ABOUT CSI

The seed for the Computer Society of India (CSI) was first shown in the year 1965 with a handful of IT enthusiasts who were a computer user group and felt the need to organize their activities. They also wanted to share their knowledge and exchange ideas on what they felt was a fast emerging sector. Today the CSI takes pride in being the largest and most professionally managed association of and for IT professionals in India. The purposes of the Society are scientific and educational directed towards the advancement of the theory and practice of computer science and IT. The organisation has grown to an enviable size of 100,000 strong members consisting of professionals with varied backgrounds including Software developers, Scientists, Academicians, Project Managers, CIO’s, CTO’s & IT vendors to just name a few. It has spread its branches all over the country. Currently having more than 500 student branches and rooted firmly at 73 different locations, CSI has plans of opening many more chapters & activity centres in smaller towns and cities of the country. The idea is to spread the knowledge, and provide opportunities to as many interested as possible.

The CSI Vision: "IT for Masses"

Keeping in mind the interest of the IT professionals & computer users CSI works towards making the profession an area of choice amongst all sections of the society. The promotion of Information Technology as a profession is the top priority of CSI today. To fulfill this objective, the CSI regularly organizes conferences, conventions, lectures, projects, awards. And at the same time it also ensures that regular training and skill updating are organized for the IT professionals. Education Directorate, CSI helps physically challenged citizens by providing training 'Punarjani'. CSI also works towards a global approach, by seeking out alliances with organizations overseas who may be willing to come forward and participate in such activities. CSI also helps governments in formulating IT strategy & planning.
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1. INTRODUCTION

In various fields where we need to store and process data related to spatial objects. Spatial object may be any 2-dimensional (for example GIS, road network, VLSI design etc.) or 3-dimensional (the universe, molecule structure etc.) or any point of interest like hotels, hospitals, river, shopping mall etc.

Spatial database systems can handle both spatial data as well as non-spatial data in its data model. Spatial data means data related to space and it can be processed by spatial attributes that have location on the surface of the earth. On the other hand non-spatial data are alphanumeric data for example name, email id, contact no. etc.

In other words we say that spatial database systems are same as traditional database systems with additional abilities to handle spatial data by using spatial data types and spatial operators. To handle spatial data it use (i) spatial data types, (ii) spatial operators and (iii) spatial indexing. Which is shown in Fig.1.

![Fig.1 Spatial database system](image)

Spatial database systems have ability to handle spatial data as well as non-spatial data concurrently that distinguishes it from other traditional/conventional database systems. In traditional/conventional relational database systems there was no provision to store and process spatial data.
spatial data represented by spatial data types like points, lines, and polygons. To store and process spatial data, object-oriented database and object relational database allow us to define some abstract data types. Several vendors of database software use this ability to handle spatial data.

## 2. APPLICATION OF SPATIAL DATABASE SYSTEMS IN MILITARY

In real world there are various fields (like transportation, military application, management, medical, Geographic Information System (GIS) etc. where we use spatial data and spatial queries. Spatial data plays a very important role in military operation to take any decision in an efficient ways. In this article we present military application where we use spatial data using GIS, and GPS (Global Positioning System) to process all the operation. In military all the operations (like command, control, communication, etc.) are dependent on accurate information and mainly concerned with spatial data that makes easy to take any decision. Major General Gurbaksh Singh VSM says in the article in “Electronic Today November 1996” about the importance of spatial information for taking appropriate decision in military application as:

"The lessons gained from military history indicate that the key to military victory lies (Regardless of military size of the opposing forces) in remaining ahead of the enemy in time sensitive SCORE loop of C4I2(Command, control, communication, coordination, information and interoperability) process."

“If a defending force or weapon system can with some accuracy and sufficient warning finds out where the attacker is or his future course of action would be, it would be easier to defeat him by occupying position of advantage or by massing a superior force at the point of decision.”

In military operation GIS also plays a very important role and military forces use GIS in various different field like terrain analysis, monitoring terrorist activity, battlefield management, finding location of enemy, remote sensing etc. to minimize the risk of errors.

**Terrain analysis:** In terrain analysis military commanders use land map with accurate information on the land to improve effectiveness of mission and optimizing resource utilization. For any military operation based on land it use road networks condition, communication path information with accuracy that makes easy to take any decision. Ministry of defense of any country gathers these information and after filtering and analyzing process takes decision. Due to random deployment and flexible response it may endanger the operation.

**Air operation:** Air operation needs all the information (like target location, civilian’s areas, and terrain analysis) that is required for land operation with additional of height information accurately for targeting. In all the operation either air operation or land operation or sea weather plays a very important role in battlefield to complete a task. For successful completion of any task in battlefield it is required to know the information regarding weather conditions, wind conditions, visibility conditions, and temperature condition of battlefield.

**Naval operation:** At sea naval vessels navigate the position by using various electronic gadgets. Recently various technologies provide us to navigate position with accurate information. Electronic chart display and information systems (ECDIS) support the navigator to navigate in all the weather conditions. Electronic navigation chart (ENC) is used as a tool for navigation which is different from conventional chart that takes information related to depth, hazards within the area as input. In military application GIS use Electronic navigation chart as the spatial database.

Military operations are mainly depends on GIS and GPS to take decisions. GIS with satellite image in military service is use to understand any terrain area that plays a major role to determine ideal
locations, and also has the capability to hide all the equipment’s/weapons and troops, supplies weapons on demand, finding best routes etc.

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Internet plays a very important role in day-to-day life. As time pass by, Internet tend to be a part of the daily routine of mankind. Increase in reliability of internet has demanded for faster internet services. Therefore, in these past few years, numerous changes have been evolved in the world of technology in order to cope up with the user's needs. This led to the development of the latest and advanced technology-4G(fourth generation). This paved a way for effective and advanced Internet accessibility. It changed the view of a user about internet to perform his various needs. 4G provides service to access to mobile internet anywhere, anytime. It provides best service in multimedia gaming, multimedia communication, and connecting internet with wireless connections. It provides portability in mobility.

1. INTRODUCTION

4G stands for fourth generation of wireless telecommunication. Deployed in 2010, it provides the speed for accessing internet and high speed transmission of data. Not only does it provide the best service for accessing and utilizing the latest application but also offers the best video conferencing, and video streaming, multimedia application support, and gaming in multimedia.

The International Telecommunications Union Radio Communications sector established a set of standards for 4G in March, 2008 (i.e., International Mobile Telecommunications Advanced) specification, that set a peak speed requirements for 4G renders services at 100 megabits/ second for high mobility communication and 1 gigabit/ second for low mobility communication. The increasing growth of user demands and the limitations of the Third generation wireless communication systems (3G) led to the emergence of 4G. In 1981 the first generation of mobile technology 1G came with analog transmission, and in 1992 2G appeared in the form of digital information exchange. 3G debuted in 2001, including multi-media support along with a high transfer rate of at least 200 kilobits per second. Then 4G was introduced and represents a number of improvements over the 3G technology, 4G networks works on the basis of all Internet protocol (IP) packet switching, and usage of OFMDA multi-carrier transmission methods or other frequency-domain equalization (FDE) methods. 4G should also be able to offer handovers across different networks without any data loss and provide high quality service for next generation media. One of the main aspects of 4G technology is the parallel circuit-switched and packet-switched network nodes elimination using Internet Protocol version 6. The currently used standard, Internet Protocol version 4, has a finite limitation on the number of IP addresses which can be assigned to devices, meaning duplicate addresses should be created and reused using network address translation (NAT). 4G has wider bandwidths and higher bit rates. It is an entirely packet-switched network. 4G supports for previous wireless technologies and tight network security. Needs only less time to build 4G because it uses the same tower and fibre cable as 3G- they only have to upgrade the tower with 4G.
1.1 APPLICATIONS OF 4G:

Some of the applications of 4G technology are the Better usage of Multimedia applications, it also gives mobile users a "virtual presence" like Video Conferencing. Another application of 4G technology is Virtual Navigation. It is a remote database that contains the graphical representation of streets and buildings and also physical characteristics of a large metropolis. Sections of this database are transmitted in rapid sequence to a vehicle. In normal life, 4G is used in Traffic Control, Mobile Phones, Sensor on public vehicle, Cameras in traffic light and Public Security.

1.2 ADVANTAGES AND DISADVANTAGES:

Some of the Advantages of 4G technology is : Affordable communication services, High capacity, High speed and low cost per bit, Support for interactive multimedia, global access, service portability other broadband services, scalable mobile services, variety of quality of services provided and Better spectral efficiency.

Disadvantages of using 4G technology is that it is hard to implement, Increased usage of battery usage is more, Need complicated hardware, The equipment required to implement is very expensive, and Higher data prices for consumers.

2. CONCLUSION

In this paper we have discussed about 4G technology, its applications, advantages and disadvantages. The history of mobile communications shows that several attempts have been made to reduce a number of technologies into a single global standard.

4G is considered to be a very promising generation of wireless communications which will change the people's life in the wireless world. Both stationary and mobile users have been given quick internet access. 4G can be effectively combined with cellular technologies to make use of video blogs and smart phones. This gave a chance to the producer to create more user friendly and cost-effective 4G compatible devices.

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BIG DATA AND VERACITY CHALLENGES

Compiled by:

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ABSTRACT

This paper points out that big data consist of different characteristics which affect its quality. The term big data is defining a collection of large and complex data sets that are difficult to process using conventional data processing tools. Every day, we create billions of data all over the world. These data come from scientific experiments, social networking sites, sensor networks, mobile conversations and various other sources. Big data divided into many dimensions: Volume, Velocity and Variety. To improve the quality of these three dimensions, a new dimension veracity was introduced. This paper provides an analysis about the concept of veracity. Veracity can be explored mainly based on three dimension objectivity/subjectivity, truthfulness/deception, credibility/implausibility. These dimensions are combined to form one composite index - the big data veracity index. This index is useful for assessing systematic variations in big data quality. The paper contributes to the big data research by dividing the existing tools to measure the suggested dimensions.

1. INTRODUCTION

“Without big data analytics, companies are blind and deaf, wandering out onto the web like deer on a freeway.” – Geoffrey Moore
Big data is used in organization for storing, managing, and manipulating vast amounts of disparate data at right speed at right time. To achieve the right uses the big data can be divided based on three characteristics like volume, velocity, and variety. Big data is a large or complex set of data in which cannot be managed by traditional data processing applications. The major challenges involved includes analyzing, capturing, searching, sharing, storing, transferring, visualizing, queering and privacy of information. This term refers the using of predictive analysis and seldom to a particular size of data set. Big data accuracy may helps in decision making, and better decisions lead to greater efficiencies in operations, reduction in cost and it also reduces the risk[1]. The three dimensions of big data: volume-amount of data. Variety-data in various forms. velocity-how fast data is processed. Veracity is the fourth dimension. The biases, noise and abnormality in data can be referred to as big data veracity. Compared to velocity and volume veracity is a biggest challenge. The data should be clean so that ‘dirty data’ will not accumulate in your systems.[3]. If the data is inaccurate, is unreliable, the organization may face a big problem, especially the organization for selling information like the marketing ones. Due to the volume of information the veracity is the hardest thing to achieve with big data. The three dimensions of veracity include: objectively, Truthfulness, credibility. These dimensions may cause errors and decrease in big data quality. The Veracity issues arise due to:

1. Process Uncertainty (Processes contain randomness) Example _Uncertain travel times, Semiconductor yield
2. Data Uncertainty (Data input is uncertain), Example _GPS uncertainty, Ambiguity, Conflicting Data, Model Uncertainty (All modeling is approximate)Example- Fitting a curve to data, forecasting a hurricane.
Paul Miller mentions that “a good process will, typically, make bad decisions if based upon bad data. e.g. what are the implications in, for example, a Tsunami that affects several Pacific Rim countries? If data is of high quality in one country, and poorer in another, does the Aid response skew ‘unfairly’ toward the well-surveyed country or toward the educated guesses being made for the poorly surveyed one?”

There are several challenges:

- How perfect is the sampling resolution?
- How can we manage the uncertainty, imprecision, missing values, misstatements?
- Checks whether the data is good?
- Is the reading on time?
- Is the sampling bias understandable?
- Checks whether data is available to all?

