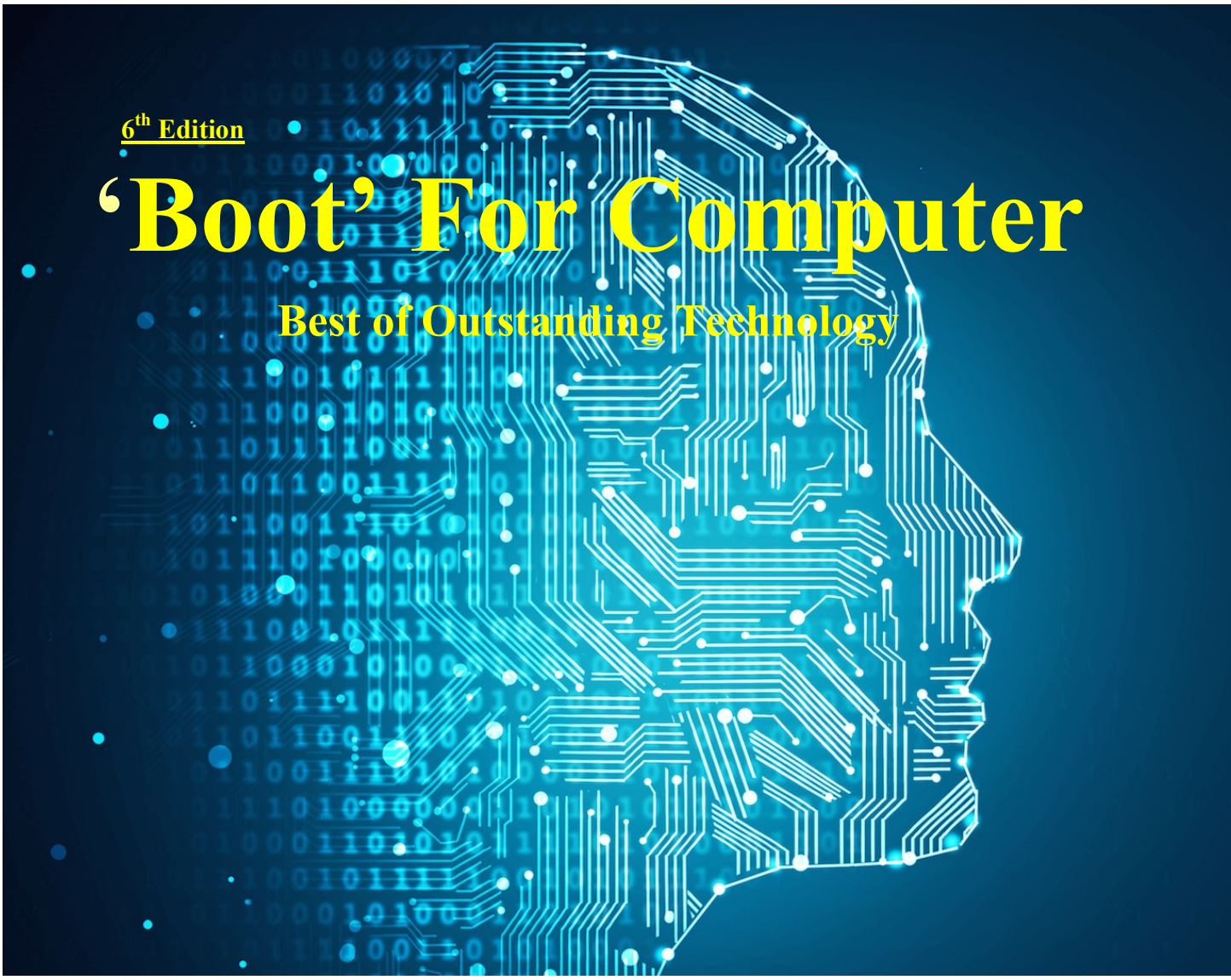


6th Edition

‘Boot’ For Computer

Best of Outstanding Technology

Department of Computer Science & Engineering

Institute of Engineering and Science

IPS Academy, Indore

2017-18

Part A

Part B

HOD Message

Today we find that information technology has become overwhelmingly pervasive, while its parent, computing science, has become correspondingly hard to find. While many CS educational institutions have shifted focus from core CS. This is the single most important attribute of the education offered here. Our department has remained true to the vision on which it was founded.

