K.L.N.COLLEGE OF INFORMATION TECHNOLOGY

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Ph : 0452-6562566, 6454167 E-mail : info@klncit.edu.in URL : www.klncit.edu.in

TECHNICAL MAGAZINE

eLANTERN 7.0

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

MESSAGE FROM HOD

With the blessings of Almighty and our founder President Shri.K.L.N.Krishnan and with the kind hearted and prestigious Management of KLNCIT, our college is growing well. It is great pleasure for me to be associated with ECE department of KLNCIT for more than two decades.

ECE Department has well established laboratories, spacious class rooms, LCD projectors, OHP projectors, Department library, Dedicated as well as experienced faculty members and good ambience.

Among the various activities of the Department to promote the level of students, the department magazine e-lantern plays an important role. As the name implies, it is enlightening the life of students through the exhibition of their talents in technical and non-technical aspects.

I hope this initiative will take the department to higher steps in attaining the mission and vision of the department.

I wish all the staff and students who have contributed for shaping the magazine to this level and I have a strong hope that this will further improve in the years to come.

Thank you for the opportunity given to me to express my views in this magazine.

Dr.D.Venugopal

HOD/ECE

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FROM THE EDITOR

Dear Readers,

We feel delighted to present you the seventh volume of book of knowledge "E-LANTERN". This piece of knowledge lying at your hands is the result of contribution and success of E-LANTERN First to Sixth Volume. By releasing the seventh volume we made our earnest attempt towards excellence. The benchmark was laid and we did our level best to achieve it.

The aim of E-LANTERN is to create platform for budding engineers to present their articles in this esteemed magazine. We wish to develop E-LANTERN into a specific magazine promoting innovative ideas to meet the challenges in the field of Electronics & Communication Engineering.

We express our heartfelt thanks to all the members who gave us this privilege position to be the editor of this magazine. We would like to express our considerable appreciation to all authors of the articles in this issue of E-Lantern. It is their generous contribution of time and effort that made this issue possible.

We are grateful to Management members, Principal, Head of the department, Staff members and students for their guidance and cooperation in bringing up this magazine as a book of knowledge.

WANT TO REALIZE SOMETHING

To realize the value of four year

Ask an engineering graduate!

To realize the value of one year

Ask a student who failed in final exam!

To realize the value of one month

Ask a mother who had a premature baby!

To realize the value of one week

Ask an editor of a weekly magazine!

To realize the value of one hour

Ask a person who missed his interview!

To realize the value of one hour

Ask a person who missed his interview!

To realize the value of one minute

Ask a person who missed a train!

To realize the value of one second

Ask a person who survived an accident!

To realize the value of one millisecond

Ask a person who won a gold medal in Olympics!

TIME AND TIDE WAITS FOR NONE!

TREASURE IS EVERY MOMENT YOU HAVE!

REMEMBER WHILE IT IS NICE TO BE IMPORTANT,

IT IS EQUALLY IMPORTANT TO BE NICE!

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Dr.D.Venugopal
HOD/ECE

A Revolutionary Semiconductor For Electronics

I.Jesudass
AP/ECE

Semiconductors that are as thin as an atom are no longer the stuff of science fiction. A new two-dimensional material could revolutionize electronics.

Semiconductors that are as thin as an atom are no longer the stuff of science fiction. Bayreuth physicist Prof. Dr. Axel Enders, together with partners in Poland and the US, has developed a two-dimensional material that could revolutionize electronics. Thanks to its semiconductor properties, this material could be much better suited for high tech applications than graphene, the discovery of which in 2004 was celebrated worldwide as a scientific breakthrough. This new material contains carbon, boron, and nitrogen, and its chemical name is "Hexagonal Boron-Carbon-Nitrogen (h-BCN)." The new development was published in the journal *ACS Nano*"

"Our findings could be the starting point for a new generation of electronic transistors, circuits, and sensors that are much smaller and more bendable than the electronic elements used to date. They are likely to enable a considerable decrease in power consumption," Prof. Enders predicts, citing the CMOS technology that currently dominates the electronics industry. This technology has clear limits with regard to further miniaturization. "h-BCN is much better suited than graphene when it comes to pushing these limits," according to Enders.

Graphene is a two-dimensional lattice made up entirely of carbon atoms. It is thus just as thin as a single atom. Once scientists began investigating these structures more closely, their remarkable properties were greeted with enthusiasm across the world. Graphene is 100 to 300 times stronger than steel and is, at the same time, an excellent conductor of heat and electricity. However, electrons are able to flow through unhindered at any applied voltage such that there is no defined on-position or off-position. "For this reason, graphene is not well suited for most electronic devices. Semiconductors are required, since only they can ensure switchable on and off states," Prof. Enders explained. He had the idea of replacing individual carbon atoms in graphene with boron and nitrogen, resulting in a two-dimensional grid with the properties of a semiconductor. He has now been able to turn this idea into reality with his team of scientists at the University of Nebraska-Lincoln. Research partners at the University of Cracow, the State University of New York, Boston College, and Tufts University also contributed to this achievement

IRIS AS BIOMETRICS

S.Abinaya
III ECE A

Biometrics is defined as measurable physiological and or behavioural characteristics that can be utilized to verify the identity of an individual. The commonly used Biometric techniques include recognition of faces, hands, fingers, signatures, voices, fingerprints and irises for a person's identification and authentication.

The iris is a protected internal organ of the eye, located behind the cornea and the aqueous humour, but in front of the lens. It is the only internal organ of the body that is normally visible externally. Images of the iris adequate for personal identification with very high confidence can be acquired from distances of up to about 3 feet (1 meter).

John Daugman developed and patented the first actual algorithms to perform iris recognition, published the first papers about it and gave the first live demonstrations, the concept behind this invention has a much longer history and today it benefits from many other active scientific contributors. In a 1953 clinical textbook, F.H. Adler wrote: *"In fact, the markings of the iris are so distinctive that it has been proposed to use photographs as a means of identification, instead of fingerprints."* Adler referred to comments by the British ophthalmologist J.H. Doggart,[3] who in 1949 had written that: *"Just as every human being has different fingerprints, so does the minute architecture of the iris exhibit variations in every subject examined.*

Iris recognition illustrates work in computer vision, pattern recognition, and the man-machine interface. Iris recognition achieves real-time, high confidence recognition of a person's identity by mathematical analysis of the random patterns that are visible within the iris of an eye from some distance. The iris being a protected internal organ whose random texture is stable throughout life can serve as a kind of living password that one need not remember but one always carries along. Because the randomness of iris patterns has very high dimensionality, recognition decisions are made with confidence levels high enough to support rapid and reliable exhaustive searches through national-sized.

To record an individual's iris code, a black-and-white video camera uses 30 frames per second to zoom in on the eye and "grab" a sharp image of the iris. A low-level incandescent light illuminates the iris so the video camera can focus on it, but the light is barely noticeable and used strictly to assist the camera. The camera can be set at a distance of four inches (10 centimetres) to 40 inches (one meter), depending on the scanning environment. When iris recognition is used for logging on to a personal computer or checking in at an airport, people need to be somewhat closer to the camera. An automatic cash machine, on the other hand, does not require such nearness. One of the frames is then digitized and stored in a PC database of enrolled users. The whole procedure takes less than a few seconds, and can be fully computerized with voice prompts and auto focus. The iris record size is only 512 bytes with a resolution of 640 x 480, allowing for massive storage on a computer's hard drive.