Web has significant practical importance as online rumor and misinformation can have tremendous impacts on our society and everyday life. One of the fundamental difficulties is that data can be biased on noisy, outdated, incorrect, misleading and thus unreliable. Conflicting data from multiple sources amplifies this problem and veracity of data has to be estimated. Beyond the emerging field of computational journalism and the success of online fact-checker (e.g., Fact Checks, Claim bus) truth discovery is a long-standing and challenging problem studied by many research communities in artificial intelligence, databases, and complex systems and under various names: fact-checking, data or knowledge fusion, information trustworthiness, credibility or information corroboration for a survey and for a comparative analysis. The ultimate goal is to predict the truth label of a set of assertions claimed by multiple sources and to infer sources’ reliability with no or few prior knowledge. One major line of previous work aimed at iteratively computing and updating the source’s trustworthiness as a belief function in its claims, and then the belief score of each claim as a function of its sources’ trust-worthiness. More complex models have then included various aspects other than trustworthiness of source and claims belief such as the dependence between sources the correlation of claims, the notion of evolving truth [5].

2. CONCLUSION

In this paper we point out that big data is a collection of large and complex data set that is difficult to manage using database management tool. This includes processes in Big data like Capture, Storage, Search, Sharing, Analysis and Visualization. In 2001, the dimension also called as 3v model were introduced. The 3vs were not enough for storing big data. So a new dimension called Veracity was introduced. Uncertainty of big data directly affect veracity. Challenges are always a threat to veracity that include: How can we manage the uncertainty, imprecision, missing values, misstatements? Checks whether the data is good? How large is the coverage? How perfect is the
sampling resolution? Is the reading on time? Is the sampling bias understandable? Checks whether data is available to all? So, we conclude that veracity is a new dimension that is used for maintaining a balanced form of big data.

3. REFERENCES


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AUTOMATIC MALL BILLING SYSTEM

Compiled by:

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1. INTRODUCTION

We all are aware of the procedure for shopping (in mall) which includes the traditional way. We take the shopping cart to put the items and do further shopping. During shopping, putting items in shopping cart is not difficult and doesn’t take much time but when you go for billing, that takes time and we have to stand in the queue till turn comes. According to this approach, you may have to wait even for several hours in queue by wasting your precious time. As students of Computer Engineering Department of CHARUSAT, we built a prototype to improve this process. The model can be fitted in the shopping cart. When any customer puts the item in the cart (containing our model), that particular item will be directly scanned and will be added to billing counter’s computer with the particular customer id. As many items the customer put in the cart, all items will be scanned and the entry of the all items will be directly added with customer id at the billing counter. When customer goes for the billing, he/she does not have to wait in long queues. When customer reaches to the billing counter, he or she just has to pay the bill of the purchased item and move further. When the bill is generated, the total amount of the bill is send through SMS to customer’s mobile number.

2. HOW IT WORKS

In this particular model, you must be thinking that how the items are scanned and directly added to the billing counter. For that we have used RFID module. It scans the RFID number. With the help of XBee module, the details of the item is directly send to the billing counter. When the bill is generated, the total amount of the bill is directly send through SMS to customer’s mobile number with the help of GSM module. For this project the following components are used:

1) Arduino UNO
2) XBee module (Sender and Receiver)
3) Servo motor
4) GSM module 900A
5) RFID (taken as particular item)
6)
3. BENIFITS OF THE PROJECT

1) This device is used to control the rush at the billing counter in different shopping centers.
2) This device helps the customer to save their time at the billing counter.
3) It also sends the total amount of the bill to the given mobile number with help of GSM services.
4) It can ensure the customer about the budget of the shopping by displaying the total amount on LCD attached on the cart.
5) With the help of this device, customer can secure their items through automatic gate attached on the cart.

6) By the attachment of Payment techniques, customer can pay their bill automatically and securely transfer their payment.

7) By receiving the final bill amount on mobile, customer can keep record of their shopping.

8) By using this automatic system, the mall can improve customer service.

9) At last, customer satisfaction and transparency in their shopping can be improved.

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CONTROLLING A TOY CAR USING ANDROID

Compiled by:
Yash Punjabi

ABSTRACT:
A concept of Internet of Things is very popular now a day. With this concept many handheld devices and many home appliances and smart devices are connected using any of the networking technology. One of existing technology which is Bluetooth is having limited range. For solving this problem of the range we have used the Wi-Fi, which is having a much larger range to overcome the range problem of Bluetooth. By using this Wi-Fi module we can have access to anything if we have a suitable micro controller for interfacing that Wi-Fi module. This is a kind of small effort to implementation of concept of INTERNET OF THINGS (IoT).

1. FEATURES:
This is kind of an application which is used in our smart phones for controlling any toy or robot which is having a micro controller and a Wi-Fi module interfaced on it. This hardware which we have used can be used as an automation tool for anything in our home or business or any general purpose use.

This controller, which is used in the car can be easily coded as we want to use it. In this Wi-Fi module it can be programmed as a host of any home router or any business place router so that if we are in the particular region of that business place or home, the range of this Wi-Fi module can be extended. Snapshots of the modules and car is following

(1) Bascom AVR Atmega8 micro controller

(2) Big WiFi module by Hi-Link
(3) USB ASP loader for coding or programming Bascom

2. SYSTEM REQUIREMENTS:

1) Developer side:

Android development environment for developing of an application and for coding of Bascom, the Bascom AVR IDE is used. Hardware required-Bascom controller, WiFi module, readymade car or handmade car using motors and other things and for coding of the Bascom USB as plunder.

2) User side:

Android phone with an android application of controlling a toy car and toy car which is having a micro controller.

A snapshot of the particular system is shown below:

Toy car controller will help every human being to get access to anything after adding some components in the application and some components in embedded module.
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ABSTRACT
Many information and communications Technologies are available in internet but they are not secure now a days. There are many serious cyber attacks happening in our society. The protection of our personal sites and computers are very necessary. The internet, have been an increasingly important aspect of global social, political and economic life for two decades. Internets are the backbone of the today's global information society. Making the concept of security as aim our paper provides a theoretically informed understanding and critical assessment about cyber security.

1. INTRODUCTION
In India the internet is growing day by day. Giving rise to new opportunities in every field we can think of-be entertainment, business, sports or education.
There are two sides to a coin. Internet also has its own disadvantages .One of the major disadvantage is cyber crime, illegal activity committed on the internet. CYBER SECURITY is a major feature of internet to prevent these illegal activities.

1.1 CYBER SECURITY
Cyber security is the protection of information systems from theft or damage to the hardware. The software and to the information on them, also from disruption or misdirection of the services they provide .It includes controlling physical access to the hardware .we are protecting against the harm that come across the network access. This field is of growing importance due to the increasing dependence on computer systems in most societies .Computer systems now include a very wide variety smart devices such as smart phones ,televisions and tiny devices etc. As a part of the internet things and networks include not only the internet and private data networks but also Bluetooth , Wi-Fi and other wireless networks.

2. WHY CYBER SECURITY IMPORTANT?
With the growing volume and sophistication of cyber attacks, ongoing attention is required for the protection of sensitive business and personal information as well as safe guard national security.
2.1 NETWORK SECURITY

**Network perimeter police:**

Establishment of a multi-layered boundary defenses' with firewalls and proxies deployed between the entrusted external network and the trusted internal network.

*Protecting the internal network:
  Prevention of any direct connection to an external services and protection of internal IP addresses.

*Monitor:
  Regularly audit activity logs and use intrusion monitoring tools

2.2 INFORMATION RISK MANAGEMENT REGIME

*Establishment of a governance framework:
  Enable and support risk management across the organization.

*Determination of your risk appetite:
  Decide on the risk of level the organization is prepared to tolerate and communicate it.

*Maintaining the Board’s engagement with cyber risk:
  Record cyber risks in the corporate risk register to ensure senior ownership and make cyber risk a regular agenda item.

*Produce supported risk management policies:
  An overarching corporate security policy should be produced together with an information risk management.

*Adopt a lifecycle approach:
  Life cycle approach is a whole life process and the organization's policies. Processes should support and enable it.

*Testing the security controls:
  Undertake simulated cyber attack exercises and conduct regular penetration tests.

2.3 SECURING CONFIGURATION

*Corporate policies are developed for updating and patch systems:
  Establishment and maintenances of policies that set out the priority and timescales for the application of updates and patches.

*Creating and maintaining hardware and software inventories:
  Automated tools are used to create and maintain inventories of every device and application used by the organization.

*Locking down of operating systems and software:
  Creation of baseline security build for workstations, servers, firewalls and routers.

*Conduction of regular vulnerability scans:
  Against all networked devices run automated vulnerability scanning tools at least weekly and remedy any vulnerability within an agreed time frame.

2.4 MALWARE PREVENTION

*Publish and develop corporate policies:
Production of policies to manage the risks to the business processes.

* Establishment of anti malware defenses across the organization:
  Agree a corporate approach for each business area to manage the risks from malware.

* Scanning for malware across the organization:
  Protections of host and client machines are protected with antivirus solutions that will automatically scan for malware.

### 2.5 MONITORING

* Establishment of monitoring strategy and supporting policies
* Monitor every ICT systems:
  Make sure that all networks and host systems (e.g. clients and servers) are monitored
* Monitoring of network traffic:
  It should be continuously monitored to identify unusual activity and trends that could point out an attack

### 3. COUNTRY TRENDS OF CYBER CRIME (2013)

1. United states -39%
2. United Kingdom-8%
3. Angola-3%
4. China-3%
5. Italy-3%
6. Turkey-3%
7. Ukraine-3%
8. Bangladesh-2%
9. Brazil-2%
10. Israel-2%
11. India-2%

### 4. USE OF A COMPUTER OR INTERNET TO DO SOMETHING THAT WOULD BE A CRIME IN ANY CASE.

Examples:

* Financial fraud
* Sabotaging of data/networks
* Robbery of proprietary information
* System penetration from the outside
* Service denial
* Insider’s unauthorized accessing
*Abuse of employee of internet privileges

*Viruses

For this we have able to consult the cyber security services. The services are given below.

**CYBER SECURITY CONSULTING SERVICES**

*PCI compliance
*Policy implementation
*Coaching and advice
*Social engineering assessment
*Cyber security awareness

**The advantages and disadvantages of cyber security**

**Advantages:**
1) Secure system from viruses, worm, spyware and unwanted programs.
2) Protection of data from theft.
3) Protect the computer from hacking.
4) Lessens computer freezing and crashes.
5) Provides privacy to users.

**Disadvantages:**
1) It is very difficult to configure Firewalls correctly.
2) Until the firewall is configured correctly it may block users from performing certain actions on the internet.
3) Makes the systems slower than before.
4) Updation of new software is needed to keep security up to date.
5) It is costly for average user

**5. CYBER SECURITY APPLICATIONS**

*Mobile

Multiple device is digitally registered and keyed to a user and can be instantly reported lost or stolen. If reported, counter measures are initiated and found can found easily re-enrolled for continued service.

*Secure email

Prevent from tampering of email content prove message origin and prevent from exposure of email content with encryption flexible, secure communications, Seamlessly combining with your email clients and web hosted email applications.

*Online validation

Automatic authentication validates the secure connection request whether logging into a remote application or opening a file on your computer. The online services can operate thousands of requests per second.
*Smart Cards

Enforces multifactor authentication usually for physical access control that means Opening doors and logging onto computers. In manufacturing or utilities operations a typical use is turning on a manufacturing line

*Document signing

Add e-signatures, time stamps and encryption or decryption to contracts statements, in voices legal and financials in file types like PDF and XLS.

6. CONCLUSION

As we know now a days there are number of mobile users and data networks increasing day by day , so we understand that how to prevent our sites and our personal computers from hackers, theft etc.Cyber security is our shared responsibility so always stop,think before you connect.

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DO YOU EAT PLASTIC?

Right from the globalization we don’t concern much about our lifestyle in a healthy way, like the food we take. Do you think the food is safe? Are there any ways to find it out? Of course we can check on the ingredients. How can we believe that the companies use the same in gradients they print in the packets? Also are those ingredients safe?

We have many questions like these, when choose a healthy product. Why rely on them to find it out, we can find it ourselves. Come let’s find out how?

1. THE TECHNOLOGY BEHIND

There may be several technologies used in different sectors, but the guaranteed and instant solution is the Hyper Spectral Image (HSI) analysis. It is a form of spectral imaging, collecting and processing the acquired images of the specimen and obtain spectrum for each picture elements. The result is stored as cubes, type of data cube. It provides unique spectrum for every pixel which can be used for identifying materials. We can also get to know about the composition of the food. The Fig. shows the amount of water and fat present in doughnut.