There are several ways to present the canonical core of computer science. Over the years we have developed a distinct style and method that bridges the theory - practice divide while remaining grounded in the core. Technology changes rapidly, especially in the field of computing, whereas the science, if it changes at all, does so much more gradually. Our understanding is that persons who are clear and thorough about the fundamentals can adapt to rapid changes in technology relatively easily. We want the education imparted to our students to be the basis of a life time of learning.

Our Department has produced hundreds of professionals and has established a name for itself in the country and abroad. They have consistently excelled in the highly competitive industrial environment, Best Employer/ awards in top-ranking companies. I attribute this success to the winning combination of a dedicated faculty that works hard at imparting quality education, a well-planned syllabus and last but not the least, our students.

Learning is a continuous process and does not end with the acquisition of a degree, especially because steady and rapid advances in computing technologies shorten the life of tools and techniques prevalent today. Therefore we do not aim to make our students walking manuals of any language or package. Instead, they are given a strong foundation in computer science and problem-solving techniques and are made adaptable to changes.

We believe that this approach to teaching-learning, coupled with practical experience gained during Industrial Training in reputed organizations, equips our students to handle the challenges posed by the software industry.

Prof. Namrata Tapaswi
Professor & Head CSE Department
Institute of Engineering & Science,IPS Academy

Editorial

'BOOT' For Computer

Session 2017-18

E-Magazine Faculty Coordinator

Mr. Kamal Borana
Mr. Sudhir Kumar Patidar

E Magzine Student Editorial Board

[1] Aarushi Jain

[2] Prakhar Sharma

[3] Priyanka Dasani

[4] Prachi Lodha

Programme Education Objectives

The educational objectives of the Computer Science & Engineering programs are as follows:

1. To prepare students for successful careers in software industry that meet the needs of Indian and multinational companies.
2. To develop the skills among students to analyze real world problem & implement with computer engineering solution and in multidisciplinary projects.
3. To provide students with solid foundation in mathematical, scientific and engineering fundamentals to solve engineering problems and required also to pursue higher studies.
4. To develop the ability to work with the core competence of computer science & engineering i.e. software engineering, hardware structure & networking concepts so that one can find feasible solution to real world problems
5. To inseminate in student's professional and ethical attitude, effective communication skills, team work skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.
6. To motivate students perseverance for lifelong learning and to introduce them to professional ethics and codes of professional practice

Programme Outcomes

An engineering program defines a set of specific program outcomes that relate to its educational objectives, including the items a-k listed below. We regularly review the courses in our curriculum to make sure that all these items are covered, and try to measure whether our students are successfully attaining the following goals:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

CSE Department Information

Name and address of the department:

Department of Computer Science & Engineering
Institute of Engineering and Science, IPS Academy
Knowledge Village
Rajendra Nagar, A.B.Road, Indore (M.P) PIN-452012

Head of the Department

Dr. Namrata Tapaswi
HOD, Computer Science & Engineering
Phone: 0731- 4014853
e-mail: hod.compsc@ipsacademy.org

History of the department:

The Department of Computer Science & Engineering was established in the year 1999 offering Bachelor of Engineering (BE) with intake 60, it was increased to 120 in year 2012 and again intake was increased to 180 in year 2014. The programme is intended to educate students on the applications of scientific knowledge for practical purposes involving activities like modeling, analysis, design and other associated fields of core courses in Computer Science & Engineering education. It intends to equip graduates with profound theoretical knowledge and rich hands on experience.

Vision & Mission of the Department

Vision

Attaining global recognition in computer science and engineering education, research and training to meet the growing needs of the industry and society

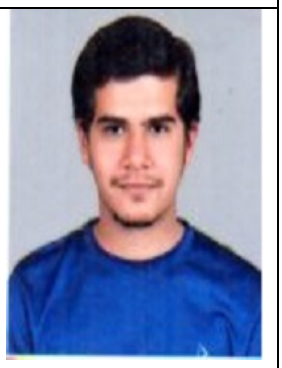
Mission

Provide quality undergraduate and postgraduate education, in both the theoretical and applied foundations of computer science, and train students to effectively apply this education to solve real-world problems, thus amplifying their potential for lifelong high-quality careers.