Scientists say that a person's retina can change with age, while an iris remains intact. And no two iris blueprints are mathematically alike, even between identical twins and triplets. Glasses and contact lenses, even coloured ones, do not interfere with the process. In addition, recent medical advances such as refractive surgery; cataract surgery and cornea transplants do not change the iris'characteristics. In fact, it is impossible to modify the iris without risking blindness. And even a blind person can participate. As long as a sightless eye has an iris, that eye can be identified by iris recognition. An iris has a mesh-like texture to it, with numerous overlays and patterns that can be measured by the computer. The iris-recognition software uses about 260 "degrees of freedom," or points of reference, to search the data for a match, whereas, the best fingerprint technology uses about 60 to 70 degrees of freedom.

Advantages of the Iris for Identification

- Highly protected, internal organ of the eye
- Externally visible; patterns imaged from a distance
- Iris patterns possess a high degree of randomness
  - variability: 244 degrees-of-freedom
  - entropy: 3.2 bits per square-millimeter
  - uniqueness: set by combinatorial complexity
- Changing pupil size confirms natural physiology
- Pre-natal morphogenesis (7th month of gestation)
- Limited genetic penetrance of iris patterns
- Patterns apparently stable throughout life
- Encoding and decision-making are tractable
  - image analysis and encoding time: 30 milliseconds
  - decidability index (d-prime): d' = 6 to 8 typically
  - search speed: 1 million IrisCodes per second, with a 3 GHz CPU

Disadvantages of the Iris for Identification

- Small target (1 cm) to acquire from a distance (1 m)
- Moving target ...within another... on yet another
- Located behind a curved, wet, reflecting surface
- Obscured by eyelashes, lenses, reflections
- Partially occluded by eyelids, often drooping
- Deforms non-elastically as pupil changes size
- Illumination should not be visible or bright

Application areas of biometric iris recognition

- ❖ Immigration and border control
- ❖ Finance and bankings
- ➢ Hospitality and tourism

Conclusion

Iris recognition technology is durable, quantifiable, recordable and reliable. It thus fulfills the basic tenets of an ideal biometric system. The stored biometric template can be used for a person's whole life as iris patterns are not susceptible to change, remaining stable for long periods of time. Enrollment is required only once in a lifetime, saving both time and money.

Biometric iris recognition systems are easy to use and create a hassle free security environment. Iris scanners can be used to protect high value locations by denying access to unwarranted visitors. Business and governmental organizations across the board have recognized the benefits of this system and have gone about implementing iris recognition based authentication systems in a big way.

BLUE BRAIN

B.Hema
IV ECE-A

INTRODUCTION

Human brain, the most valuable creation of God .The man is called intelligent because of the brain. But we loss the knowledge of a brain when the body is destroyed after the death .

"BLUE BRAIN"- The name of the world's first virtual brain. That means a machine that can function as human brain.

The simulations are carried out on a blue gene supercomputer built by the IBM .Hence the name blue brain.

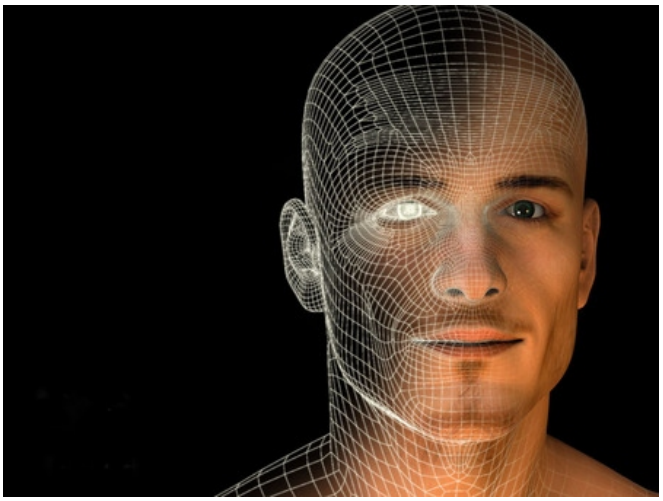
WHAT IS BLUE BRAIN?

Is it really possible to create a human brain?

"YES", The IBM is now developing a virtual brain known as the BLUE BRAIN.

It would be the world's first virtual brain.

Within 30 years, we will be able to scan ourselves into the computers.



HOW TO BUILD A VIRTUAL BRAIN?

There are three main steps in building the virtual brain:

1) Data acquisition

2) Simulation

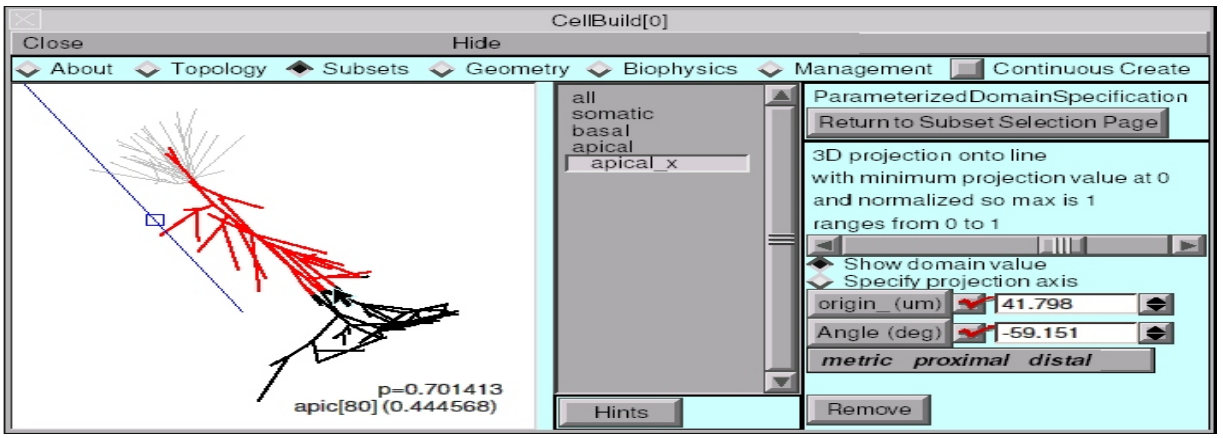
3)Visualisation of results

Data acquisition

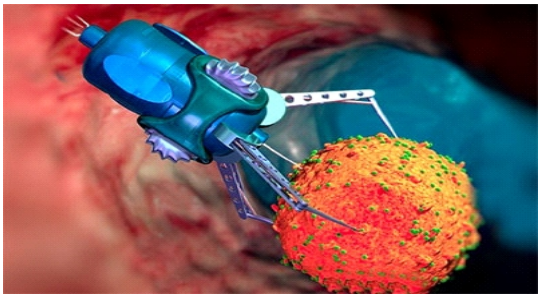
Data acquisition involves taking brain slices, placing them under a microscope. Measuring the shape and electrical activity of individual neurons.This is how the different types of neuron are studied and catalogued. These observations are translated into mathematical algorithms and used to generate biologically-realistic virtual neurons ready for simulation**.**

