Google Chrome browser to create an interactive overlay on top of existing internet television and web TV.

So, basically Google TV is a software platform that Logitech, Sony and DISH will support. The common features involve an Atom(or simply a processor),discrete GPU,HDMI-out, Bluetooth, IR, Wi-Fi and Ethernet, all while also supporting a keyboard and of course it's a TV thus a remote(which also acts as appointing device) that works with your existing cable/satellite box.



Equipped with an IR blaster to change channels, Google TV can sit on top of your existing infrastructure. This means it will work with your existing cable or satellite boxes that works just like a google search.

Of course it is google TV, google chrome is there to take you to all the webpages. So, say you want to watch something that only exists on Amazon's streaming service. You'll be taken to Amazon's webpage through Chrome,where the video will stream.

With wi-fi and Bluetooth facility, you'll be able to load a webpage on your Android Phone and beam it to your TV. Moreover, with your phone's vice recognition facility you'll be able to change the channels or just for your favourite show...simply amazing.

Google TV includes complete access to the Android App Store. Moreover, now we have google specific apps too.

Of course, when you have flash you have videos and games. This is just the surface of what you have in Google TV. We also have google translator and maps,- to name a few .

The first truly portable games console was the Nintendo Gameboy which has now sold more than 70 million copies worldwide.

GNU Octave

G. Aravind Kumar
IV year

GNU Octave is a high-level programming language, primarily intended for numerical computations. It provides a convenient command-line interface (CLI) for solving linear and nonlinear problems numerically, and for performing other numerical experiments using a language that is mostly compatible with MATLAB. It may be used as a batch-oriented language. As part of the GNU Project, it is free software under the terms of the GNU General Public License (GPL).

Technical details:

• Octave is written in C++ using the C++ standard library.
• Octave uses an interpreter to execute the Octave scripting language.
• Octave is extensible using dynamically loadable modules.
• Octave interpreter works with GNU plot and Grace software to create plots, graphs, and charts, and to save or print them.

Octave, the language:

The Octave language is an interpreted programming language. It is a structured programming language (similar to C) and supports many common C standard library functions, and also certain UNIX system calls and functions. Octave programs consist of a list of function calls or a script. The syntax is matrix-based and provides various functions for matrix operations. It supports various data structures and allows object-oriented programming. Its syntax is very similar to MATLAB, and careful programming of a script will allow it to run on both Octave and MATLAB.

Notable features:

Command and variable name completion : Typing a TAB character on the command line causes Octave to attempt to complete variable, function, and file names.

Command history:

When running interactively, Octave saves the commands typed in an internal buffer so that they can be recalled and edited.

Data structures:

Octave includes a limited amount of support for organizing data in structures.

MATLAB compatibility:

Octave has been built with MATLAB compatibility, and shares many features with MATLAB:
1. Matrices as fundamental data type.
2. Built-in support for complex numbers.
3. Powerful built-in math functions and extensive function libraries.
4. Extensibility in the form of user-defined functions.

The first video game arcade machine was called Computer Space (an arcade version of the previously-mentioned Spacewars) and it was bulit by Nolan Bushnell in 1971.

MALALA YOUSAFZAI

Koushik Rachakonda
IV year

Here is a fable about a novice fearless girl. To start with, Malala Yousafzai is a normal school girl who aspires about nurturing her future by becoming accomplished. She is from Pakistan and hence had to face a lot of woes for which Taliban was accountable.

As it is said that a person's real character comes out only when he/she is pushed into challenges, despite being threatened by extremists, she stood her ground for education, given such a precarious situation which is caught in a quagmire of crisis and chaos.

Right from her childhood, she was pro-active and used to write articles under a pen name for newspapers. She is honoured with Pakistan's first national youth peace prize, national Malala peace prize and also got nominated for the International children's peace prize.

Malala raised her voice in support of education saying "One student, One teacher, One pen" can change the world. There is a petition that had been passed in U.N summit that says "I am Malala" and appeals for the education of all children worldwide by the end of 2015.

She is one of the 100 most influential people in the world according to the Times magazine. July 12th had been declared as "Malala Day" by U.N General Secretary Ban Ki Moon as a token of appreciation for her efforts.

She had been nominated for the Nobel peace prize and her purpose in life is to serve humanity.

The fifth and latest generation electronic games machine is 128-bit and the rival consoles are Sony's Playstation 2, Nintendo's GameCube and Microsoft's Xbox.

SCILAB

Dwaraknath.L
IV year

Scilab is an open source, cross-platform numerical computational package and a high level, numerically oriented programming language. It can be used for signal processing, statistical analysis, image enhancement, fluid dynamics simulations, numerical optimisation, and modeling, simulation of explicit and implicit dynamical systems and (if the corresponding toolbox is installed) symbolic manipulations. MATLAB code, which is similar in syntax, can be converted to Scilab. Scilab is one of several open source alternatives to MATLAB.