Department Faculty Details

 Dr. Namrata Tapaswi HOD & Professor	 Mr.Jayesh Gangarade Associate Professor	 Mr. Arvind Upadhyay Associate Professor	 Mr.Neeraj Shrivastava Associate Professor
 Mr. Sunil Nimawat Assistant Professor	 Mr.Sourabh Jain Assistant Professor	 Mr. Kamal Borana Assistant Professor	 Mr.Sumit Devray Assistant Professor
 Mr.Deepak Shukla Assistant Professor	 Ms.Nisha Bhalse Assistant Professor	 Ms.Shweta Gangrade Assistant Professor	 Mr.Vijay Choudhary Assistant Professor

 Mr.Yagyapal Yadav Assistant Professor	 Mr.Neeraj Mehta Assistant Professor	 Mr.Ved Kumar Gupta Assistant Professor	 Ms.Anjali Verma Assistant Professor
 Mr. Anil Panwar Assistant Professor	 Ms.Barkha Sahu Assistant Professor	 Ms.Vaishali Gupta Assistant Professor	 Mr.Sudhir Kumar Patidar Assistant Professor
 Mr.Pratik Jain Assistant Professor	 Mr. Ajay Jaiswal Assistant Professor	 Mr. Pankaj Pateriya Assistant Professor	 Mr. Prateek Nahar Assistant Professor

 Ms. Nitu Mathuriya Assistant Professor	 Mr. Ankur Ratmele Assistant Professor	 Ms. Priyanka Vijayvargiya Assistant Professor	 Mr. Sunny Bagga Assistant Professor
 Ms. Purnima Pandey Assistant Professor	 Ms. Neha Yadav Assistant professor	 Mr. Dharmendra Choukse Senior Programmer	 Mr. Antriksha Somani Assistant Professor
 Mr. Mayur Rathi Assistant Professor	 Mr. Sumit Jain Assistant Professor	 Mr. Vishal Chabra Assistant Professor	 Mr. Anshul Oza Assistant Professor

 Ms. Archana Aapte System Analyst	 Dr. Pratik Gite Assistant Professor	 Mr.Dharmendra Gupta Assistant Professor	

Departmental Events

Four faculty development programs were organized in which, one day program was on Cloud Computing in the month of April 2018, six days Refresher course on 'Programming Language C++' in the month of December 2017, five days Refresher Course on 'Microsoft Office' in the month of December 2017 and a six days Refresher course on 'Data structure and algorithm'.

One day Seminar on 'Cyber Hygiene & Opportunities in Cyber Securities' in the month of January 2018 and another one day seminar on 'Machine Learning' in the month of August 2017.

A 30 days workshop was organized on 'Woman Entrepreneurship Development Programme' in the month of August 2017.Seven expert lectures were organized in which one day program on Cloud Computing by Ms. Nisha Chouhan Indore in the month of April 2018, one day program on Professional Ethics by Dr. D.B Pathak in the month of February 2018, one day program on 'Current Trends in Software Development' by Mr. Sunil Sahu in the month of February 2018. One day Program on 'Cyber Security and Ethical Hacking' by Mr. Jafar Hasan in the month of January 2018,one day program on 'Applications of Adriuno' by Mr.Amarpreet Singh in the month of January 2018, one day program on 'Mobile Application Development' by Mr. Akhilesh Gour and one day program on 'Security Changes in Cloud Computing' by Dr. RK Pateriya.

One Industrial Visit tour was organized for 6 days by Mapro Technologies, Pune in the month of October 2017.

17 Training programs were organized on C and CPP, Java, NetBeans, Linux, Advanced Java, Hybrid Technology, IOT.

Other Events were organized in which one Engineer's day program ,Two one day Awareness Camp in the month of August 2017,a brain storming competition AAGHAZ-2018 in the month of April 2017, a major and minor project competition cum exhibition UDAAN-2018.

Membership of Professional Societies

Department of Computer science & engineering is having the membership of Computer society of India (CSI). Programs were organized under the banner of CSI in the Department.Anveshan'2018 Paper Presentation competition was held on 13th April 2018 for all CSE students under the banner of CSI.A Seminar on "Cyber Hygiene and Opportunities in Cyber Securities" was organized for II year students by Mr. Mayank Acharya Trainer, Anaastomosis, and Delhi.