Simulation

- The primary software used by the BBP for neural simulations is a package called NEURON.
- Developed starting in the 1990s by Michael Hines at Yale University and John Moore at Duke University.
- It is written in C, C++, and FORTRAN.
- The software continues to be under active development and, as of July 2012, is currently at version 7.2.
- The simulation timestep for the numerical integrations is 0.025 ms
- The timestep for writing the output to disk is 0.1 ms**.**

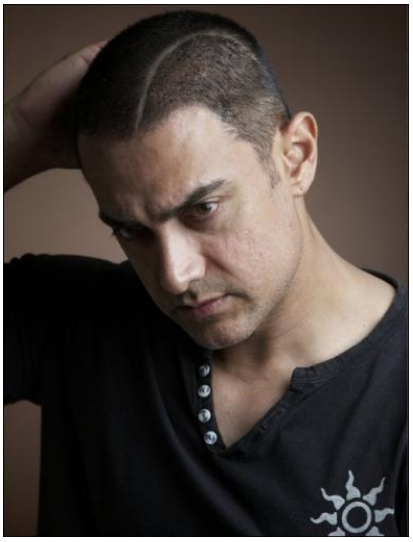


The uploading is possible by the use of small robots known as the“NANOBOTS”.



EXAMPL E OF BLUE BRAIN

- Very good example of utilization of blue brain is the case "short term memory".
- In some movies we might have noticed that a person might be having short term memories.



RESEARCH WORK

- IBM developing the “Blue brain” .
- IBM, in partnership with scientists at Switzerland's Ecolab Polytechnique Federal De Lausanne's (EPFL) Brain and Mind Institute will begin simulating the brain's biological systems.

HARDWARE AND SOFTWARE REQUIREMENT

- A Super computer.
- Memory with a very large storing capacity.
- Processor with a very high processing power.
- A program to convert the electric impulses from the brain to input signal, which is to be received by the computer and vice versa.
- Very powerful Nanobots to act as the interface between the natural brain and the computer.

ADVANTAGES

- Remembering things without any effort.
- Making decision without the presence of a person.
- Using intelligence of a person after the death.
- Understanding the activities of animals.
- Allowing the deaf to hear via direct nerve
- Stimulation.

DISADVANTAGES

- We become dependent upon the computer .
- Others may use technical knowledge against us.
- Another fear is found with respect to human cloning.
- A very costly procedure of regaining the memory back.

CONCLUSION

We will be able to transfer ourselves into computers at some point.It will bring both benefits and harm to human society .Very soon this technology will be highly accepted whole over the world.

ECG T-Shirt

P.Iswariya
IV ECE-A

Abstract

ECG T-shirt was devoloped with a portable recorder for unobtrusive and long-term multichannel ECG monitoring with active electrodes. A major drawback of conventional 12-lead ECGs is the use of adhesive gel electrodes, which are uncomfortable during long-term application and may even cause skin irritations and allergic reactions. Therefore, we integrated comfortable patches of conductive textile into the ECG T-shirt in order to replace the adhesive gel electrodes.

In order to prevent signal deterioration, as reported for other textile ECG systems, we attached active circuits on the outside of the T-shirt to further improve the signal quality of the dry electrodes.

Finally, we validated the ECG T-shirt against a commercial Holter ECG with healthy volunteers during phases of lying down, sitting, and walking. The 12-lead ECG was successfully recorded with a resulting mean relative error of the RR intervals of 0.96% and mean coverage of 96.6%. Furthermore, the ECG waves of the 12 leads were analyzed separately and showed high accordance. The P-wave had a correlation of 0.703 for walking subjects, while the T-wave demonstrated lower correlations for all three scenarios (lying: 0.817, sitting: 0.710, walking: 0.403). The other correlations for the P, Q, R, and S-waves were all higher than 0.9. This work demonstrates that our ECG T-shirt is suitable for 12-lead ECG recordings while providing a higher level of comfort compared with a commercial Holter ECG.

Introduction

Unobtrusive sensing of vital signs, such as cardiac activity and respiration, has been increasingly applied in the past decade. The aging of our society has resulted in an increasing demand on medical staff, which cannot always be met. As a result, an increasing number of technical solutions, the so-called personal healthcare systems, are being developed. They aim at enabling sick and elderly patients to stay at home for a longer period , rather than facing prolonged hospital stays. When staying at home, patients generally benefit from increased comfort, which may accelerate their recovery. In turn, costs for the healthcare system will be reduced by shortening the stay in hospital. This is the main rationale for developing long-term monitoring solutions for the home environment. One of the established long-term cardiac monitoring devices is the Holter.

This is a portable electrocardiography (ECG) device with up to 12 leads for long-time application. These ECG recorders are often used to diagnose cardiac conditions over the duration of several days. For this, patients wear the device while continuing their daily routine. Commercial Holter devices consist of a portable ECG recorder with adhesive electrodes. However, these electrodes have one major problem: the gel that ensures good conductivity can lead to skin allergies. Moreover, the longer the gel is applied, the greater the possibility that more problems arise.

Signal quality is deteriorated if the gel dries up, which is highly probable during long-term monitoring. In addition, in some cases (e.g., if patients are sweating), the electrodes detach themselves, requiring reapplication. If this occurs, the patient may not reattach them in the correct place. In order to address these problems and to improve patient comfort, we developed a 12-lead ECG T-shirt with active electrodes and a portable ECG recorder. Various textile ECG T-shirts have been investigated in the last decade. Whereas some systems were developed mainly for research purposes only [14], some shirts are [5,6]. The latter type is a shirt that is compatible with a 12-lead ECG recorder.

Materials and Methods

The portable 12-lead ECG measurement system consists of a T-shirt, active electrodes and an ECG recorder. The active electrodes of the capacitive measurement system record the potentials on the body's surface. The analogue signals from the active electrodes are digitalized in the ECG recorder, which also calculates the 12 ECG leads. The signals of the leads are then processed by a microcontroller and stored on an SD card in the ECG recorder. In terms of practicability, it would have been an option to send the data wirelessly. The two main reasons why no wireless module was used are medical data protection and power consumption. A wireless module would drastically reduce battery life, especially when sending data of 12 channels at a high sample rate.

12-Lead ECG

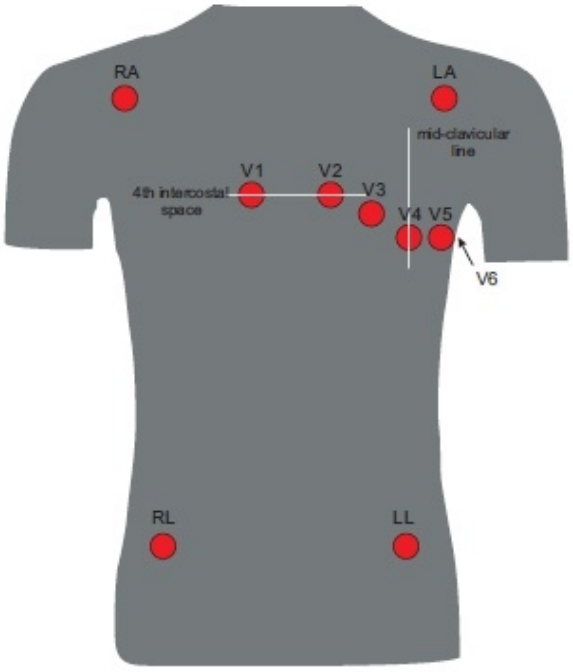
A 12-lead ECG requires 10 electrodes on the patient's limbs and chest: 10 physical channels are recorded (3 limb leads, 6 thoracic leads, 1 RL lead), as shown in Figure 1. In Holter ECGs, the electrodes are placed only on the chest. Figure 1 shows that, additional to the 3-lead setup for Einthoven and Goldberger, 6Wilson leads are included. Einthoven and Goldberger leads are calculated from three electrodes forming a triangle, namely the left leg (LL), left arm (LA) and right arm (RA), also called limb electrodes. The fourth electrode applied is the neutral or right leg electrode. The bipolar Einthoven leads are calculated as follows:

I = LA - RA, (1)

I I = LL - RA, (2)

I I I = LL - LA, (3)

so that I I I = I I - I.