Another real time example is that the rice adulteration in China which is solved by HSI. Similarly we can use this to find out any variations in the food patterns and can identify any adulterated food. The image of the food is taken and is processed to get the spectral image. Then the spectrum can be compared with the spectral image taken from the similar food prepared naturally. The variations in the spectrum provide that the food has any harmful items, thus notifying the consumer. These process are completely automated and analysis is done within fraction of seconds.

Some of the tools and software used for hyper spectral image analysis are
Open source:

Hyper Spy (software) Python Hyper spectral Toolbox.

Gerbil (software) hyper spectral visualization and analysis framework.

Commercial:

A MATLAB Hyper spectral Toolbox.

MountainsMap HyperSpectral, a version of MountainsMap dedicated to the analysis of hyper spectral data in microscopy.

Although it provides accurate and instant results of the specimen, it is more costly and is complex to understand and also fast computers are needed for processing the hyper spectral data. The requirement is a hyper spectral camera along with spectrograph. This is more costly and can be used by reputed organizations for research purposes. But with technological advancements scientists developed a hyper spectral camera, HyperCam which is cheaper and can be integrated with a mobile device. This is affordable up to $50 which is far lesser than a conventional hyper spectral camera.

Cheaper way:

Sensors are cheaper that they cost only about $5 to $10 and they can be easily integrated with any mobile devices and microcontrollers like Raspberry pi. Commonly used sensors are plastic detectors. It identifies polyethylene and polyvinyl compounds. In our daily routine we force to eat different varieties of fast-foods and packed foods. These foods contain some preservative agents which will react with outer cover and produces toxic chemicals like polyethene and these chemicals are harmful to health. This kinds of food can be detected using the sensors. The food radar sensors are recently developed, they test the food based on microwaves emitted from sensors. This sensor can also detect any vegetable, wood, bone matters. The accuracy and the efficiency of the sensors are not yet verified. These are best instead of using costlier cameras.

2. CONCLUSION

These technologies are different from traditional way of detecting foreign matters in food and they can be portable. These technologies may be costlier but they are already in development, that may be made available to every one and can be integrated with all mobile devices. In future we may carry these with us to shops to check the product quality.

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The basic method for protecting networks today is by using a firewall: is a shield that protects the users from intruders. It offer less protection from internal attacks, due to limited firewall processing capacity, and limited support of mobile computing. Distributing a firewall to each network nodes avoids many of these problems, but weakens the security guarantees of the network. In this paper we are presenting the advantages and disadvantages of firewall and an introduction to the next generation firewalls. The firewall currently supports basic packet filtering and some application policies as well as secures policy distribution.

1. INTRODUCTION

Firewall is a network security system that detects and controls the incoming and outgoing network traffic based on fixed security rules. A firewall creates a obstacle between a trusted, secure internal network and another external network. It is used to control access between two individual systems with the help of a hardware component or software program.

Internet is a worldwide network that makes information’s available to various users like home users, business users and also in educational field. In current scenario, access to information is something essential because different users rely on information for various purposes. Now days there is only a low degree of security to various networks and highly confidential information are open to everyone and it raises the degree of risk I think security and privacy are two criteria’s and firewall provides a solution by protecting from vulnerable services. We must be aware about consequences and how to protect our data and critical systems when we connect to other unsecured network. An application firewall is a special firewall that is specifically structured for the type of block it is inspecting. The most widely developed application firewall is the web application firewall. The primary goal is to keep individual components secure and away from unwanted interference of external information.

1.1 TYPES

A. Packet-filtering Router
B. Application-level Gateway
C. Circuit-level Gateway
1.2 DESIGN GOALS

The ultimate goal for a firewall is to collectively sum up all the network traffic from internal to external which must go through the firewall physically trimming off all access to the local network except through the firewall. The second goal would be only commissioned traffic which is designed by the local security policy will be allowed to proceed. Finally the last goal is that the firewall itself is resistant to infiltration inclusive is a solid authentic system with a protected operating system.

1.3 ADVANTAGES AND DISADVANTAGES

Any computer network system will have number of advantages when using a firewall. They are cheaper than securing each computer in the collective network since there are often only one or a few firewall systems to focus on. There are some firewalls which are able to monitor viruses etc. Easy to configure or reconfigure.

The major disadvantage of firewall is that it cannot protect the network from outbreak from the inside. Firewalls cannot protect a network or Personal Computer from viruses, Trojans, worms and spyware which transmit through flash drives, portable devices etc. They may restrict commissioned users from accessing important services and do not protect against private attacks.

1.4 NEXT GENERATION FIREWALL

NGFW is a unified network platform based on hardware or software network security systems. The main goal of NGFW’s is to include more OSI layer model to enhance filtering of network traffic dependent on the packet content. Also used to identify and block attacks by carry out security at application level.

2. CONCLUSION

In current scenario, firewall technology has get significantly since the days of packet filters and network address translation. Firewall comes in different types, topologies etc. These types and topologies help to keep that networks and internet have a protected connection between each other. Local area networks (LAN) are also ensure by firewalls which suites for the intensity of the network. The future of firewall technology depends on the hands of today’s impacts such as network security threats, viruses etc.

ACKNOWLEDGEMENTS

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GRID COMPUTING

Compiled by:
S. Varshini

1. INTRODUCTION

Today's world has seen major advancements in the field of technology. Computers have made our lives easier in more ways than one. Therefore, optimising them has always been in the forefront of technological developments. Everyone wants faster access to the internet, higher speeds and rapid computing. The Grid technology comes into play in this aspect. Designed to run complex analyses, larger programs and to obtain a flexible infrastructure of computing, Grid technology has become indispensible to organizations and individuals.

2. WHAT IS GRID COMPUTING?

Grid computing is a collection of computer resources from various systems organised as a “grid”, and this grid is used as a common resource pool. It facilitates the sharing of resources among individuals and organizations by acting as a centralized control for the distributed resources. For instance, doctors may be able to access terabytes of data from the grid on rare diseases and their cures, which would not have been available to them otherwise. The Grid computing technology provides a transparent mode of accessing a wide range of resources. The Search for Extraterrestrial Intelligence (SETI) project is one of the earliest grid computing systems.

The grid may be a local one, confined to a specific organization for their personal use, entrusted to a few, also known as Intragrid. Another type of grid is the one which is a consortium of the resources from various partner organizations, known as Extragrid. This can be connected through a VPN (Virtual Private Network) and is available to more number of people. The third type of grid is the Intergrid wherein many multiple clusters of extragrids are integrated. The distinction between the types of grid is based on the configuration of the information such as: security, scope of policies, obligations to the user of the infrastructure.
3. WHY IS GRID COMPUTING NECESSARY?

In many organizations, there is a surplus of underutilized computing resources. This may either be the desktop machines or the server itself. The Grid makes use of the idle CPU or storage or any other component available in a system whose potential can be tapped into useful work. The Grid provides a framework to exploit these resources and hence, collect the unused storage to turn it into a virtual data store. This has an improved performance and reliability as compared to that of a single system.

The Grid helps in reducing the time taken to obtain the required output through faster computing speed. It fulfills its mission by implementing the concept of parallel processing. The problem can be distributed into parts and run simultaneously to reduce time. In this manner, each part of the problem will be executed separately. This can also be used to schedule a large number of tasks by making use of the idle time of the processor i.e. the unused processor cycles.

To sum it up, we can say that the grid provides a dependable way to balance the load on a wide range of resources.

4. FEATURES

The computing process in the grid is used to promote human-to-human interactions rather than the usual human-to-machine interactions. The virtual space where the data and applications are shared is modified and accessed by humans while the grid acts as an interface to facilitate easy access.

One of the main features is heterogeneity. The grid may contain varied data from various geographical locations and domains. The grid is also adaptable and fault tolerant, the errors or hardware/software faults are dealt with by the resource manager without impacting the data. It is scalable i.e. it can accommodate a large number of systems or nodes in its network.
5. HOW DOES GRID COMPUTING WORK?

There are three main components in a Grid.

a) Server
The server handles the administrative tasks and acts as a control node for the network of systems.

b) Network of Computers
Each computer has a dual role. They can act as an interface for the user as well as the storehouse of resources which can be accessed by the user.

c) Middleware
This is the main component of the grid. It is a software which allows a user to run his process or application across a network of machines. This acts as a scheduler to decide which grid jobs will run and where and when. There is no fixed format for this middleware. Some Grid computing middleware are ARC, DIET, EMI, gLite, Globus toolkit, GridWay, Alchemi etc.

When a machine on the grid has some large task to be performed, some steps are followed before execution begins. Firstly, the program must be parallelized. Secondly, the flow of the program needs to be analysed so that it can be separated into small independent modules. Next, the modules are sent to different machines for execution. Finally, the results are sent to the original machine, where they are compounded into a whole.

GRID ARCHITECTURE

- **APPLICATIONS** (Business, Web services, Media)
- **PLATFORMS** (Storage – Database/File; Software – Java/Python/.NET)
- **INFRASTRUCTURE** (Security, Scheduling, Computing and Storage)
- **HARDWARE** (CPUs, Memory and other resources)
6. APPLICATIONS OF GRID

Grid is used in fields like:

a. Biomedical Research
b. Engineering Research
c. Architecture
d. Industrial Research
e. Astronomical Surveys
f. Study of Weather and Climatic conditions
g. Chemical Compounds Identification
h. Medical Research
i. Advanced Physics Applications
j. Data Communication
k. Space Research Organisations
l. Government
m. Business/Financial Services
n. Web Services
o. Accessing Scientific Instruments and Readings
p. Business and commercial applications

7. ADVANTAGE OF GRID OVER CLOUD

The Grid technology has an advantage over the Cloud, and that is the storage of data. Since the infrastructure of the Grid is owned by the company and the servers with the data are within company premises, there will not be any problems concerning the location of the Grid. Technical issues can be addressed individually by the company without having to call forth an external agency. The main concern for big organisations is the location of the data and this has been put to rest by using the Grid technology. This assures the security of the data when information security is the first priority of the organisation.

The cost of storing the data is also reduced when the grid is used as is the ease of use of the resources within the company. This is especially useful when the grid is a local one, and the data maintained is privy to limited people.

8. ADDRESSING THE CONCERNS ABOUT GRID COMPUTING

Linking two or more systems will raise a number of concerns among the users. The major concerns are:

- Data privacy
- Data security and integrity
- Access control
- Judicious usage of systems’ resources

The answer to all these concerns is the middleware. The middleware is a software specially designed to provide system and data security by encryption and user authentication methods. It also
facilitates the distribution of the process components to available resources for proper allocation and usage of the system resources.

9. CONCLUSION

The optimisation of computing, operational flexibility, resilience and availability of infrastructure have been the goals kept in mind while coming up with the concept of the Grid. There has been an increase in the use of this technology in not only all the upcoming fields of scientific and technological research but also in several commercial and management applications. What was once a concept has now become a reality and it has made a huge difference to the scientific community in pursuit of knowledge. Research projects, running complex computing algorithms of critical applications, access to data across different platforms along with data security have all been made easier and faster with this technology.

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Responsive Web Design (RWD) is a modern approach to design websites that aims to provide optimal viewing and interaction experience across a wide range of devices that include smartphones, tablets, laptops and desktop computers. All of the web content dynamically resizes to the screen of the requested platform. The first and foremost principle in designing a responsive website is to follow a mobile-first strategy. In contrast to the typical Photoshop approach, RWD requires a more abstract way of design. Fluid Layouts, Media Queries, Resizable Images and scripts that reformat the Web page are the prime elements of design in a Responsive Website.

Currently, to Web Designers, the term ‘Responsive Web Design’ and ‘Web Design’ mean exactly the same thing. Though most websites claim to be responsive, some are still fixed-width old-timers. But the responsive approach is the default option for all websites with the future in mind.

1. WHERE DID IT ALL GETSTARTED?

The expansion of the mobile web for smartphones and tablets was in nexus relationship with the rise of Responsive Web Design. Statistics stated that mobile web accounts for almost 60% of the total web traffic. Displaying desktop-oriented web pages on touch based mobile devices led to a lot of issues especially, zooming in, pinching of screens and incorrectly thumbed buttons. At the end it was frustration. Out of an economic need RWD embraced out. The fact that hundreds of variations of a single site can serve the most appropriate device even at the development cost of a single web application stormed the industry.