Placements

Total numbers of placements offered in year 2017-18 are 108. Name of the company for placement are Infosys, Amdoc, Hidden brains Infotech, TCS, AVL Pvt. Ltd, Verdantis, Benfie Consultancy Pvt. Ltd., Best Peers, Byju's, Hidden brains Infotech, HSBC Software Technologies, Cash Karo, CIS, ClearTrail, Collabera, Process Master Technologies Pvt. Ltd, Global Shiksha Pvt. Ltd, I-Lead, InnoEye, Masu Tech, Jaro Education, Moneyites Global, NIIT Technologies, Relaince Jio, Yardi Software, Tudip, Newgen Software,Wipro Limited, Xorient Solutions Pvt. Ltd. etc.

Sports Activities

Students had received winner & runner up awards in different sports activities (IPSA Level) like Cricket Competition(Boys), Basketball(Boys), Volleyball(Girls), Shotput(Boys & Girls), Table Tennis(Boys), Chess(Boys & Girls), Carrom(Boys & Girls).

Faculty Members Achievements

In the department, Papers published in Journals were nineteen in numbers. Journals are IJCA, IJARCS, International Journal of Computer Applications, International Journal of Computer Applications, International Journals of Scientific Research & Development, IJSRCSEIT, IJIRSET, IJCSE, IJSER, IJESRT, IJDACR, and IJITST.

Paper published in seminar/conference international were nine in number on topics Enhancing cloud data storage performance by secure data deduplication, Cloud Scheduling using improved hyper heuristic framework, Design & Implementation of cryptographic data retrieval technique, Customizing Lineage for different embedded devices, Diagnosis of heart disease using cultural algorithm with neural network, A Comparative analysis of Medical Image Segmentation, Approach for multi word expression recognition and annotation in urdu corpora, Real Time Hand Gesture Recognition using Histogram of Oriented Gradient with support vector machine, Real Time Hand Gesture Recognition using Histogram of Oriented Gradient with support vector machine.

Three books were published by Dr. Pratik Gite on topics Introduction to IT, E-Commerce, Mobile Adhoc Network under VEDA and VSDA publication.

Twelve Expert Lectures were delivered by Faculties in Seminars and Workshop on Memory Allocation, Class & File Handling, Functions, Office 365, MS Word & MS Excel, Linked List, Trees, Searching & Sorting, Introduction, Stack, Queue, Infix-Postfix Conversion, Business Opportunity Guidance Interactions with Rep. From SFC, KVIC, Consultant etc, Personal Management: IPR and Its Management Pattern, Copy Rights, Trade Mark and Industrial Management. Eight Seminars & Workshops were attended by the faculty members on different topics like Awareness program on outcome based education & accreditation, FDP201x Pedagogy for Online and Blended Teaching-Learning Process, FDP101x Foundation Program in ICT for Education, Awareness program on Hackathon-2018, Machine Learning, Women Entrepreneurship Development Eleven SDPs/FDPs were attended by the faculty member on the topic Cloud Computing, Soft Computing & Machine Learning, Programming Language C++, Microsoft Office, Data Structure & Algorithm, Mobile Application Development, Security Changes in Cloud Computing, Machine Learning Basics and Emerging Trends, Internet of Things for smart living, Data Science & Big Data Analysis.

Student Achievements

Fourteen different Academic Awards: winner & runner up awards in events like Paper Presentation, “UDAAN2018” Minor Competition Cum Exhibition, “UDAAN2018” Major Project Competition Cum Exhibition, Technical Quiz, Anveshan'2018,Paper Presentation Competition, AAGHAZ’2018 An Innovative Idea Competition, 2017 Cummins Scholarship Program, Dell Ambassador Program.

Papers published in Journals were eleven in numbers. Journals are International Journals of Scientific Research & Development, IJARCS, IJSRCSEIT, IJSER, IJCSE, IJIRSET, IJESRT, and IJDACR.

Six Papers were presented in Seminar on enhancing cloud data storage performance by secure data deduplication, Cloud Scheduling using improved hyper heuristic framework, Design & Implementation of cryptographic data retrieval technique, Customizing Lineage for different embedded devices, Diagnosis of heart disease using cultural algorithm with neural network, Real Time Hand Gesture Recognition using Histogram of Oriented Gradient with support vector machine.