The regular shape of the Einthoven II lead is shown in Figure 2. The ECG can be divided into different waves that are referred to as P to T. They reflect the stages of the electrical excitation propagation of the heart. The P-wave is the depolarization of the atria. The QRS complex (QRS waves) reflects the depolarization of the ventricles and the T-wave is their repolarization.

The unipolar Goldberger leads are also recorded for the 12-lead ECG. The Goldberger leads, denoted aVR, aVL and aVF, are augmented leads. These leads are formed using an augmented reference electrode, which is a combination of the two other limb electrodes. This is calculated as follows:

$$aVR = RA - \frac{1}{2}(LA + LL), \quad (4)$$

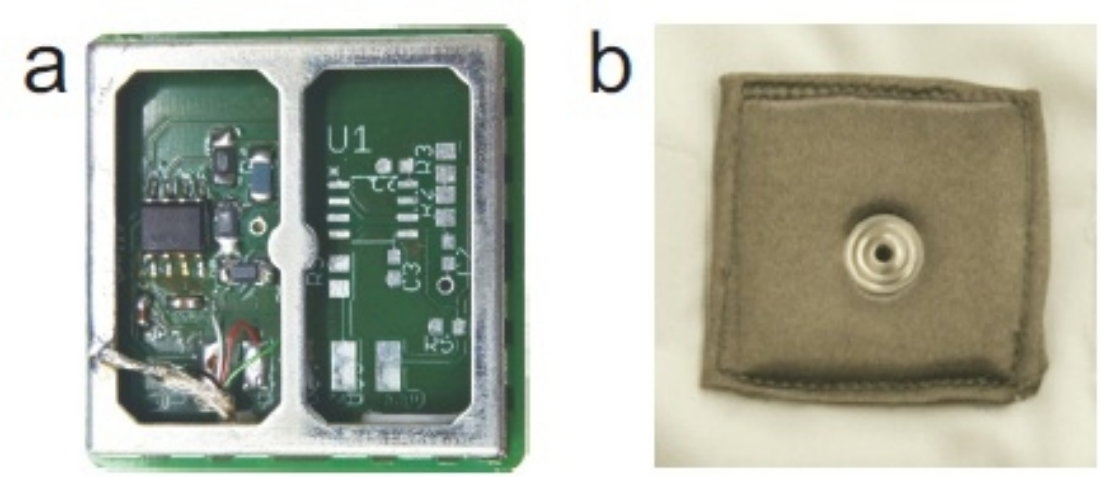
$$aVL = LA - \frac{1}{2}(RA + LL), \quad (5)$$

$$aVF = LL - \frac{1}{2}(RA + LA). \quad (6)$$

The Wilson leads are placed around the left side of the rib cage. Wilson leads are used to detect local irregularities of electric cardiac function, such as infarctions. The leads are labeled V1 to V6. Their reference is called the Wilson central terminal (WCT). It is a reference potential that is formed by connecting all three limb electrodes to 5 kohm resistors resulting in their average

T-Shirt

The T-shirt is a commercially available breathable sports T-shirt (Nike Legend Pro DRI-FIT, Beaverton, OR, USA) . Ten textile patches made of electrically conductive fabric (Shieldex Med-tex P180, Statex, Bremen, Germany) serve as electrodes. The patches (4cm 4 cm) are sewn into the interior of the T-shirt. This fabric is silver plated with 99% silver and has been used as electrodes by two other group. While other conductive textile materials exist, silver coating was selected. It was found that silver electrodes are advantageous even at recording low frequencies



ECG recorder are fastened. The T-shirt needs to fit relatively tightly, since signal quality improves with contact pressure of the electrodes. Therefore, we added a few Velcro straps to “tighten” the T-shirts and keep the electronics in place. The locations are chosen according to the common 12-lead ECG setup (see Figure 1). The driven right leg (DRL) electrode has a larger area to ensure good contact (30 cm 5 cm). Each electrode has a snap fastener connection, where the amplifier boards (or in the case of the DRL electrode, the cable) that lead to the

Electrodes

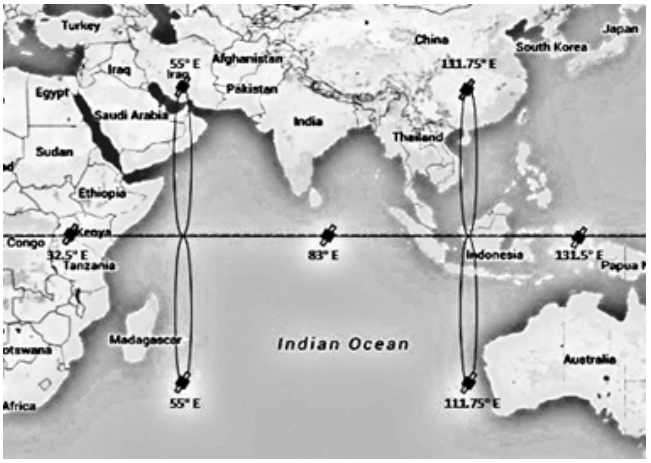
The textile electrodes are followed by active circuits. The aim was to improve the signal quality of a dry or an optionally capacitive setup. The main principle of the active electrodes is shown in Figure 4. As mentioned, the textile patches serve as electrodes and they are connected to the outside of the T-shirt by snap fasteners. An active circuit PCB is placed on the snap fasteners from the exterior. More precisely, an impedance converter with OPA129U (Texas Instruments, Dallas, TX, USA) on the PCB decouples the ECG signal at the snap fastener from the following electronics. A highly resistive bias resistor (10 G ohm) prevents the build-up of static charge at the input on the impedance converter. Then, the analogue output of the impedance converter is led to the ECG recorder with a shielded six-wire cable. This cable also carries extra wires for the power supplies

CONCLUSIONS

This paper introduces a novel ECG T-shirt for 12-lead measurements with fully active and dry electrodes. A portable 12-lead ECG recorder was developed, which is compatible with the T-shirt. The system is portable and has a battery life of two days. To our knowledge, a 12-lead ECG T-shirt specifically with active electrodes has not been developed before. In a study with three volunteers, the functionality of the device was successfully compared with a commercial device in everyday scenarios. The relative error of the RR intervals was 0.96% with a mean coverage of 96.6%. The P-wave had a correlation of 0.703 for walking subjects, while the T-wave demonstrated lower correlations for all three scenarios The other correlations for the P, Q, R, and S-waves were all higher than 0.9.