It is fairly obvious to foresee that RWD is the correct path to choose in order to capture the changing habits of customers and thereby satisfying their impatient needs for web and mobile browser-
friendly applications. Changes made in one site are reflected across all devices. Thus maintenance is narrowed down to a single website. Also, Google has already been boosting the ratings of sites that are mobile-friendly especially if the search has been made from a mobile device. The non-mobile friendly sites rating fall drastically in market view.

2. FLEXIBLE, FLUID AND FANCY: THE HOW OF RESPONSIVE WEB DESIGN

The idea behind the responsiveness (ability to adapt) of any RWD-based website is the fluid grid system. Rather than using absolute units like pixels or points, this concept uses relative units like percentages to size the elements in a web page. Images are automatically re-sized based on relative units of the outer containment avoiding overflow. The webpages adapt to various CSS style sheet rules using media queries according to the platform width characteristic.

It is done by detecting the resolution and the orientation of the screen. Since devices can switch orientations (landscape to portrait and vice-versa) at the user’s whim, the designer must keep in mind these situations while designing a website. The screen size is also impacted by another factor when the user doesn’t maximize the browser to the window size which leaves ample space and variety options.

**Media Queries:** In addition to the media types such as `screen`, `print` and `handheld` CSS3 has added newer types like `max-width`, `device-width`, `orientation` and `color`. Combining media query types is also allowed using `and`. 

![Responsive Web Facts](image-url)
**Fluid Images:** Considering the fluidity of the images used in a web page, there are several techniques to achieve it:

- Hiding and Revealing Portions of Images
- Creating Sliding Composite Images
- Foreground Images that Scale with the Layout

**Layouts and Grids:** Using the relative system of sizing page elements by specifying them in percentage values, grids can be designed. When coupled along with the right media queries, these grids and layouts prove out to be the most fluidic and responsive.

*Content is like Water* – One of the core principles of Responsive Web Design

![Content is Like Water](image)

“The Past and the Present

Every time a new approach for an existing design methodology enters the designer’s room, he prototypes it and tests it for different UI issues. If he chooses to use it in his future projects, he decides to change his default practices of design. Some of the changes in practice that designers accept while implementing RWD in their designs include:

### 3.1 Design Process:

**Then:** The designer reviews a brief with the client, goes back to his room. After a month or two, he comes back with a static collection of PSDs (Photoshop Documents).
Now: The designer collaborates and communicates with the client throughout the entire design process. He shares his solutions with as much insight and context when he learns the client’s problems.

3.2 DELIVERING WORKING PROTOTYPES:

Then: A collection of pages with notes about how things are supposed to interact is given to the client for review.

Now: The client is given the actual look and feel of the application that was intended by providing a native experience. This is done by delivering rapidly-constructed working prototypes.

3.3 BAKED-IN USER INTERFACE:

Then: More time is spent in making things look good, often at the cost of usability issues like long load times.

Now: Usability must be considered in every stage of the design process and create a product that people want to use. Light-as-possible User Interface with lightning-fast interactions.

3.4 ADDING VALUE AT EVERY STEP:

Then: A typical and formulaic design process with no ignition is given to thoughts like “What if we…”

Now: “Beating the curve by going beyond the brief”, imagining solutions to problems the client has not even thought about.

4. AN ALTERNATIVE FOR NATIVE APPS AND MOBILE WEB APPS?

The continuous evolution of smartphones and regular releases of newer mobile OS versions in each specific platform, high speed internet connections and the availability of a huge variety of native mobile applications from different app stores have completely transformed the way consumers use their mobile devices.

Native Mobile Apps: A native mobile application offers a rich and unique mobile experience to the customers. Platforms include iOS, Android, Windows Phone and other less popular operating systems. In native mobile app is designed, developed and deployed after a thorough analysis of mobile users’, on a desirable platform resolute by the company

Mobile Web Apps: Also, an approach that was increasingly popular until the upsurge in RWD, was developing a mobile version of their website. This was completely a separate version of the website, generally placed in the same server. Users who access their site with a mobile device are redirected to their mobile version of their site.

Meanwhile, in RWD one size fits all.
Where does RWD has an edge over its competing approaches?

- Single Code Base.
- Deliver across any screen size of various hardware from a 20” inches desktop monitor to even a 3” inches Smartphone.
- Improves Search Engine Optimization (SEO). When a single website share two different versions of itself, it deeply impacts the page rankings.
- Greatly reduces maintenance cost.
- Provides centralized control and flexibility. Whereas if native mobile applications of multiple platforms are built by different development companies, then the changes must be conversed to all.
- Easy marketing for mobile users.

A few areas where it fails to excite in comparison to Native Apps:

- User Experience is as not rich as native or mobile web apps.
- Navigation is mostly top to bottom. Left to Right navigation is possible in RWD but needs more customizations in the layouts of page elements.
- They have longer development cycles in comparison to building a native app from scratch. Even rebuilding a normal website to make it responsive in order to optimize across devices will add to the complexity.

Scenarios where RWD would be most applicable

- Corporate Websites/Blog Sites: In such sites where input and images are of minimal requirement, brand consistency is of primary concern and where target audience is higher, it is much easier to keep a consistent look and feel using RWD.
- Media/News Sites: Here, users are more accustomed to scrolling from top to bottom in their mobile devices. These sites are text heavy and require frequent content updates. Thus RWD reduces maintenance cost drastically in such sites.
- Location-based Services: Auto-adjustment is necessary in sites where map imagery needs zooming and re-sizing. This is well supported in RWD.

5. FRAMEWORKS VS. D.I.Y MANUAL DESIGNS

In general the framework is considered to resolve new problems of alike nature as it sets criteria’s, notion and practices in dealing varied exertions.

In the world of Web Design, it can be given a more straightforward definition; a framework is defined as a package made up of a structure of files and folders of standardized code (HTML, CSS, JS documents, etc.) Which can be used to support the development of websites, as a basis to start building a site?
Responsive CSS Frameworks are popular than Grid Systems (Grid-based Frameworks), as they greatly reduce time and effort in writing code for making sites responsive. They are compatible across browsers in all platforms. Other than responsiveness, some frameworks offer extra components and widgets that make sites look more rich and complete. Some of the most popular and richest frameworks available are:

**Bootstrap:** Bootstrap is a powerful, full-fledged CSS framework with an extensive component list, responsive design, and built-in Javascript functions.

The CSS Framework is built in with Javascript functions, leading to Bootstrap with the help of responsive design and extensive components making it powerful.

Bootstrap gives you everything you need to create production grade web pages from scratch.

Bootstrap provides functionality that instigate production of webpages from scratch.

Its features include Mobile-first, responsive design, grid-based layout with up to 12 columns. Also, including “media objects, extensive component list, alerts, progress bars, badges, jumbotron, nav bars, dropdown menus, etc. are available. Over a dozen custom jQuery plugins to create modals, dropdown menus, tabs, tooltips, popovers, and carousels “enhances the power of Bootstrap.

**Foundation:** An advanced responsive front-end framework. Foundation is built with Sass, a powerful CSS pre-processor, which allows us to much more quickly develop Foundation itself — and gives you new tools to quickly customize and build on top of Foundation. It comes loaded with a number of features, including faster animation rendering, icon fonts, better mobile experience with fastclick.js support, rapid-prototyping capabilities, etc.

**Skeleton:** A Beautiful Boilerplate for Responsive, Mobile-Friendly Development. Skeleton is a small collection of CSS files that can help you rapidly develop sites that look beautiful at any size, be it a 17” laptop screen or an iPhone. Some notable features: a responsive layout grid, standard media queries for your device-specific CSS style properties, a CSS class for responsive image elements that scale with the layout grid, a PSD template for mocking up your web designs, and an HTML5 shiv for old web browsers.

Apart from the above popular frameworks, other frameworks that are RWD-based include Pure CSS by Yahoo, UiKit, YAML, Titan, etc.

**Advantages and disadvantages of using frameworks**

**Advantages**

- Speeds up the mock-up process
- Uncomplicated and hassle free code
- Clarifications to usual CSS issues
- Browser compatibility
- Learn good practices
- Having a single procedure to resolve common problems makes maintaining various projects more straightforward.
Helpful in collaborative work

**Disadvantages**

- Merges presentations and contents
- Unused code leftover
- Slower learning curve
- You don’t learn to do it yourself

On the other hand, a framework-less DIY approach is not that hard, to be honest. It just takes more time. But it would be worth the time spent as one can learn to use the complete grid system and efficiently write CSS media queries to make them more responsive. Also, several plugins exist to make a normal website responsive, so that one does not need to worry about the ‘extra’ code, a framework provides in its library. Diving deeper into LESS and SASS would help a lot in writing code and style sheets for responsive websites.

### 6. SO... IS RESPONSIVE WEB DESIGN REALLY THE FUTURE?

Well, what does the future hold for Responsive Web Design or what does RWD hold for the future. A common answer is that new technologies need to adjust to the technological advancements and changing user behaviours. The process of evolution is progressive; the need for new and innovative ideas must be contributed by the web designers. The new buzz is around for voice based navigation of web which is nothing but audio responsive web pages is the next breakthrough in web.

Considering the likes of Siri, Cortana and OK Google, this is deployable. Currently the responsive webpage’s is a major breakthrough to web designing but still the future is open to unimaginable is solutions.

One of the great qualities of responsive design is that the template responds based on the dimensions of the screen, not the device that is being used.
What about Responsive Web Designs for Wearables?

With the launch of wearables like Apple Watch, Samsung Gear, Sony SmartWatch, Moto 360 and TagHeur Connected, many who own or have tried a wearable, however have probably noticed he lack of web browser present. Whilst it could be argued Apple and other wearable tech developers such as Android laid off the issue, the main reason could be the best technical teams aren’t able to provide a innovative solution to browser adaptable to 272px by 340px screen of a wearable. The pursuit to provide a full web experience is still in underway. The future of responsive web design is being screen independent rather being screen agnostic.

“In practical terms, it means dropping mobile-first, and adopting an audio-first approach. If your sites are optimised for screen readers, then they will function effectively on the next generation of web browser.”[4]

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“Internet of Things” is the new buzzword that is technologically revolutionising the world. Sci-fi stiffs that were once seen only in the movies few years ago have become realistic with the dawn of this revolution. Everything around us, from the spoon we eat, accessories we wear to the electronics at home are becoming increasingly connected with the ability to communicate to humans through IoT’s transformational impact. This might seem magical, but it is a pure experimentation of technology of how every element of human life can be controlled by it. Why do we innovate or invent? To make human life easier, comfortable and efficient so will IoT. It creates a platform for a highly personalised experience with the emergence of the virtual and the physical world through ubiquitous networking. Though it is at its nascent stage in the business world, the IoT has been transforming lives, business outlook which includes everything from the model to sales with its emergence since the mid 90s. It has grown exponentially since its evolution and has achieved a state of success that the Smartphone or Internet took twice the time to reach. Every innovation comes at the cost of effect on the industries to adopt it; will IoT tread the same path?

1. A BIT INTO HISTORY

People were connected to Internet since its birth but in 1999 a new age gave rise to things being connected to the Internet. It was at that time; Kevin Ashton coined the term “Internet of Things”.

The term “Internet of things” might have been coined only in 1999 and technology advancements might have elevated from then, but the concept of things being connected to internet has been in existence for many years and researchers were passionate about it since the early 1800s. Carl Friedrich Gauss and Wilhelm Weber developed a short-range communicative electromagnetic telegraph dating back to 1832 in Germany. Another famous personality and his research regarding wireless communication and energy transfer was that of Nikola Tesla’s. He once quoted in his interview back in the 1920s,

“Wireless will achieve the closer contact through transmission of intelligence, transport of our bodies and materials and conveyance of energy... When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole. We shall be able to communicate with one another instantly, irrespective of distance. Not only this, but through television and telephony we shall see and hear one another as perfectly as though we were face to face, despite intervening distances
of thousands of miles; and the instruments through which we shall be able to do his will be
amazingly simple compared with our present

telephone. A man will be able to carry one in his vest pocket” From then on, Innovation has
taken a leap to where we stand today. The Invention of big things like Circuit board,
computers, radio to small things like bar codes, touch screens, Bluetooth etc. that is taken
for granted today, have been made in a short span of 20 years, but we forget the several
decades of effort and inspiration that has taken to reach thispoint.