Overview:

As the syntax of Scilab is similar to MATLAB, Scilab includes a source code translator for assisting the conversion of code from MATLAB to Scilab. Scilab is available free of cost under an open source license. Due to the open source nature of the software, some user contributions have been integrated into the main program.

License:

Scilab family 5 is distributed under the GPL-compatible CeCILL license.

Prior to version 5, Scilab was semi-free software according to the nomenclature of the Free Software Foundation. The reason for this is that earlier versions' licenses prohibited commercial distribution of modified versions of Scilab.

Syntax:

Scilab syntax is largely based on the MATLAB language. The simplest way to execute Scilab code is to type it in at the prompt, --> , in the graphical command window. In this way, Scilab can be used as an interactive mathematical shell.

Hello World! in scilab:
disp("Hello World !")
Plotting a 3d surface function:
// A simple plot of z = f(x,y)
t=[0:0.3:2*%pi]';
z=sin(t)*cos(t');
plot3d(t,t,z)
LaTeX engine

Scilab can render formulas in mathematical notation using its own Java-based rendering engine, JLaTeXMath, a fork of the JMathTeX project.

Toolboxes:

Scilab has many contributed toolboxes for different tasks:

- Scilab Image Processing Toolbox (SIP) and its variants (such as SIVP)
- Scilab Wavelet Toolbox
- Scilab Java and .NET Module
- Scilab Remote Access Module
- Scilab MySQL

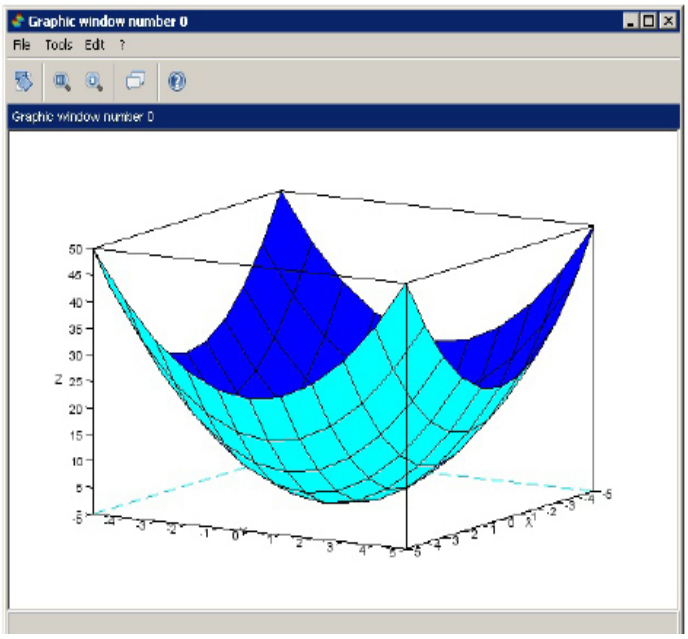
The first electronic mail was sent between two machines sometime in the Autumn of 1972 by Ray Tomlinson, chief engineer with Bolt Beranek & Newman Technologies and the content was the single phrase "QWERTYUIOP" (the letters making up the top line of the standard keyboard).

- Equalis Communication Systems Module
- Equalis Signal Processing Module
- SoftCruncher Performance Accelerator

Many more toolboxes are available in ATOMS portal or the Scilab forge.

History:

Scilab was created in 1990 by researchers from INRIA and École nationale des ponts et chaussées (ENPC). It was initially namedΨlab (Psilab). The Scilab Consortium was formed in May 2003 to broaden contributions and promote Scilab as worldwide reference software in academia and industry. In July 2008, in order to improve the technology transfer, the Scilab Consortium joined the Digiteo Foundation.



In June 2010, the Consortium announced the creation of Scilab Enterprises. Scilab Enterprises develops and markets, directly or through an international network of affiliated services providers, a comprehensive set of services for Scilab users. Scilab Enterprises also develops and maintains the Scilab software. The ultimate goal of Scilab Enterprises is to help make the use of Scilab more effective and easy. In September 2010, Scilab Enterprises announced a world-wide partnership with Equalis to provide Scilab Online Support (SOS) Services. Through this partnership Scilab users can get the benefit of industrial-grade software, support, and services from Equalis and its network of partners anywhere in the world.

Since July 2012, Scilab is developed and published by Scilab Enterprises.

The separation of the name of the user from the name of the machine on which the user is working by the @ sign in all e-mail addresses was the idea of Ray Tomlinson sometime in 1972.