INDIA'S VERY OWN GPS READY WITH SEVENTH NAVIGATION SATELLITE

K. Archana
III ECE 'A



Indian Regional Navigation Satellite System (IRNSS) :

IRNSS is an independent regional navigation satellite system being developed by India. It is designed to provide accurate position information service to users in India as well as the region extending up to 1500 km from its boundary, which is its primary service area. An Extended Service Area lies between primary service area and area enclosed by the rectangle from Latitude 30 deg South to 50 deg North, Longitude 30 deg East to 130 deg East.

IRNSS will provide two types of services, namely, Standard Positioning Service (SPS) which is provided to all the users and Restricted Service (RS), which is an encrypted service provided only to the authorised users. The IRNSS System is expected to provide a position accuracy of better than 20 m in the primary service area.

Some applications of IRNSS are

- Terrestrial, Aerial and Marine Navigation
- Disaster Management
- Vehicle tracking and fleet management
- Integration with mobile phones
- Precise Timing
- Mapping and Geodetic data capture
- Terrestrial navigation aid for hikers and travelers
- Visual and voice navigation for drivers

The IRNSS Signal-in-Space Interface Control Document (ICD) for Standard Positioning Service (SPS) is released to the public to provide the essential information on the IRNSS signal-in-space, to facilitate research & development and aid the commercial use of the IRNSS signals for navigation-based applications.

A regional navigation satellite system with just seven spacecraft and in civil domain is unique to India.

India's own navigational system, the set-up for which was completed on Thursday with the launch of the seventh and final satellite, is called NAVIC (Navigation with Indian Constellation)

The seventh and final satellite of the Indian Regional Navigation Satellite System, the IRNSS 1G, was launched into a sub geosynchronous transfer orbit with a perigree (nearest point to earth) of 284 km and an apogee (farthest point to earth) of 20,657 km. The satellite was launched on board the Polar Satellite Launch Vehicle (PSLV), which took off from the Sriharikota launch pad at 12.50 p.m.

With this launch, the IRNSS constellation of seven satellites is now complete. This will allow the Indian Space Research Organisation (ISRO) to focus on the process of designing front end chips which will receive the navigational signals sent out by the satellites. The system will be similar to the Global Positioning System (GPS) operated by the United States with 24 satellites and the Glonass, Galileo and BeiDou systems of Russia, Europe and China respectively.

An area of 1,500 km from Indian boundaries will be covered under the navigational system. “We have seven neighbours who rely on technology provided by other countries. They can use Indian services if they want.

With an accuracy of better than 20 m being claimed by ISRO, the navigation system will be offered as an open or Standard Positioning Service and a superior, coded military Restricted Service.

We are now one of five countries with our own navigational system. Today we are free of dependence on other countries for navigation. Our planes will be able to land with ease and accuracy; we can plan disaster relief better and with our own technology.

Microbivores

D.Mahalakshmi
IV ECE A

Abstract

Nanomedicine offers the prospect of powerful new tools for the treatment of human diseases and the improvement of human biological systems using molecular nanotechnology. This paper presents a theoretical nanorobot scaling study for artificial mechanical phagocytes of microscopic size, called "microbivores" whose primary function is to destroy microbiological pathogens found in the human bloodstream using a digest and discharge protocol.

The microbivore is an oblate spheroidal nanomedical device measuring 3.4 microns in diameter along its major axis and 2.0 microns in diameter along its minor axis, consisting of 610 billion precisely arranged structural atoms in a gross geometric volume of 12.1 micron.

It is an ideal nanotechnology - based drug delivery system which isself - powered, computer - controlled medical nanorobot system capable of digitally precise transport, timing, and targeted delivery of pharmaceutical agents to specific cellular and intracellular destinations within the human body. Microbivores will have many applications in nanomedicine such as initiation of apoptosis in cancer cells and direct control of cell signaling process

What would an ideal drug delivery vehicle look like? To start with, it would be targetable not just to specific tissues or organs, but to individual cellular addresses within a tissue or organ. Alternatively, it would be targetable to all individual cells within a given tissue or organ that possessed a particular characteristic (e.g., all cancer cells, or all bacterial cells of a definite species, etc.).

This ideal vehicle would be biocompatible and virtually 100% reliable, with all drug molecules being delivered only to the desired target cells and none being delivered elsewhere so that unwanted side effects are eliminated. The ideal vehicle would remain under the continuous control of the supervising physician, including post-administration. Even after the vehicles had been injected into the body, the doctor would still be able to activate or inactivate them remotely, or alter their mode of action or operational parameters. Once treatment was completed, all of the vehicles could be removed intact from the body, leaving no trace of their presence

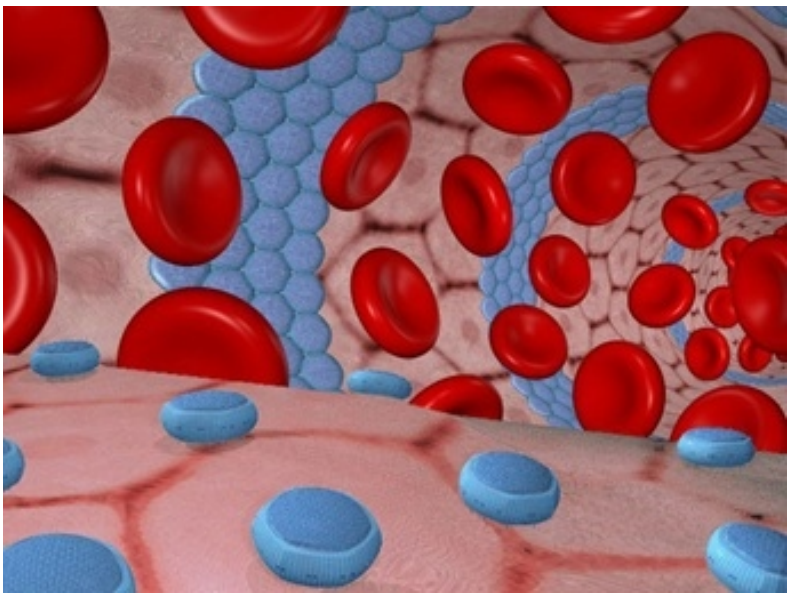
Introduction-MICROBIVORE

A nanorobotic device that could safely provide quick and complete eradication of bloodborne pathogens using relatively low doses of devices would be a welcome addition to the physician's therapeutic armamentarium. Such a machine is the microbivore, an artificial mechanical phagocyte.

The microbivore is an oblate spherical nanomedical device consisting of 610 billion precisely arranged structural atoms plus another ~150 billion mostly gas or water molecules when fully loaded. The nanorobot measures 3.4 microns in diameter along its major axis and 2.0 microns in diameter along its minor axis, thus ensuring ready passage through even the narrowest of human capillaries which are ~4 microns in diameter. Its gross geometric volume of 12.1056 micron includes two normally empty internal materials processing chambers totaling 4 micron in displaced volume.