![2020 Vision](image)

2. SCENARIO FOR STARTUP’s

Starting a firm in IoT sector cannot be mentioned ‘easy’, but the process is becoming less
complicated. This is being mentioned considering the fact about number of rising startups
having IoT as its base technology or Product. Funding for an idea no more seems to be an
unachievable task. Investors find IoT to be gold strike. To give a comparative look, this is the
phase of which ‘www’ face in late 1990s among investors. The lifetime of the startup in IoT
sector seems to reduce at the rate, equal to the gain in market size. In spite of being at early
stages in market with niche customer base, it has gained the attention of not only investors,
but also giant players in market like Google, Facebook, Amazon, IBM, Cisco and many more.
This means, any potential startup will be keenly watched out by giants to be acquired down
the lane within years or months of start.

Ever since IoT started in the 1990s there has been a steady growth in application of the
technology and has resulted in a steady growth in few of the applications which are,
Connected Home gadgets, Infotainment, Navigation, Safety & Diagnostics, fitness
monitoring, action cameras, smart watches, connected city, health care tools and industrial
internet. These are the main types of industry where IoT has its impact currently. The
business models used by the these sectors currently in the market, are the same from last
decade of Internet. Starting with brick & mortar from the traditional time, to e-commerce and continuing to recent times of leveraging customer data, the field seems to make use of every possible business models out in market. But, there seems to be no innovative or dedicated business model for the Internet of Things sector. There is potential area untapped for fresher in the field of Internet of things. **Competing through business model innovation could put a fresh startup in leading position** rather than competing with products.

### 3. AND THE END!!!!

IoT is a companion and not a necessity at this stage, but the future is very clear. This is the next smartphone market with just half the period or less of ‘time to market’ that smartphone took. While the argument of technology push or market demand still is a debate just like in any other case, IoT is a technology push that has or will become a human need.

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LI – FI TECHNOLOGY

Compiled by:

Varsha Mohan and Sangeetha Pradeep

ABSTRACT

How sluggish our PC’s work when more than a device is tapped into the wireless network, we experience slow connection clogged airways produces difficulty to latch onto a reliable signal connection.

A German physicist Dr. Harald Haas introduced the idea of data carried through illumination. The process is carried out by taking fiber out of fiber optics. Then the data is sent through an LED light bulb which varies in its intensity, $3 \times 10^{-8} \text{ ms}^{-1}$ speed which a human eye cannot detect and follow. He calls his invention as “D-light Project”.

1. INTRODUCTION

Li-fi stands for light fidelity. A light based wi-fi connection can be called li-fi. Light is used instead of radio waves to transmit information. A transceiver-fitted LED lamp is used to light the room, transmit information. It can have many access points. The technology is powered by the theory of visible spectrum.

We encode and decode data in the presence of light by varying rate which LED’s flicker switch on and off. This process produces a string of binary values 1’s and 0’s. VLC data rates can be increased by sophisticated techniques.

Advantages:

* Cost effective as it uses LED light bulbs.
* It produces data rates faster than 10 megabytes per second.
* Transmission of data is fast and easy.
* Its bandwidth is 10,000 times than the radio waves.
* It is ideal for high density coverage in a confined region.
* It has no security issues as it is unable to detect by a human eye.
* Easy to work with.

Disadvantage:

* Requires many man hours for careful construction.
* Less familiar technology.
* Less reliability.
* You cannot dim light.
* Presence of light is essential.
* There should be line of sight.
* Very low efficiency with bulbs.
* Interference from external light sources.
* High installation cost of VLC systems.

Working:
Data connects to local network and internet is used to vary the LED source’s intensity. It is undetectable to human eye. Photo detector picks up signal, converts back into a data stream and sent to the client.

Client can communicate with their existing network. LED’s work quickly by switching on and off. This is helpful in data transmission. LED’s are put in a form of array for parallel data transmission. Other helpful method is to use a combination of different frequency. It produces a 10 Giga bytes per second speed.

**Construction:**
The LI_Fi chip consists of 4 primary sub-assemblies:
* Bulb
* RF power amplifier circuit (PA)
* Printed circuit board (PCB)
* Enclosure

The PCB controls the electrical inputs and outputs of the lamp. An RF (radio-frequency) signal is generated by PA is guided into an electric field about the bulb vaporizes the contents of the bulb to a plasma state and generates an intense source of light.

2. **APPLICATIONS**

* Traffic lights
* Intrinsically safe environments
* Public internet hotspots
* Underwater communications
* On airlines
* Green information technology
* Multi user communication
* Smarter power plants

3. **FUTURES OF LI-FI TECHNOLOGY**

LI-FI can be used in sensitive areas such as aircraft for data transmission without causing interference. It can be used in places where it is difficult to lay optical fibres like operation theaters.

In traffic scenario, LI-FI can be used to communicate with the LED lights of cars and might alert drivers when other vehicles are too close, so accident numbers can be decreased. It will improve conditions for those working in underwater oil rigs where radio waves can’t propagate.
4. CONCLUSION

Light is safe. It is used in places where radio frequency communication is a problem. Such as in aircraft, hospitals, and many more places.

It solves the trending problem of lack of spectrum space. It enables novel application. The visible light spectrum is usually not used and can be used for communication at high speed.

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Machine Learning is the area where we focus on developing programs that can teach themselves to learn and adapt themselves when exposed to new data. They learn from the past experiences and act accordingly.

WEKA tool is the most efficient and easy tool for learning machine learning algorithms. The question that arises in mind why to choose the Weka tool for learning machine learning algorithms? It is GUI tool that efficient enough to load the data sets, algorithms execution, design and run experiments with results to publish.

The following steps will help you in understanding the usage of Weka tool for running the machine learning algorithms.

1. **WEKA - EASY TO INSTALL**

   The simplest way to install Weka tool is to visit [www.cs.waikato.ac.nz/ml/weka/downloading.html](http://www.cs.waikato.ac.nz/ml/weka/downloading.html) the download page for Weka tool. Once you visit the page look for the suitable version for your PC(Windows, Mac or Linux). Java is required for Weka installation. If Java is not on your machine then you are required to see the Weka versions that include Java in the download page. The software will install Java for your with the Weka tool.

2. **FIRST STEP TO WEKA**

   There are two ways to launch Weka. The first way way is to launch with the help of program launcher. The second option is double clicking the weka.jar file. You can find that jar file in the Weka directory made on the machine when Weka is installed.

   Both the steps will start the GUI interface of Weka. The GUI chooser of Weka provides us with Explorer, Simple CLI, Experimenter and Knowledge Flow.
The second step is to click on the **Explorer button** to launch the Weka Explorer. The GUI lets you to load the data sets, execute various classification algorithms. The GUI lets you load data sets, run classification algorithms. It also provides other features like filtering the data, visualization, clustering, association rule extraction and selecting attributes.

![Weka Explorer](image)

**Fig 2: Weka Explorer**

### 3. LOADING THE DATA SET BANK.ARFF

The data sets are widely available on internet. You can easily download them and use them. Here we are using the data set called as **bank.arff**. You can create your own .arff (Attribute Relation File Format) file. We also have option in Weka where we can load the .csv file and use them. We need to click on **Open button** and select the .arff we want to use.
The bank data set is most commonly used data set used by the researchers and scholars for machine learning. This data set contains 300 instances (rows) with 9 attributes (columns).

4. CHOOSE AND RUN THE ALGORITHM

Once you have loaded the data set we can choose the algorithm and see the results. If we want to implement classification we can select the classify tab. Choose the algorithm you want to test, by default ZeroR algorithm is selected. Here we are selecting NaiveBayes under bayes folder for classification. After selecting the algorithm click on Start to run the algorithm.
Here we can see that it uses Cross Validation whose value is 10 folds. This value signifies that data set is split in 10 parts and first 9 are used for training the algorithm and the 10\textsuperscript{th} is used for assessing the algorithm. So, we can see that Weka is an efficient and helpful tool for developing ML applications. It is easy to install and its user friendly interface help the user to develop ML experiments in with efficiency and easiness.


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INTRODUCTION:

Hello Friends, Here we are going to build an android game. It is simple game has four buttons and mobile will make pattern by pressing it automatically and we have to follow the same track for button pressing.

GETTING STARTED:

Here I am using Android Studio IDE for android development. It is an official IDE for development. However you can use Eclipse + ADT for development.

You need the following things:
1. Android Studio.
2. Genymotion (It is an android emulator for testing our app. You can you use android studio emulator or you can run it on your Android mobile also.)
3. Basic Knowledge of android development.

Let’s Start:
Step 1: Create new Android Studio Project and Name it as MemoRush. Keep Company domain default.

Then select the empty activity in activity selection window.
Then check the create layout file checkbox is ticked then finish the project creation process.

Step 2: Wait till gradle building finishes.
Now we need to create layout of our game so go to
app>res>layout>activity_main.xml
Open it you will get mobile view. It is the GUI of game now you need to create four Buttons also add
Game title to top and other buttons to start game. Just Drag and Drop it from Palette and adjust it as
follows.

You can customize your game view as you want.

Step 3: Now it time to coding. Firstly you need to register the all components from layout file to java
file.
Step 4: We have to create the game state like Mobile Turn, Player Turn. Do is as follow:

```java
public class MainActivity extends AppCompatActivity {

    private Button[] mButtons = new Button[4];
    private TextView mLevelTextView;
    private TextView mStatusTextView;
    private ImageButton mStartButton;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        mButtons[0] = (Button) findViewById(R.id.button0);
        mButtons[1] = (Button) findViewById(R.id.button1);
        mButtons[2] = (Button) findViewById(R.id.button2);
        mButtons[3] = (Button) findViewById(R.id.button3);
        mLevelTextView = (TextView) findViewById(R.id.game_level);
        mStatusTextView = (TextView) findViewById(R.id.game_status);
        mStartButton = (ImageButton) findViewById(R.id.start_game);
    }
}
```

Step 5: Set creates function t set Button clickable or not. And call it on onCreate with false value.

```java
private void setButtonsClickable(Boolean clickable) {
    for (int i = 0; i < mButtons.length; ++i) {
        mButtons[i].setClickable(clickable);
    }
}
```

Step 6: Now get the Button Click event and check the current turn for game if it is of player let player to play else do the computers turn. It can done as follow.

```java
private void buttonClicked(int button) {
    if (mState != GameState.PlayerTurn) {
        return;
    }

    if (mComputerClicks.get(mPlayerClick) == button) {
        ++mPlayerClick;
        if (mComputerClicks.size() == mPlayerClick) {
            doComputerTurn();
        }
    } else {
        doGameOver();
    }
}
```

Step 7: Here doComputerTurn() it is the function to make computer button click event during computer turn buttons clicks are off.
In `doComputerTurn()` function we the to select random buttons and makes them clicks and show it to user so that user can follow it. It can done using following code.

```java
private void doComputerTurn() {
    setState(GameState.ComputerTurn);
    setButtonsClickable(false);
    int clicks = mComputerClicks.size() + 1;
    mComputerClicks.clear();
    mLevelTextView.setText("Level " + clicks);
    mStatusTextView.setText(R.string.get_ready);
    mStatusTextView.setTextColor(getResources().getColor(R.color.yellow));
    new ComputerTurnTask().execute(clicks);
}
```

```java
private class ComputerTurnTask extends AsyncTask<Integer, Integer, Void> {
    Random mRandom = new Random();
    protected Void doInBackground(Integer... clicks) {
        delay(1500);
        int computerClicks = clicks[0];
        int clickDelay = getClickDelay(computerClicks);
        int pressDuration = getPressDuration(computerClicks);
        for (int i = 0; i < computerClicks; ++i) {
            delay(clickDelay);
            int buttonIndex = mRandom.nextInt(mButtons.length);
            mComputerClicks.add(buttonIndex);
            publishProgress(buttonIndex);
            delay(pressDuration);
            publishProgress(buttonIndex);
        }
        return null;
    }
    protected void onProgressUpdate(Integer... buttonIndexes) {
        int buttonIndex = buttonIndexes[0];
        Button button = mButtons[buttonIndex];
        button.setPressed(!button.isPressed());
        button.invalidate();
    }
    protected void onPostExecute(Void unused) {
        mPlayerClick = 0;
        setState(GameState.PlayerTurn);
        setButtonsClickable(true);
        mStatusTextView.setText(R.string.player_turn);
        mStatusTextView.setTextColor(getResources().getColor(R.color.green));
    }
}
```

Here we set buttons unclick able and setting text to display user which level is going on also we notifying user about clicks.