THE PC

Mohammad Faisal
III year

It might be time for us to step into the post-PC world, as many large corporations would like us to believe, but I'm not ready to give up my assortment of desktops, laptops and netbooks just yet. For all the talk about multitouch gestures and integrated ecosystems, I can only hope that traditional PCs continue to live on alongside, at least until a number of questions are answered.

First of all, is there a singular vision for what computing should be like in the future, and who is in charge of it? It seems like a bunch of different companies are all trying to fi gure out how they can make the most money off their users, without much thought put in to actually building a foundation for the entire world to transition to. At the moment, we're looking at massive fragmentation between iOS, Android, Windows and a handful of potential competitors in the form of Qt (RIM), WebOS (HP) and possibly Meego (Nokia and others).

Today's computers are largely built according to standards—very few companies dare to step outside the box and use non-standard components or connections. On the plus side, this brings costs down and allows vendors and users to build and swap parts around largely at will.

A hard drive from any manufacturer, for instance, can be plugged into any other company's motherboard, and when I buy it, I'll be able to install and use the operating system of my choice. Because of this, I know that I can use the software and hardware I'm used to, try out alternatives, and diagnose and fi x problems.

I know that there's basically no limitation on the kind of files I can open, the services I can use, and the ways I can handle my own data. What guarantee do I have that I will actually be able to get things done in the future, without worrying about which services and accessories I'm being tied down to?

If tablets, for example, become as dominant as PCs today, will there be legal grounds for forcing manufacturers to make devices more interoperable? Apple's in the process of being hauled up by a court in India because apps can be purchased only through the App Store. It seems laughable now, since the software distribution model is totally different, but it isn't completely inconceivable that a more open system will be demanded in the future.

I also can't help worrying that I'll be losing a lot of the functionality that a PC offers. Previews of Windows 8 are tantalizing, but don't make it clear how much of the old world we'll be able to take forward when the new one is upon us.

Multitasking, for example, is severely limited, and even Web browsing, which is something tablets are supposed to be designed for, is constrained by "simplified" browser design and a lack of extensibility. I'm used to having much more control over my hardware

The word "hypertext" was coined well before the invention of the World Wide Web by Ted Nelson who first came up with the idea in an article written in 1965, before developing it in a book called "Literary Machines" in 1981 [I once met Ted Nelson at an Internet meeting in Paris].

and software. What will the fallout be of multiple fragmented platforms be for developers? Will we be stuck with multiple devices that can do a lot of the things we need, but not one that can do it all? Where does all of this leave power users? I don't yet believe that professional 3D modelling and video editing tools can be recast as Web apps with HTML5 and JavaScript, but will the industry remain strong enough with only corporate users driving PC sales? What about the workforce? Will we still have as many talented developers, designers and garden-variety geeks around if they don't grow up in environments with access to a PC? I'm not against anything the future might bring, but I'd like to have a good idea of what it is, well in advance.

BT claims to have invented hyperlinks - one of the building blocks of the World Wide Web - in the 1970s as part of its Prestel videotext system and originally sought patents in 1976, but it failed in an attempt to enforce this view in the US courts.

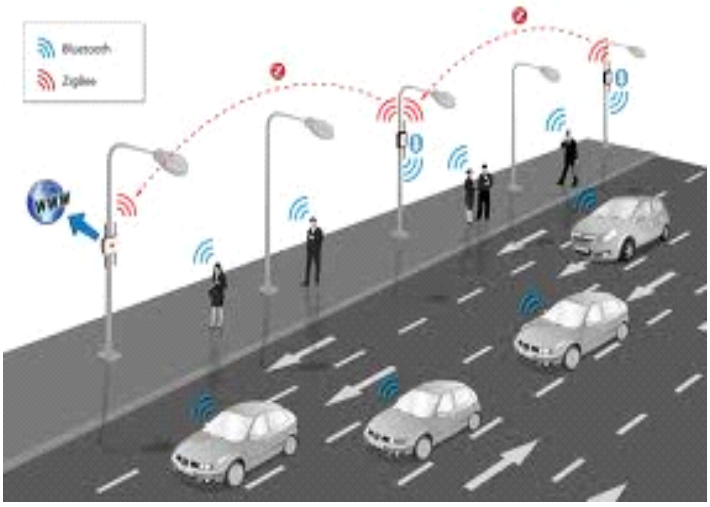
ZIGBEE

K. Surya
IV year

Zig Bee is a new wireless technology that looks to have applications in a variety of fields. Zig bee is a technological standard based on the IEEE 802.15.4 specification for low data rates technology allowing devices to communicate with one another with very low power consumption, allowing the devices to run on simple batteries for several years. Zig bee is targeting various forms of automation, as the low data rate communication is ideal for sensors, monitors, and the like. Home automation is one of the key market areas for Zig bee, with an example of a simple network.