The nano device consumes 100-200 pW of continuous power while in operation and can completely digest trapped microbes at a maximum throughput of 2 micron per 30-second cycle, large enough to internalize a single microbe from virtually any major bacteremic species in a single gulp. As in previous designs, to help ensure high reliability the microbivore has tenfold redundancy in all major components, excluding only the largest passive structural elements. The microbivore has a dry mass of 12.2 picograms.

The microbivore, an artificial white cell, floats along in the bloodstream prior to encountering a pathogen. This image, the binding site arrays appear as multicolored circular dapples on the blue s apphire-colored surface



SEPTICEMIA & BACTEREMIA

Septicemia, also known as blood poisoning, is the presence of pathogenic microorganisms in the blood. If allowed to progress, these microorganisms can multiply and cause an overwhelming infection. Bacteremia is the presence of bacteria in the human bloodstream. Although bacterial nutrients are plentiful in blood, the healthy human bloodstream is generally considered a sterile environment. Major antimicrobial defenses include the circulating neutrophils and monocytes (white cells) capable of phagocytosis (engulfing and digesting other cells) and the supporting components of humoral immunity including complement and immunoglobulin's

Bacteria can enter the blood via injury to the skin, the lining of the mouth or gems, or from gingivitis and other minor infections in the skin and mouth or gums, or from gingivitis and other minor infections in the skin and elsewhere. Bacteria can also enter the blood during surgical, dental, or other medical procedures. Such bacteria are normally removed by circulating leukocytes (along with fixed retculoendothelial phagocytes in the spleen, liver, and lungs), but a few species for disease control estimates that~25,000 U.S. patients die each year from bacterial sepsis. Current therapies often involve multiple antibiotics administered simultaneously in multi-gram quantities per day. These treatments can sometimes take weeks or even months to bring under control certain hardy infectious microorganisms

HOW IT WORKS???

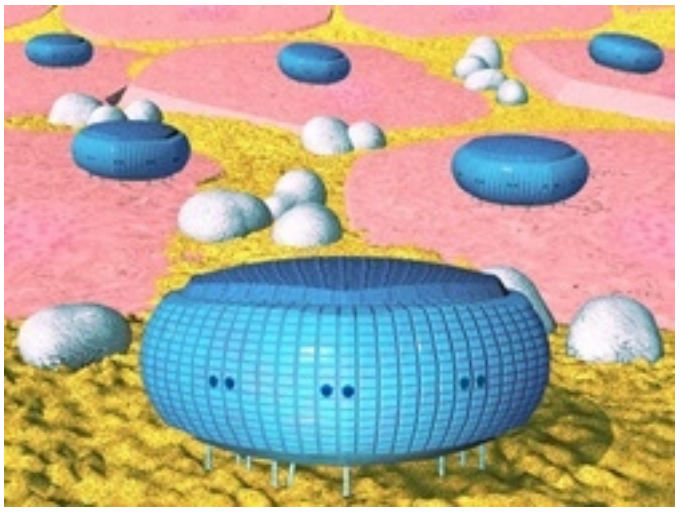
The principal activity which drives microbivore scaling and design is the process of digestion of organic substances, which also has some similarity to the digestion of food. The microbivore digestive system has four fundamental components:

1) An array of reversible binding sites to initially bind and

2) Trap target microbes an array of telescoping grapples to manipulate the microbe, once trapped

3) A morcellation chamber in which the microbe is minced into small, easily digested pieces and

4) a digestion chamber where the small pieces are chemically digested



Working of Microbivores

Here's how the nano robot works. During each cycle of operation, the target bacterium is bound to the surface of microbivore like a fly on flypaper, via species-specific reversible binding sites. Telescoping robotic grapples emerge from silos in the device surface; establish secure anchorage to the microbe's plasma membrane, then transport the pathogen to the ingestion port at the front of the device where the pathogen cell is internalized into 2 micron morcellation chamber. After sufficient mechanical mincing, the morcellated remains of the cell are pistoned into a 2 micron digestion chamber where a preprogrammed sequence of 40 engineered enzymes are successively injected and extracted six times, ,progressively engineered enzymes are successively injected and extracted six times, progressively reducing the morcellate ultimately to monoresidue amino acids, mononucleotides, glycerol, free fatty acids and simple sugars .

These simple molecules are then harmlessly discharged back into the bloodstream through an exhaust port at the rear of the device, completing the 30-second digestion cycle. This “digest and discharge” protocol is conceptually similar to the internalization and digestion process practiced by natural phagocytes, except that the artificial process should be much faster and cleaner. For example, it is well-known that macrophages release biologically active compounds during bacteriophagy, whereas well-designed microbivores need only release biologically inactive effluent.

SENSORS OF MICROBIVORE

Acoustic communication sensors mounted within the nanorobot hull permit the microbivore to receive external instructions from the attending physician during the course of in vivo activities.

Assuming (21 nm)3 pressure transducers , then 1000 of these transducers displace ~0.01 micron3 of device volume and 0.44 micron2 of device surface area, producing a small net power input to the device of ~10-4 pW when driven by continuous 0.1-atm pulses

An internal temperature sensor capable of detecting 0.3°C temperature change may have a volume of (~46 nm)3 ~ 10-4 micron3; positioning ten such sensors near each of the 10 independent power plants for redundancy implies a total internal temperature sensor volume of ~0.01 micron3. An additional 0.03 micron3 of unspecified internal sensors are included in the microbivore design, bringing the total for all sensors to 0.15 micron3

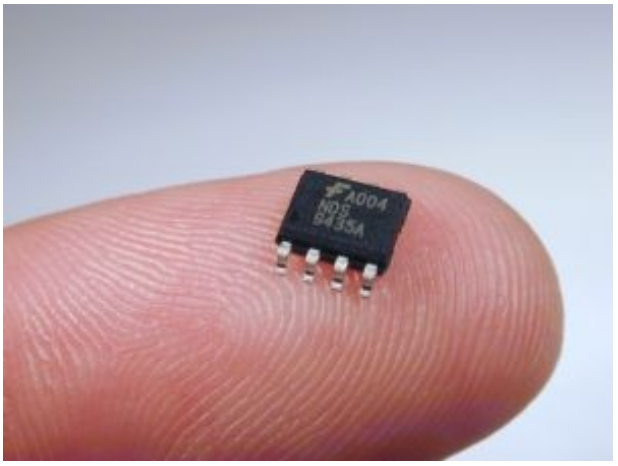
Conclusion and Future Scope

Microbivores could also be useful for treating infections of the meninges or the cerebrospinal fluid (CSF) and respiratory diseases involving the presence of bacteria in the lungs or sputum, and could also digest bacterial biofilms. These handy nanorobots could quickly rid the blood of nonbacterial pathogens such as viruses (viremia), fungus cells (fungemia), or parasites (parasitemia). Outside the body, microbivore derivatives could help clean up biohazards, toxic biochemicals or other environmental organic materials spills, as in bioremediation.

NANO ELECTRONICS

S.Abinaya
III ECE A

Nanoelectronics refer to the use of nanotechnology in electronic components. The term covers a diverse set of devices and materials, with the common characteristic that they are so small that inter-atomic interactions and quantum mechanical properties need to be studied extensively. Some of these candidates include: hybrid molecular/semiconductor electronics, one-dimensional nanotubes/nanowires (e.g. Silicon nanowires or Carbon nanotubes) or advanced molecular electronics. Recent silicon CMOS technology generations, such as the nanometer node, are already within this regime. Nanoelectronics are sometimes considered as disruptive technology because present candidates are significantly different from traditional transistors.