ComputerTurnTask is the Background task to make click in ramdom pattern and display to user. In `doInBackground` we making random button click and `onProgressUpdate` we are displaying the button click to user and `onPostExecute` we are set the player turn on.
Step 8: Now speeding up the game we will decrease the time delay between button clicks in Computer Turn. This can be done using following code.

Step 9: Now build the project. Check is there any error or not. If there is error the try to remove it and rebuild it.

Step 10: final step run your project on Android Emulator for testing.

You will Output like this.

Step 11: It is an Optional step if you want to run it on Your mobile the go to the workspace> MemoRush>app>build>outputs>apk>app-debug.apk

Copy this file to your mobile and install it.

Congrats . You build your own game.

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PARADIGMS OF COMPUTATIONAL INTELLIGENCE

Compiled by:

Namitha S.J. and Krishnapriya Surendran

ABSTRACT

Computational Intelligence (CI) has successfully used in the recent years. It is used to address various challenges like optimal deployment, data aggregation and fusion, energy aware rooting, task scheduling and security.

CI provides adaptive mechanisms that shows intelligent behavior and complex and dynamic environments like Wireless Sensor Networks. It brings flexibility, autonomous behavior and robustness against topology changes, communication failure, and scenario changes. However WSNs can make use of potential CI algorithms to overcome the challenges in Wireless Sensor Network. This presentation includes some of the WSN challenges and their solutions using CI paradigms.

1. INTRODUCTION

Paradigms of CI have found practical application in areas such as product designs, robotics, intelligent control, sensor networks. Researches has successfully used CI techniques to address many challenges in WSNs. Various research communities are developing these applications and a single overview of this does not exist. Their aim is to connect the gap between CI approaches and applications which provide the Wireless Sensor Networks researches with new ideas and incentives.

CI is a successor of artificial intelligence which relies on heuristic algorithms like Fuzzy systems, neural networks, evolutionary computations etc. Besides, CI also embraces that use techniques that use Swarm intelligence, Fractals and Chaos Theory[2]. Artificial immune system, Wavelets etc. CI is a combination of learning and evolution used to intelligent applications. Computational intelligence research may not reject statistical methods, but gives a complementary view of implementation of these methods. CI is closely associated with soft computing a combination of neural networks, fuzzy logic , connectionist systems like cybernetics and artificial intelligence.[3]

CI experts may consider the biological inspirations from the nature for implementations, but even if biology is extended to all psychological inspirations then CI includes only the neural, Fuzzy and evolutionary algorithms. Genetic algorithm is only the solution for solving optimization problems. CI studies for which there are no effective algorithms, either it is not possible to formulate them or because they are complex and not effective in real life applications. Broad definition of Computational Intelligence is a branch of computer science studying problems for which there are no effective computational algorithms[1].

A discussion on yet unexplored challenges in WSN and a projection on potential CI applications in WSN are presented to encourage researchers to use CI techniques in WSN applications.
2. FUZZY LOGIC

Classical set of theory allows elements to either included in a set or not. This is a contrast between human reasoning, which includes a measure of imprecision and uncertainty, which is marked by the use of linguistic variables. This is modeled by a multi valued logic called Fuzzy logic, that allows intermediate values to be defined between threshold values. Fuzzy systems allow the use of fuzzy sets to make decisions and to draw conclusions.[4]

The general form of fuzzy rule is that if antecedent(s) then consequence(s), where antecedents and consequents are propositions containing linguistic variables example : most. Antecedents of a fuzzy rule form a combination of fuzzy sets through the logic operation use. Thus fuzzy sets and fuzzy rules together form the knowledge base of a rule based inference system.

Evolutionary algorithm which is the process of adaptation with the aim of improving survival capabilities through the process such as natural selection, survival-of-the-fittest, reproduction, mutation, competition and symbiosis. EC encompasses a variety of EAs that share a common underlying ideas of the survival-of-the-fittest. EAs use a population of solution candidates called chromosomes that are composed of genes, which represent different characteristics. The reproduction process is continued generation after generation until a fit-enough solution is found or a previously set computational limit is attained.

3. SWARM INTELLIGENCE

Swarm Intelligence (SI) is the study of collective behavior of societies of biological species. Swarm Intelligence is the property of a system in which collective behaviors of unsophisticated agents interacting locally with their environment. The unpredictable bird-flock choreography inspired the development of particle swarm optimization, impressive ability of a group of ants to find the shortest path to their food inspired the development of ant colony optimization.

The fitness is determined in such a way that a particle closer to the solution has higher fitness value than a particle that is far away from the solution. In each iteration velocities and position of all particles are updated to persuade them to attain better fitness. The process of updating is repeated iteratively till a particle reaches the global solution with in permissible tolerance limit, or until a large number of iterations is reached. The direction and magnitude of movement of a particle is affected by its previous velocity, its experience and the knowledge that acquires through social communication.

4. CONCLUSION

A great challenge for CI community is to propose more efficient knowledge representation modeled on the associative memory by different knowledge for different purposes[5]. The aim of CI is to develop cognitive system, that could compete with humans in most of the areas. CI is the branch of computer science for solving non-algorithmic problems that may occur in the near future.
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6. 

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ABSTRACT

With the extensive use of technology, it has been the vital function to develop something new in both software and hardware. A worn out battery and a lost charges are the two difficulties every electronic device user undergoes through. To overcome this we have proposed a new technology to adopt charging of these portable electronic devices with the help of human walk. Walking is one of the best and common activities in day to day life. As per the study of biomechanics, it is seen that ground reaction force (GRF) exerted from the foot, when converted into voltage gives ample power supply to run a device. While walking the person loses energy from foot in the form of vibrations which are sensed and then converted into electric energy using micro fluids. The method combines reverse electrowetting on dielectric (REWOD) phenomenon with the rapid self-oscillating process of growth of bubble and its collapse. Fast bubble dynamics, along with REWOD, gives a chance to increase the generated power density by over an order of magnitude, when compared to the REWOD. This conversion of energy approach is well suited for energy harvesting applications and would help in effective coupling to a broad array of mechanical systems like these ubiquitous but difficult to utilize low-frequency energy sources such as human and machine motion. The method can be scaled from a single micro cell with $10^{-6}$ W output to power cell with a total power output in excess of 10 W. This makes the fabrication of small light-weight energy harvesting device capable of producing a large range of power outputs feasible.

1. INTRODUCTION

An electronic device like mobile phones, tablets, and laptops has become an indispensable part of our daily life. However, powering challenge — electrical batteries bottleneck impeding portable Now a solution to this has come up. Smartphone battery is low, in the charge it simply by plugging it into harvesting and storage technology our reliance on the batteries in our power for our devices and no mobile electronic devices is a often emerge as a critical electronics usage and development. When we are on the go and our not-so-distant future we could our shoes. An innovative energy is developed that could reduce devices, ensuring that we have matter where we are.

Human walking has a lot of energy. Theoretical analysis show that it can produce up to 10 watts per shoe. This energy is wasted as heat. A total of 20 watts from walking is actually not a small thing compared to the power requirements of the majority of modern mobile devices. Tapping onto that
A little amount of energy is enough to power mobile electronic devices, including Smart phones, tablets, laptop computers and flashlights.

### 1.1 EXISTING SYSTEM

Currently a technology called reverse electrowetting—a novel micro fluidic phenomenon, is used. Energy generation is achieved through the interaction of moving microscopic liquid droplets with a multilayer thin film. With this approach, as a conductive liquid interacts with a nano film-coated surface, the mechanical energy is directly converted into electrical energy. This method has a number of advantages over traditional conversion methods such as electromagnetic, piezoelectric, and electrostatic. Most notably, it has the potential to produce very high power densities, the ability to utilize a wide range of forces and displacements, and the ability to produce power at a broad range of currents and voltages without the need for up or down conversion. The reverse electrowetting method can generate usable power densities up to $10^3 \text{ W m}^{-2}$, but it requires a source of energy with reasonably a high frequency, such as a mechanical source that vibrates or rotates quickly.

**Reverse electro wetting concept:** The movement of a conductive liquid on a dielectric-coated conductive substrate has been a part of electro wetting-on-dielectric (EWOD) phenomenon. In a classical electro wetting experiment liquid spreading on the dielectric surface is done in parallel as electrically induced increase in the dielectric surface wettability. The wettability change originates from the extra electrostatic energy that is in association with the liquid–solid interface that is electrically charged, which is formed as the voltage from an external source is applied between the droplet which is conductive and the electrode coated with dielectric film.

### 1.2 DISADVANTAGE OF EXISTING SYSTEM

Maximum achievable power density represents one of the most important characteristics of the energy conversion method in many applications. In energy harvesting high power density (ether by volume or by area) is very desirable, as it enables the fabrication of smaller and lighter devices that can be coupled to a broad range of energy sources. Power generated using REWOD can be maximized mainly using two methods. One is to increase the energy produced during each droplet oscillation, most notably by increasing the applied bias voltage, or by increasing the capacitance of the liquid-solid interface. However, this approach has an obvious limitation as a higher capacitance requires a thinner dielectric film which, in turn, restricts the maximum bias voltage that can be applied across the interface without the risk of electrical breakdown. The second approach is to increase the oscillation frequency of the droplet. This not only increases the total power by producing more energy generating events per unit time, but also increases the energy produced for each oscillation due to the dynamics of the electrical charge transfer during the REWOD process. This change in energy per cycle as a function of frequency for a specific bias voltage is shown in the figure below. Thus increasing the droplet oscillation frequency represents a particularly effective way to raise the power density generated by the REWOD. However, under regular circumstances, achieving a high droplet oscillation frequency requires an energy source capable of providing mechanical excitations with the comparably high frequency. Such sources of mechanical energy are not uncommon, with vibrations commonly generated by vehicles or operating machinery being a prime example. Unfortunately, a very broad range of potential mechanical energy sources ubiquitous in our environment is characterized by low to medium frequencies, from a fraction of a Hz to several Hz. Typical examples of these sources include human and machine motion, waves and tides, wind and temperature induced motion of building or other large structures, etc. All of those sources can generate high level of forces, and thus provide substantial mechanical power, but their
characteristic frequency is too low to enable high energy harvesting power densities that the REWOD process is capable of achieving. One possible way to circumvent this issue is to utilize the energy harvesting approach that does not rely on the mechanical energy source to generate the required high frequency excitations but, instead, utilizes an internal fast oscillation process, which is independent from the mechanical energy source behavior. The challenge with this approach is to find a practical method of achieving such fast internal oscillation dynamics without resorting to complex mechanical or hydraulic systems.

2. PROPOSED SYSTEM

The “bubbler” method provides an elegant solution to this problem by combining the REWOD phenomenon with a high frequency oscillation process, naturally occurring during the bubble growth and collapse. The bubbler method unifies reverse electro wetting with bubble growth and collapse. This makes it well suited for extracting energy from a variety of mechanical energy sources characterized by a wide range of frequencies and allows one to dramatically increase the generated power, which is proportional to the product of the oscillation frequency and the energy produced during each oscillation.

2.1 BUBBLER CONCEPT

The bubbler conceptual design is very simple. The core of the bubbler contains no moving mechanical parts and consists of three major elements: a REWOD chip with an array of dielectric-coated circular electrodes, each electrode having a hole in the center, a thin membrane separated from the REWOD chip by a small gap, and a top plate, which serves to support the membrane and allows the dielectric fluid to escape. The gap between REWOD chip and membrane is filled with a conductive liquid, that does not wet the membrane and thus cannot penetrate it. A pressurized dielectric fluid (e.g. air, inert gas, or a dielectric liquid) is supplied through the holes in the chip, causing dielectric bubbles to grow on top of each circular electrode. The growing bubbles displace the conductive liquid and thus reduce the area of overlap between the conductive liquid and the electrodes, inducing electrical current in the circuit. Each bubble continues to grow until it becomes large enough to touch the membrane. At this point the dielectric fluid starts to escape through the membrane, causing a rapid bubble collapse. The frequency, with which the bubble growth and collapse process repeats itself, is controlled by the size of the gap between the membrane and the electrode, by the viscosities of the fluids, and by the pressures applied to the dielectric fluid and the conductive liquid.