A concern that could arise may be related to the specific frequency band that Zig Bee uses - that is, the 2.4 GHz band, which is the same band used by IEEE 802.11 and Wi-Fi. A cursory reading of the previous sentence may seem to imply that Zig Bee could not co-exist with these other technologies without interfering with one another. However, Zig Bee-based products can access up to 16 different 5 MHz channels within the 2.4 GHz band, several of which do not overlap those of 802.11 and Wi-Fi; data packets are automatically retransmitted in case interference does happen to occur and very few data packets are transmitted anyway, further reducing the probability that data will be lost. Thus, Zig Bee, with its specific application focus, is not generally affected by other similar wireless technologies, but fits nicely into a field of ever-increasing technological innovations.

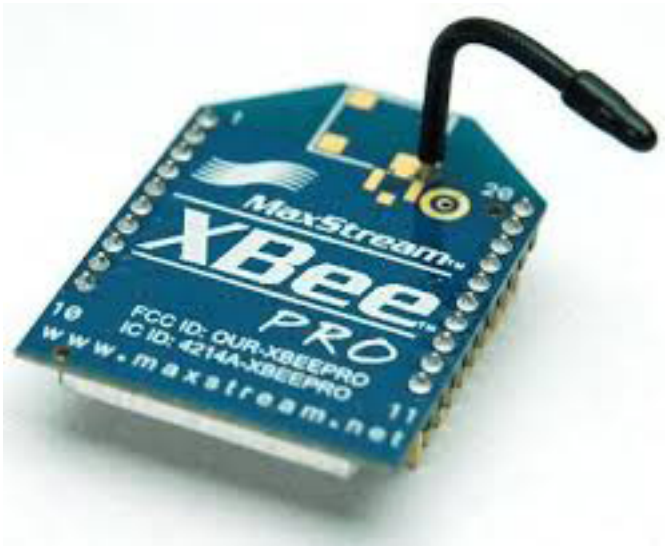
Zig Bee is designed for wireless controls and sensors. It could be built into just about anything you have around your home or office, including lights, switches, doors and appliances. These devices can then interact without wires, and you can control them all, say, from a remote control or even your mobile phone. Although Zig Bee's underlying radio-communication technology isn't revolutionary, it goes well beyond single-purpose wireless devices, such as garage door openers and "The Clapper" that turns light on and off. It allows wireless two-way communications between lights and switches, thermostats and furnaces, hotel-room air-conditioners and the front desk, and central command posts. It travels across greater distances and handles many sensors that can be linked to perform different tasks.



Zig Bee works well because it aims low. Controls and sensors don't need to send and receive much data. Zig Bee has been designed to transmit slowly. It

The first use of the term "paperless office" appeared in a headline in 1973 in a trade publications for telephone companies.

has a data rate of 250kbps (kilobits per second), pitiful when compared with Wi-Fi, which is hitting throughput of 20Mbps or more. As Zig Bee transmits slowly, it doesn't need much power, so batteries will last up to 10 years. Since Zig Bee consumes very little power, a sensor and transmitter that reports whether a door is open or closed, for example, can run for up to five years on a single double-A battery. Also, operators are much happier about adding Zig Bee to their phones than faster technologies such as Wi-Fi; therefore, the phone will be able to act as a remote control for all the Zig Bee devices it encounters.



Zig Bee basically uses digital radios to allow devices to communicate with one another. A typical Zig Bee network consists of several types of devices. A network coordinator is a device that sets up the network, is aware of all the nodes within its network, and manages both the information about each node as well as the information that is being transmitted/received within the network.

Every Zig Bee network must contain a network coordinator. Other Full Function Devices (FFD's) may be found in the network, and these devices support all of the 802.15.4 functions. They can serve as network coordinators, network routers, or as devices that interact with the physical world. The final device found in these networks is the Reduced Function Device (RFD), which usually serve as devices that interact with the physical world.

Typical Applications:

Industrial control and monitoring, sensor networks, building automation, home control and automation, toys, games Wireless LAN connectivity, broadband Internet access Wireless connectivity between devices such as phones, PDA, laptops, headsets.

Paper consumption continues to double every four years and, even in the USA, 95% of all information remains as paper with just 1% stored electronically.

BRAIN TEASERS
- SOLUTIONS

1. Johnny.

2. Meat.

3. Mt. Everest. It just wasn't discovered yet.

4. There is no dirt in a hole.

5. Incorrectly (except when it is spelled incorrecktly).

6. Billie lives in the southern hemisphere.

7. You can't take a picture with a wooden leg. You need a camera (or iPad or cell phone) to take a picture.

8. You would be in 2nd place. You passed the person in second place, not first.

9. Neither. Egg yolks are yellow.

10. One. If he combines all his haystacks, they all become one big stack.

In 1943, IBM chief Thomas Watson said there would only ever be enough demand for five computers in the world.

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