In 1965 Gordon Moore observed that silicon transistors were undergoing a continual process of scaling downward, an observation which was later codified as Moore's law. Since his observation transistor minimum feature sizes have decreased from 10 micrometers to the 28-22 nm range in 2011. The field of nano electronics aims to enable the continued realization of this law by using new methods and materials to build electronic devices with feature sizes on the nanoscale.

APPROACHES TO NANOELECTRONICS

Nanofabrication

For example, single electron transistors, which involve transistor operation based on a single electron. Nanoelectromechanical systems also fall under this category. Nanofabrication can be used to construct ultradense parallel arrays of nanowires, as an alternative to synthesizing nanowires individually.

Nanomaterials Electronics

Besides being small and allowing more transistors to be packed into a single chip, the uniform and symmetrical structure of nanowires and/or nanotubes allows a higher electron mobility (faster electron movement in the material), a higher dielectric constant (faster frequency), and a symmetrical electron/hole characteristic.

Molecular Electronics

Single molecule devices are another possibility. These schemes would make heavy use of molecular self-assembly, designing the device components to construct a larger structure or even a complete system on their own. This can be very useful for reconfigurable computing, and may even completely replace present FPGA technology.

Molecular electronics is a new technology which is still in its infancy, but also brings hope for truly atomic scale electronic systems in the future. One of the more promising applications of molecular electronics was proposed by the IBM researcher Ari Aviram and the theoretical chemist Mark Ratner in their 1974 and 1988 papers *Molecules for Memory, Logic and Amplification.*

Some of the devices that have been developed with the help of Nanoelectronics and its future applications are listed below.

- Nanoradio
- Nanocomputers

The conventional computers with a big processor will be replaced with Nanocomputers with nanoprocessors that will have higher performance and speed than the conventional computers. Researchers are performing various experiments on by using nanolithographic methods to design better nanoprocessors. Experiments are also taking place by replacing the CMOS components in conventional processors with nanowires. The FET's in the computers are replaced by carbon nanotubes.

Energy production

The devices using Nanoelectronics technology also includes solar cells that are highly efficient and cheaper than the conventional ones. If such efficient solar energy can be created it would be a revolution to the global energy needs.

Using the technology, researchers are developing a generator for energy production in vivo called bio-nano generators. Basically, the generator is an electrochemical device which is designed in nanoscale size. It works like a fuel cell which generates the power by absorbing the blood glucose in a living body. The glucose will be separated from the body with the help of an enzyme. This enzyme separates the glucose from the electrons and makes them useful for generating power.

The power generated through such a device will be only a few watts as the body itself needs some glucose for its normal functioning. This small power can be used to power up devices .

Applications of Nanoelectronics

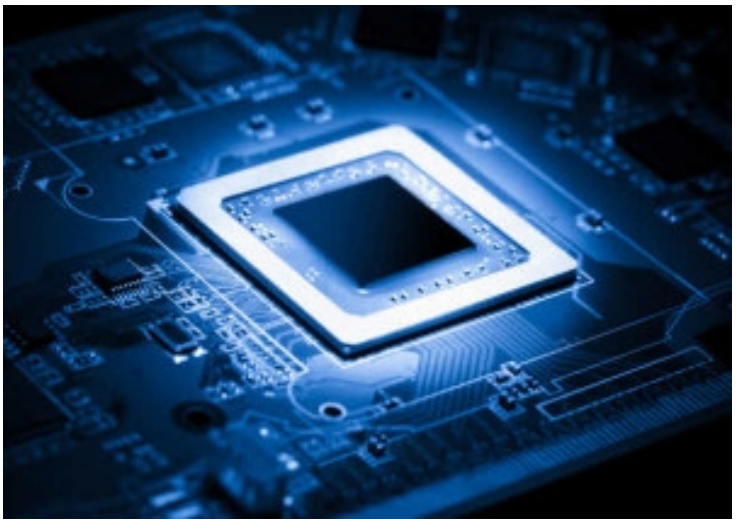
- Cadmium selenide nanocrystals deposited on plastic sheets are to form flexible electronic circuits. The aim of Researchers is for low power requirements, simple fabrication process and combination of flexibility.

- Integrating silicon nanophotonics components into CMOS integrated circuits. This optical technique is intended to provide higher speed data transmission between integrated circuits than is possible with electrical signals.

- Researchers at UC Berkeley have demonstrated a low power method to use nanomagnets as switches, like transistors, in electrical circuits. Their method might lead to electrical circuits with much lower power consumption than transistor based circuits.

- Silver nanoparticle ink was used to form the conductive lines needed in circuit boards. A method to print prototype circuit boards using standard inkjet printers was developed by Researchers at Georgia Tech, the University of Tokyo and Microsoft.

- Developing a lead free solder reliable enough for space missions and other high stress environments using copper nanoparticles.



Nano Integrated Circuits

- Laser that uses a nano patterned silicon surface that helps produce the light with much tighter frequency control developed by Researchers at Caltech.
- Nanowires that would enable flat panel displays to be flexible made from electrodes.
- Transistors built in single atom thick graphene film to enable very high speed transistors.
- Building transistors from carbon nanotubes to enable minimum transistor dimensions of a few nanometers and developing techniques to manufacture integrated circuits built with nanotube transistors.
- Combining gold nanoparticles with organic molecules to create a transistor known as a NOMFET (Nanoparticle Organic Memory Field-Effect Transistor).
- Making integrated circuits with features that can be measured in nanometers (nm)
- Using carbon nanotubes to direct electrons to illuminate pixels, resulting in a lightweight, millimeter thick “nanoemmissive” display panel.
- Using nanosized magnetic rings to make Magnetoresistive Random Access Memory (MRAM).
- Researchers have developed lower power, higher density method using nanoscale magnets called magnetoelectric random access memory (MeRAM)
- Memory chip that uses carbon nanotubes developed by IMEC and Nantero. This memory is known as NRAM for Nanotube-Based Nonvolatile Random Access Memory.

SIGNALLING PROCESS IN RAILWAYS

A.ABDUL MUNTHASIR
III ECE 'A'

In the early days ,to access the safety of a route two policemen on horseback were sent ahead. later signal arms(present semaphore arms) were erected and operated by men. Then a system of cables and pulleys were introduced. Following this electrically operated signal was introduced in the beginning of the century. In the real sense signaling forms a medium of communication between the station master and the loco-pilot of the train.

Objectives of signalling

- To monitor and regulate the movement of the train such that they function safely with the allowed maximum speed.
- To maintain safe distance between trains moving on the same track on the same direction.
- To provide adequate safety to trains at converging junctions.
- To give directional indication to trains at diverging junctions.
- To provide necessary facilities for shunting operations.
- To regulate the in-coming and out-going trains at the station yard.
- To permit trains to run at restricted speed during the maintenance and repair of tracks.
- To make sure the safety of trains,while crossing at level crossings.