Twenty eight Workshops/Seminars were attended on topic like C & C++, Cloud, Computing, Professional Ethics, Current Trends in Software Development, Cyber Security & Ethical Hacking, Applications Of Arduino, Cyber Hygiene and Opportunities in Cyber Securities, JAVA, Net Beans, LINUX, Advanced JAVA, Hybrid Technology, IOT, Spoken Tutorial Projects IIT Bombay. Machine Learning, Digital India Initiative

1. XBOX 360 System

Abstract

Virtual reality (VR) is the creation of a highly interactive computer based multimedia environment in which the user becomes a participant with the computer in what is known as a "synthetic environment."

Virtual reality uses computers to immerse one inside a three dimensional program rather than simulate it in two-dimensions on a monitor. Utilizing the concept of virtual reality, the computer engineer integrates video technology, high resolution image-processing, and sensor technology into the data processor so that a person can enter into and react with three-dimensional spaces generated by computer graphics.

The goal computer engineers have is to create an artificial world that feels genuine and will respond to every movement one makes, just as the real world does. Naming discrepancies aside, the concept remains the same - using computer technology to create a simulated, three-dimensional world that a user can manipulate and explore while feeling as if he were in that world. Scientists, theorists and engineers have designed dozens of devices and applications to achieve this goal.

Opinions differ on what exactly constitutes a true VR experience, but in general it should include: Three-dimensional images that appear to be life-sized from the perspective of the user The ability to track a user's motions, particularly his head and eye movements, and correspondingly adjust the images on the user's display to reflect the change in perspective Virtual realities are a set of emerging electronic technologies, with applications in a wide range of fields. This includes education, training, athletics, industrial design, architecture and landscape architecture, urban planning, space exploration, medicine and rehabilitation, entertainment, and model building and research in many fields of science.

Virtual reality (VR) can be defined as a class of computer-controlled multisensory communication technologies that allow more intuitive interactions with data and involve human senses in new ways. Virtual reality can also be defined as an environment created by the computer in which the user feels present. This technology was devised to enable people to deal with information more easily. Virtual Reality provides a different way to see and experience information, one that is dynamic and immediate. It is also a tool for model building and problem solving. Virtual Reality is potentially a tool for experiential learning.

The virtual world is interactive; it responds to the user's actions. Virtual Reality is defined as a highly interactive, computer-based multimedia environment in which the user becomes the

participant in a computer-generated world. It is the simulation of a real or imagined environment that can be experienced visually in the three dimensions of width, height, and depth and that may additionally provide an interactive experience visually in full real-time motion with sound and possibly with tactile and other forms of feedback. VR incorporates 3D technologies that give a real life illusion. VR creates a simulation of real-life situation. The emergence of augmented reality technology in the form of interactive games has produced a valuable tool for education. One of the emerging strengths of VR is that it enables objects and their behavior to be more accessible and understandable to the human user.

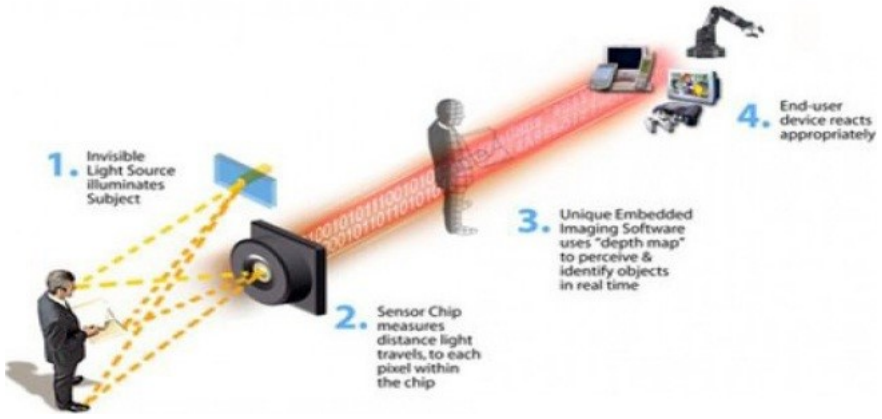
KINECT

Microsoft Xbox 360 Kinect has revolutionized gaming In that you are able to use your entire body as the controller. Conventional Controllers are not required because the Kinect Sensor picks Up on natural body movements as inputs for the game. Three major components play a part in making the Kinect function as it does; the movement tracking, the speech recognition, and the motorized tilt of the sensor itself. The name "Kinect" is a permutation of two words; Kinetic and Connect. The Kinect was first announced on June 1, 2009 at E3 (Electronic Entertainment Expo) as "Project Natal," the name stems from one of the key project leader's hometown named "Natal" in Brazil. The software that makes Kinect function was by and large developed by Rare, a Microsoft subsidiary.