This is particularly true for low-frequency energy sources, such as human, machine, or buildings motion. Very low frequencies (from several Hz to less than 1 Hz) typical for such motion can severely hamper energy harvesting by dramatically reducing the number of energy generating events per unit time. However, since the bubbler energy generating events frequency is determined by the frequency of the bubble self-oscillation, which is independent of the frequency associated with the energy source, the energy density of the bubbler method remains high. For example, a simple bubbler device, which can be integrated into footwear to enable energy harvesting from human locomotion (about 1 Hz frequency) is shown in figure below. In this case
the bubbler chip is located between two chambers filled with the pressurized gas. During the heel strike the top elastic chamber is compressed and the gas is displaced through the REWOD chip inducing many thousands of bubble oscillations, each of which converts a portion of mechanical energy of the heel strike into electrical energy. During the toe-off process the compressed gas flows from the bottom chamber back to the top chamber through an auxiliary bypass check valve completing the cycle. Estimations show that such a device can generate about 1 W of usable electrical power. The oscillatory flow induced by the bubble growth and collapse process unavoidably causes mechanical energy dissipation due to viscous forces. This, in turn, affects the bubbler energy conversion efficiency. The rate of energy dissipation depends strongly on the details of the bubbler geometry. The major contributors are the gap thickness, the bubble size, and the inlet-hole diameter, as well as the fluid viscosity and the bubble oscillation frequency. Analytics prove that the energy conversion efficiency of the bubbler setup used in the current experiment is on the order of several percent. This, however, does not represent the intrinsic limitations of the technology, as the current experimental setup has not been optimized for efficiency. In many situations the energy conversion efficiency is not the most important characteristic of the energy harvesting technology. Because for a wide range of applications the power absorbed by the harvester is much smaller than the power of the energy source itself, the behavior of the source is not influenced by the harvester in any appreciable way. Under such circumstances the most important characteristic of the harvesting technology is its power density as it directly determines the maximum power that can be generated by the harvester of a particular size.

### 2.2 ADVANTAGES OF THE PROPOSED SYSTEM

The main advantage of the bubbler approach is its ability to combine a high frequency self-oscillation process, naturally occurring during the air bubble growth and collapse, with the REWOD-based energy conversion process, which is capable of producing large quantities of energy per each oscillation. This allows one to maximize the produced power, which is in proportion to the product of the oscillation frequency and the energy produced during each oscillation. Experimentally obtained power density was about 100 Wm$^{-2}$, and theoretical estimates show that power densities in excess of 10 kWm$^{-2}$/can be expected under the right conditions. The bubble self-oscillation occurs naturally as long as there is an external pressure applied to the device thus allowing effective coupling of the device to mechanical energy sources possessing a wide range of forces, displacements, and frequencies. The simplicity and flexibility of the bubbler approach makes it particularly suitable for the energy harvesting applications, especially for cases where direct coupling to low-frequency, high-force mechanical energy sources, such as human, machine, or buildings motion is desired. This will lead to the development of a wide range of REWOD based energy harvesting devices.

### 3. CONCLUSION

This could directly power various mobile devices through a charging cable, or it could be integrated with a broad range of devices that are electronic in nature embedded in a shoe, such as a Wi-Fi hot spot that acts as a “middleman” between mobile devices and wireless network. The latter would require no cables; dramatically cuts the power requirements of wireless mobile devices, and can make a cell phone battery last 10 times longer between charges. For a Smartphone, the energy cost of the transmission of radio frequency back and forth between the phone and the tower is a tremendous contributor to the total drain of the battery.
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PILL CAMERA - (AN APPLICATION OF NANOTECHNOLOGY)

Compiled by:

Sanjya Javed

The technology used to achieve manufacturing at molecular level is “NANOTECHNOLOGY”. Nanotechnology is the creation of useful materials, devices and system through manipulation of such miniscule matter (nanometer). Nanotechnology deals with objects measured in nanometers. Nanometer can be visualized as billionth of a meter or millionth of a millimeter or it is 1/80000 width of human hair. One such product manufactured is PILL CAMERA, which is used for the treatment of cancer, ulcer and anemia. It has made revolution in the field of medicine. This tiny capsule can pass through our body, without causing any harm. It takes pictures of our intestine and transmits the same to the receiver of the Computer analysis of our digestive system.

PILL CAMERA:

1. INTRODUCTION

Imagine a vitamin pill-sized camera that could travel through your body taking pictures, helping diagnose a problem which doctor previously would have found only through surgery. No longer is such technology the stuff of science fiction films.

2. CONVENTIONAL METHOD

Currently, standard method of detecting abnormalities in the intestines is through endoscopic examination in which doctors advance a scope down into the small intestine via the mouth. However, these scopes are unable to reach through all of the 20-foot-long small intestine, and thus provide only a partial view of that part of the bowel. With the help of pill camera not only can diagnoses be made for certain conditions routinely missed by other tests, but disorders can be detected at an earlier stage, enabling treatment before complications develop.
2.1 DESCRIPTION:

The device, called the given Diagnostic Imaging System, comes in capsule form and contains a camera, lights, transmitter and batteries. The capsule has a clear end that allows the camera to view the lining of the small intestine. Capsule endoscopy consists of a disposable video camera encapsulated into a pill like form that is swallowed with water. The wireless camera takes thousands of high-quality digital images within the body as it passes through the entire length of the small intestine. The latest pill camera is sized at 26*11 mm and is capable of transmitting 50,000 color images during its traversal through the digestive system of patient.

Video chip consists of the IC CMOS image sensor which is used to take pictures of intestine. The lamp is used for proper illumination in the intestine for taking photos. Micro act as memory to store the software actuator code that is the instructions. The antenna is used to transmit the images to the receiver. For the detection of reliable and correct information, capsule should be able to designed to transmit several biomedical signals, such as pH, temp and pressure. This is achieved with the help of Soc.

2.2 WORKING:

It is slightly larger than normal capsule. The patient swallows the capsule and the natural muscular waves of the digestive tract propel it forward through stomach, into small intestine, through the large intestine, and then out in the stool. It takes snaps as it glides through digestive tract twice a second. The capsule transmits the images to a data recorder, which is worn on a belt around the
The patient’s waist while going about his or her day as usual. The physician then transfers the stored data to a computer for processing and analysis. The complete traversal takes around eight hours and after it has completed taking pictures it comes out of body as excreta. Study results showed that the camera pill was safe, without any side effects, and was able to detect abnormalities in the small intestine, including parts that cannot be reached by the endoscope.

### 2.3 CIRCUIT BLOCK DIAGRAM OF TRANSMITTER AND RECEIVER:

In the first block diagram, one SMD type transistor amplifies the video signal for efficient modulation using a 3 biasing resistor and 1 inductor. In the bottom block, a tiny SAW resonator oscillates at 315 MHZ for modulation of the video signal. This modulated signal is then radiated from inside the body to outside the body.

For Receiver block diagram a commercialized ASK/OOK (ON/OFF Keyed) super heterodyne receiver with an 8-pin SMD was used. This single chip receiver for remote wireless communications, which includes an internal local oscillator fixed at a single frequency, is based on an external reference crystal or clock. The decoder IC receives the serial stream and interprets the serial information as 4 bits of binary data. Each bit is used for channel recognition of the control signal from outside the body. Since the CMOS image sensor module consumes most of the power compared to the other components in the telemetry module, controlling the ON/OFF of the CMOS image sensor is very important. Moreover, since lightning LED’s also use significant amount of power, the individual ON/OFF control of each LED is equally necessary. As such the control system is divided into 4 channels in the current study. A high output current amplifier with a single supply is utilized to drive loads in capsule.

### 3. EXTERNAL CONTROL UNIT

A schematic of the external control circuit unit is illustrated below, where the ON/OFF operation of
the switch in the front of the unit is encoded into 4 channels Control signals. These digital signals are then transferred to a synthesizer and modulated into an RF signal using a OOK transmitter with a carrier frequency of 433 MHz. To verify the operation of the external control unit and telemetry capsule, CH1 was used to control ON/OFF of CMOS image sensor and CHs 2-4 to control led lighting. The four signals in front of the control panel were able to make 16 different control signals (4 bit, 2^4 = 16). The bi-directional operation of telemetry module is verified by transmitting video signal from CMOS image sensor image data was then displayed.

![Diagram of external control circuit](image)

The proposed telemetry capsule can simultaneously transmit a video signal and receive a control signal, determining the behavior of the capsule. As a result, the total power consumption of the telemetry capsule can be reduced by turning off the camera power during dead time and separately controlling the LEDs for proper illumination in the intestine. Accordingly, proposed telemetry module for bidirectional and multi-channel communication has the potential applications in many fields.

### 4. APPLICATIONS OF NANOTECHNOLOGY IN OTHER FIELDS

- Nanotechnology may have its biggest impact on the medical industry. Patients will drink fluids containing nanorobots programmed to attack and reconstruct the molecular structure of cancer cells and viruses to make them harmless.
- Nanorobots could also be programmed to perform delicate surgeries—such as nanosurgeons could work at a level a thousand times more precise than the sharpest scalpel. By working on such a small scale, a nanorobot could operate without leaving scars that conventional surgery does.
- Additionally, nanorobots could change your physical appearance. They could be programmed to perform cosmetic surgery, rearranging your atoms to change your ears, nose, eye color or any other physical feature you wish to alter.
- There's even speculation that nanorobots could slow or reverse the aging process, and life expectancy could increase significantly.
- In the computer industry, the ability to shrink the size of transistors on silicon microprocessors will
soon reach its limits. Nanotechnology will be needed to create a new generation of computer components. Molecular computers could contain storage devices capable of storing trillions of bytes of information in a structure the size of a sugar cube.

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ABSTRACT
This is based evolution of RAIN technology, its requirement, architecture, components, advantages and its disadvantages, features. RAIN was developed to overcome the problem of cloud computing and current existing problem on accessing internet. RAIN technology provide a method for fault tolerance in different topology, it is not covered by cloud computing. RAIN say nodes are always available on networks, and they use different mechanism to identify faulty nodes and it was replaced by healthy nodes.

1. INTRODUCTION
Rain technology has the disadvantages of cloud computing. It was developed by the California Institute of Technology, in a collaboration NASA’S Jet population laboratory and DARPA. The name RAIN, which stands for RELIABLE ARRAY OF INDEPENDENT NODES. Rain technology has the capacity for solution by reducing the number of nodes in the chain linking the client and the server in addition to making the current node more robust and more autonomous. The objective of the rain is to recognize and make key to building blocks. It is for reliable distributed systems build using reasonably priced off-the-shelf components.[1][3].

1.1 GOALS OF RAIN TECHNOLOGY
Rain technology is offering the solution by minimizing number of nodes in the chain connecting the client and the server. Rain technology has made exiting nodes that are robust and independent. RAIN technology offers the feature of replacing faulty node by a healthy one[3].

1.2 ADVANTAGES
* It has no limit on the size of a RAIN cluster.
* It has no concept of master-slave relation.
* A RAIN cluster has the capacity to tolerate multiple node failure.
* High efficiency in traffic management.
* Addition of new node into the cluster and that is used to participate in load sharing components.

1.3 DISADVANTAGES
* Installation and configuration has time consuming and requires maintenance.
* If the node of the topology fails, it will not disturb the RAIN topology. But if the switch fails, it affects the network partially and switch has to be required as early as possible.

2. **TOPOLOGY USING RAIN**

Rain technology used in building the structure of topology. It minimizes the number of nodes and removes the extra nodes. It has the capacity to provide the solution by minimizing the total number of nodes in network. That is between client and server. The total number of nodes are minimum, and so the data transmission time will be reduced from source node to destination node. Delay factor will be reduced. Data transmission can be done within less period of time.

**Star Topology:**

In star topology the nodes are attached to central HUB or switch.

**Ring Topology**

Formation of ring like network by the connection of one node with another node.

**Bus Topology**

In Bus topology backbone cable is used because all the nodes of network are connected. Therefore all node of network communicate with each other via backbone cable.

**Mesh Topology**

Every node of network in Mesh topology has a dedicated point to point link to every other device. A connected mesh network has n (n-1)/2 physical channels. It is used to link the n channels. To accommodate that many links, every device on the network has n-1 input/output ports [5].

3. **APPLICATION OF RAIN TECHNOLOGY**

We present proof-of-concept applications related to the RAIN building blocks:

- A video server is related to the RAIN communication and data storage.
- A Web server related to the RAIN fault management component.