Types of signals

Signals are based on the following aspects

1. Signals based on function
2. Signals based on location
3. Special signals

1. Signals Based On Function:

These signals comprise of signaling the driver of a train to stop, move cautiously, proceed and to carry out shunting operations.different types of signals used under this category are:

I. Stop signals
II. Warner signals
III. Disk or ground signals
IV. Coloured light signals

COLOUR OF SIGNALS	INTERPRETATION
Red	Stop dead, danger ahead.
Yellow	Pass the signal cautiously and be prepared to stop at the next signal.
Two yellow lights displayed together	Pass the signal at full speed but be prepared to pass the next signal which is likely to be yellow at a cautious speed.
Green	Pass the signal at full speed ,next signal is also off.

Fig: indications of coloured light signals.

2. Signals Based On Location

These signals are placed around a station yard occupying certain defined locations. Different types of signals under this category are

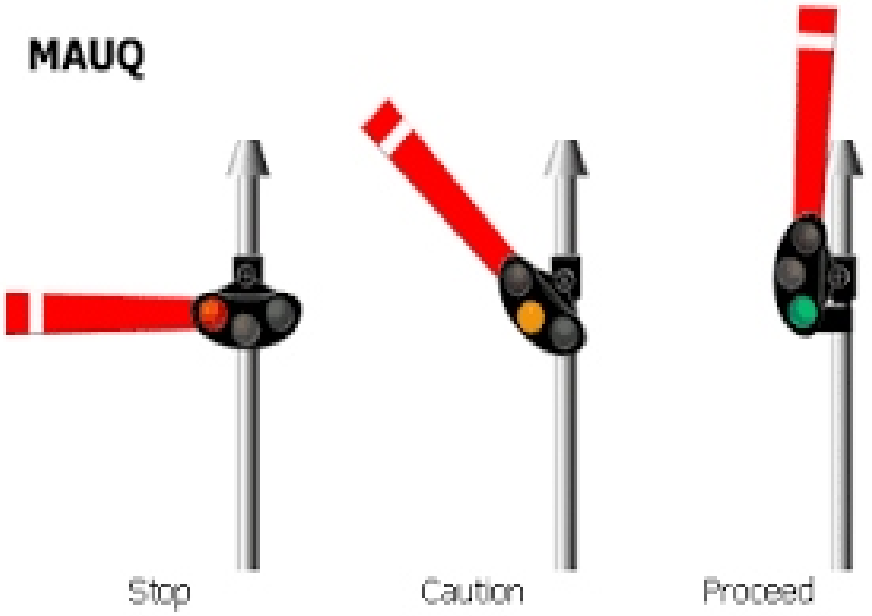
1.Outer signal
2.Home signal
3.Starter signal
4.Advance starter signal

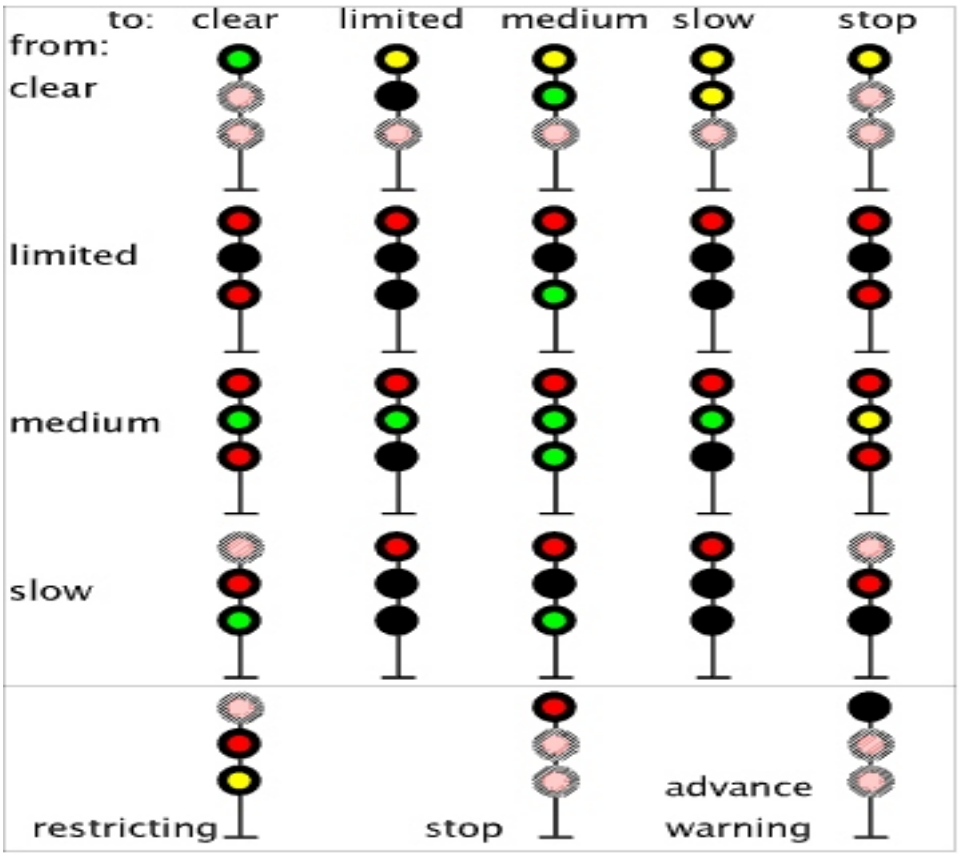
3. Special Signals

Different types of signals under this category are:

1.Audible signals
2.Calling-on signals
3.Co-acting signals
4.Repeating signals
5.Indicators

INDICATOR	PURPOSE
Caution indicator	Caution the driver to be ready to reduce the speed.
Speed indicator	Driver has to reduce the speed at this location.
Stop indicator (or) stop board	Driver has to stop the train at this location.
Termination indicator	Driver can assume normal speed restriction zone ended.


MAUQ
Stop
Caution
Proceed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WIRELESS COMMUNICATIONS

K.ARIFFA
II-ECE'A'

Wireless communication, or sometimes simply **wireless**, is the transfer of information or power between two or more points that are not connected by an electrical conductor. The most common wireless technologies use radio waves. With radio waves distances can be short, such as a few meters for television or as far as thousands or even millions of kilometers for deep-space radio communications. It encompasses various types of fixed, mobile, and portable applications, including two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking. Other examples of applications of radio *wireless technology* include GPS units, garage door openers, wireless computer mice, keyboards and headsets, headphones, radio receivers.

Somewhat less common methods of achieving wireless communications include the use of other electromagnetic wireless technologies, such as light, magnetic, or electric fields or the use of sound. The term *wireless* has been used twice in communications history, with slightly different meaning. It was initially used from about 1890 for the first radio transmitting and receiving technology, as in *wireless telegraphy*, until the new word *radio* replaced it around 1920. The term was revived in the 1980s and 1990s mainly to distinguish digital devices that communicate without wires, such as the examples listed in the previous paragraph, from those that require wires or cables. This became its primary usage in the 2000s, due to the advent of technologies such as LTE, LTE-Advanced, Wi-Fi and Bluetooth.

Wireless operations permit services, such as long-range communications, that are impossible or impractical to implement with the use of wires. The term is commonly used in the telecommunications industry to refer to telecommunications systems (e.g. radio transmitters and receivers, remote controls, etc.) which use some form of energy (e.g. radio waves, acoustic energy,) to transfer information without the use of wires. Information is transferred in this manner over both short and long distance.