- A distributed check pointing system related to the RAIN storage component, and a leader election protocol [4].
4. CONCLUSION

RAIN technology has been exceedingly advantageous in facilitating resolution of high availability and load balancing programs. It is applicable to an extensive range of networking applications, such as firewalls, web servers, IP telephony gateways, application routers etc. The purpose of the RAIN project has been to pave a way to fault management, communication and storage in a distributed environment. It integrates much significant exclusive innovation in its core elements, like unlimited scalability, built-in reliability, portability etc. The development of a fully functional distributed computing system it is very useful.

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Most modern cryptographic schemes rely on computational complexity for their security. In principle, they can be cracked, but that would take a prohibitively long time, even with enormous computational resources.

There is, however, another notion of security — information-theoretic security — which means that even an adversary with unbounded computational power could extract no useful information from an encrypted message. Cryptographic schemes that promise information-theoretical security have been devised, but they’re far too complicated to be practical.

In a series of papers presented at the Allerton Conference on Communication, Control, and Computing, researchers at MIT and Maynooth University in Ireland have shown that existing, practical cryptographic schemes come with their own information-theoretic guarantees: Some of the data they encode can’t be extracted, even by a computationally unbounded adversary.

The researchers show how to calculate the minimum-security guarantees for any given encryption scheme, which could enable information managers to make more informed decisions about how to protect data.

“By investigating these limits and characterizing them, you can gain quite a bit of insight about the performance of these schemes and how you can leverage tools from other fields, like coding theory and so forth, for designing and understanding security systems,” says Flavio du Pin Calmon, a graduate student in electrical engineering and computer science and first author on all three Allerton papers. His advisor, Muriel Médard, the Cecil E. Green Professor of Electrical Engineering and Computer Science, is also on all three papers; they’re joined by colleagues including Ken Duffy of Maynooth and Mayank Varia of MIT’s Lincoln Laboratory.

The researchers’ mathematical framework also applies to the problem of data privacy, or how much information can be gleaned from aggregated — and supposedly “anonymized” — data about Internet users’ online histories. If, for instance, Netflix releases data about users’ movie preferences, is it also inadvertently releasing data about their political preferences? Calmon and his colleagues’
technique could help data managers either modify aggregated data or structure its presentation in a way that minimizes the risk of privacy compromises.

**STAYING CLOSE**

To get a sense of how the technique works, imagine an encryption scheme that takes only three possible inputs, or plaintexts — “A,” “B,” and “C” — and produces only three possible outputs, or ciphertexts. For each ciphertext, there is some probability that it encodes each of the three plaintexts.

The ciphertexts can be represented as points inside a triangle whose vertices represent the three possible plaintexts. The higher the probability that a given ciphertext encodes a particular plaintext, the closer it is to the corresponding vertex: Ciphertexts more likely to encode A than B or C are closer to vertex A than to vertices B and C. A secure encryption scheme is one in which the points describing the ciphertexts are clustered together, rather than spread out around the triangle. That means that no ciphertext gives an adversary any more information about the scheme than any other.

Of course, for most encrypted messages, there are way more than three possible corresponding plaintexts. Even a plaintext as simple as a nine-digit number has a billion possible values, so the probabilities corresponding to an encoded Social Security number would describe a point in a billion-dimensional space. But the general principle is the same: Schemes that yield closely clustered points are good, while schemes that don’t are not.

An adversary wouldn’t actually know the probabilities associated with any given ciphertext. Even someone with access to an encryption scheme’s private key would have difficulty calculating them. For their analyses, Calmon, Médard, and their colleagues developed security metrics that hold for a wide range of distributions, and they augmented them with precise calculation of the worst cases — the points farthest from the center of the main cluster. But the mathematical description of the degree to which the probabilities cluster together is a direct indication of how much information an adversary could, in principle, extract from a ciphertext.

**TARGETED PROTECTION**

In their first Allerton paper, in 2012, the researchers used this probabilistic framework to demonstrate that, while a ciphertext as a whole may not be information-theoretically secure, some of its bits could be. It should thus be possible to devise encryption schemes that can’t guarantee perfect security across the board but could provide it for particular data — say, a Social Security number.

“Talking with cryptographers, they would always ask us, ‘Oh, cool! You can guarantee that regardless of what you do, you can hide individual symbols. What about functions of the plaintext?’” Calmon says. “Standard cryptographic definitions of security care about that.”

An encryption scheme might, that is, guarantee that an adversary can’t extract an encoded Social Security number; but it might still allow the adversary to extract the last four digits of the number. Similarly, it might prevent an adversary from determining a subject’s age; but it might allow the adversary to deduce that, say, the subject is between 30 and 40 years of age.
This is the problem that the researchers tackle in their last two Allerton papers. There, Calmon, Médard, and Varia show that if you can determine that a particular function is difficult or easy to extract from a ciphertext, then so are a host of correlated functions. In addition to addressing cryptographers’ concerns about functions of the plaintext, this approach has the advantage of not requiring analysis of massively multidimensional probability spaces. Information about the security of a single function — which can often be determined through a fairly simple analysis — can provide strong guarantees about the security of an encryption scheme as a whole.

“Perfect secrecy is a very stringent requirement — essentially, the only way of guaranteeing that is to use a one-time pad, like they would in spy novels,” says Maxim Raginsky, an assistant professor of electrical and computer engineering at the University of Illinois at Urbana-Champaign. “Instead, let’s just accept the empirical fact that practical security systems we rely on every day do not deliver perfect secrecy. Some information about the data they try to protect will leak out. The work by Calmon, Varia, and Médard shows that there are limits to what an adversary can infer from this leaked information. Naturally, this is relevant in the age of big data.”

The mathematical techniques that the MIT researchers employed “have been used in statistical analysis,” Raginsky adds. “But the information-theoretic implications are all new. This will definitely lead to a great deal of interesting research activity.”

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THE SEMANTIC WEB: AN APPROACH TOWARDS MACHINE PROCESSABLE WEB CONTENT

Compiled by:
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1. INTRODUCTION

The Semantic Web has emerged out of underlying WWW, where the web documents can be represented in natural language and the underlying annotated design could be used by software agents, which enable them to share, reuse and integrate information in convenient manner. Tim Berners-Lee's demarcates semantic web as future of the Web exchange format for varied data formats and knowledge exchange. On the basis of W3C recommendation, a layered architecture has been proposed which allows the developer’s to formulate and publish information in a machine-processable way which would enable the growth of a new generation of semantically enabled technologies and toolkits.

With billions of static web pages, the World Wide Web could be assumed as the largest information repository of the world. To this, we have to add the data of the deep or hidden web, i.e. information usually stored in relational databases, made accessible through online forms or dynamic web pages. As a result, finding the right pages becomes a challenging task, which has to be mastered by anybody searching for specific information on the Web. Today’s web content search requires human involvement in order to extract information.

2. SEMANTIC WEB IMPACT: KNOWLEDGE MANAGEMENT

Since most of the data on WWW is available in weakly structured form (e.g. image, video), hence acquiring, accessing, and maintaining information on such a large repository is bottleneck in current context of web. These kinds of knowledge management activities are of utmost importance within an organization (particularly those which are geographically dispersed).Current web uses keyword based search engines which lacks semantic, hence information extraction depends upon human involvement and human expertise for browsing, retrieving, interpreting, combining the final results. Inconsistencies in terminology and outdated information affect the information authenticity and maintenance.
Consider the example of Government financial tax computation, which comprise of numerous clause and sub clause for computation and deduction based on norms which are periodically revised. In such scenario knowledge management is inevitable.

Semantic web uses the concept of conceptual spaces according to semantic. By making use of adding appropriate annotations and metadata, more refined structure is achieved on which automated tools could be used for maintenance and knowledge discovery. Query is based on semantics which has many advantaged as compared to test based search.

In future personal agents may help for relevant searching of documents and web pages as depicted by the figure 1.

2.1 SEMANTIC WEB TECHNOLOGIES

Semantic web technology has emerged out of the existing web 1.0 and 2.0. Figure 2 shows the semantic web tower, which comprise of several layers. The bottom layer comprises of URI (Unique resource identifier) and UNICODE.
RDF is recommended standard for data model, which represents statements about Web resources. It signifies a triplet (Subject, Property, and Value). The same information could be represented via a semantic net graph. W3C has recommended set of syntax and prefixes which follows the structure of XML. The RDF triplet grows to wider dimension with linked information, which gives rise to grouping and modelling the terms into classes, relates them via property and sub property. Validation and restriction for domain and ranges could also be done with help of RDF Schema.

Ontology formalizes concepts within a domain. It helps to manage these concepts by integrating them to other proposed ontology, which results in enhancing the knowledge base. OWL (Web Ontology Language) is accepted standard by W3C to represent Ontology. It offers both syntax as well as semantics.

The Logic layer makes use of ontology for applying mathematically verifiable outcomes and inference on basis of rules. The Proof layer checks the correctness of deduced information from lower layers through proper validation. Finally, the topmost Trust layer is proposed to make use of digital signatures in order to confirm the source to be of trusted, certified and reliable.

3. APPLICATIONS OF SEMANTIC WEB

Semantic web could be applied to varied dimension of domain. It is preferred over domains having services like collaboration, education, interoperation, modelling and e-commerce. Collaboration refers to commonly agreed decision or concepts within similar kind of pattern or parameter of interest. For instance consider interdisciplinary teams, having different domain experts of specific technology. Semantic technology enables the integration of knowledge bases.

Let us consider semantically enabled B2B Electronic Commerce. Several advantages are that business partnerships requires least overhead because of automatic semantic mapping of interlinked data, also data could be interchanged to specific format on demand. Important activities like automated negotiations, auctioning, and documentation will be carried out on the fly with the help of software agents.

There are diverse domains such as academia, entertainment, arts, biology, government, geography, military applications, agriculture, Financial, networks, communications channels traffics and optimization criteria for various means of transport. In general it could be used in almost all application which requires inference on basis of accumulated information, provided the data is in accordance to W3C standard for web ontology languages.

4. CONCLUSION

The goal of semantic web is automatic discovery of web services, which assist various computations, reasoning as well as arriving at conclusion in day to day life activities. For making these web services semantically enabled, they should be registered and described in such a way that machines can learn from them or discover the services automatically through semantic web concepts. Enriched service descriptions through semantic web can help machine learning based approaches possible. With such approaches it is required to have standards to be followed. RDF and OWL (Web ontology language) are the standards.
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Puzzle

Cross Word
Test your knowledge on Star office and C++. Questions are based on 12th standard Computer Science (Tamil Nadu State board syllabus). [solution in next issue]
CLUES

across

2. A function execute faster but require more memory space
4. starting point for the execution of the program
5. a group of related functions and data that serves those functions
6. grid with a number of rows and columns
7. the process of acquiring base class properties
9. a key uniquely identifies a record
11. A file comprises the combined properties of istream.h and ostream.h
12. a dialog box used to change the margin
13. a key used to select the spelling command
14. a word processing package

down

1. first electronic spreadsheet
3. smallest individual unit in a program
8. the binding of data and functions together into a single entity
10. a repository of collections of related data or facts
13. an entry controlled loop
15. function key used to edit the data

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Call for Contributions in CSI Adhyayan
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India’s IT sector continues to a trajectory of high growth since 1990s. Our education system, the prime mover of industrial growth and modern development, has seen a phenomenal growth in terms of quantity and quality - making it the third largest education system in the world after the US and China. With double digit economic growth demanding a sustained supply of knowledge workers, India has emerged as one of the world’s largest consumer of education services.

India has the potential to provide the best education services with strong relationships among education, research and industry sectors.

Today, IT is a trillion dollar opportunity – so is higher education. We can proudly say that both the Indian IT and Indian ‘guru’ are now revered globally. Both have potential and ability to scale up with global mindset.

With regard to emerging technologies, they typically follow a strategy ‘Start small, Grow real fast and Attempt to conquer’. In the backdrop of the above and with a view to consolidate the achievements of more than four decades of Computer Society of India (CSI) and new found vitality in education and research community, we have revived our publication of CSI Adhyayan after a gap.

CSI Adhyayan is being positioned as a nation publication dedicated for IT education, research and student community. This quarterly electronic publication performs the functions of a newsletter, a magazine and journal. We take this opportunity to invite the contributions in this venture. Your invaluable contributions, suggestions and wholehearted support will be highly appreciated. We appeal to all our Chapters, Student Branches and member academic institutions for encouraging and motivating the students in terms of contributing innovative ideas, exploring new vistas of knowledge and new findings through CSI Adhyayan.

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For any kind of information, contact may be made to Dr. Vipin Tyagi via email id dr.vipin.tyagi@gmail.com.

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