A company based In Israel known as Prime Sense developed the 3D sensing technology. Microsoft purchased the rights to use the technology for their gaming system. In the first 60 days on the market, Microsoft shipped 8 million units to retailers around the globe. The estimated Bill of Materials cost for the Kinect is estimated to be $56, which does not include Research and Development or Marketing costs, merely the cost of the hardware.

Sensing Technology

Behind the scene of Prime Sense's 3D sensing technology there are three main parts that make it work. An infrared laser projector, infrared camera, and the RGB colored camera. The depth projector simply floods the room with IR laser beams creating a depth field that can be seen only by the IR camera. Due to infrared's insensitivity to ambient light, the Kinect can be played in any lighting conditions. However, because the face recognition system is dependent on the RGB camera along with the depth sensor, light is needed for the Kinect to recognize a calibrated player accurately. The following image shows a generalized concept of how kinect's depth sensing works.



In more detail, the IR depth sensor is a monochrome complimentary metal-oxide-semiconductor (CMOS) camera. This means that it is only sees two colors, in this case black and white which is all that's needed to create a "depth map" of any room. The IR camera used in the Kinect is VGA resolution (640x480) refreshing at a rate of 30Hz. Each camera pixel has a photodiode connected to it, which receives the IR light beams being bounced off objects in the room. The corresponding voltage level of each photodiode depends on how far the object is from the camera. An object that is closer to the camera appears brighter than an object that is farther away. The voltage produced by the photodiode is directly proportional to the distance the object. Each voltage produced by the photodiode is then amplified and then sent to an image processor for further processing. With this process being updated 30 times per second, you can imagine the Kinect has no problem detecting full-body human movements very accurately considering the player is within recommended distance.

Infrared Beams in the Room

Although the hardware is the basis for creating an image that the processor can interpret, the software behind the Kinect is what makes everything possible. Using statistics, probability, and hours of testing different natural human movements the programmers developed software to track the movements of 20 main joints on a human body. This software is how the Kinect can

differentiate a player from say a dog that happens to run in front of the IR projector or different players that are playing a game together. The Kinect has the capabilities of tracking up to six different players at a time, but as of now the software can only track up to two active players.

One of the main features of the Kinect is that it can recognize you individually. When calibrating yourself with the Kinect, the depth sensing and the color camera work together to develop an accurate digital image of how your face looks. The 8- bit color camera, also VGA resolution, detects and stores the skin tone of the person it is calibrating. The depth sensor helps make the facial recognition more accurately by creating 3-D shape of your face. Storing these images of your face and skin tone color is how the Kinect can recognize you when you step in front of the projected IR beams. As mentioned earlier, for the facial recognition to work accurately there needs to be a certain amount of light. Another added feature of the color camera is it takes videos or snapshots at key moments during game play so you can see how you look while playing.

Conclusion

This seminar deals with virtual reality technology and its application in entertainment field. Very recently, the most advanced and a revolutionary technology related to virtual reality and entertainment; the Kinect technology was introduced by Microsoft for its X-Box 360 gaming console. A lot of advancements have been made using VR and VR technology. VR has cut across all facets of human endeavours-manufacturing/business, exploration, defence, leisure activities, and medicine among others. The exciting field of VR has the potential to change our lives in many ways. There are many applications of VR presently and there will be many more in the future.

Many VR applications have been developed for manufacturing, education, simulation, design evaluation, architectural walk-through, ergonomic studies, simulation of assembly sequences and maintenance tasks, assistance for the handicapped, study and treatment of phobias, entertainment, rapid prototyping and much more. VR technology is now widely recognized as a major breakthrough in the technological advance of science. VR is changing our life, eventually VR will increasingly become a part of our life.

Ipshita Khare (0808cs16106)

2. iSphere

Abstract

Integrating a high-level 3D modeling interface in free-hand sketching reduces the human cognitive load in 3D creations. Modern CAD based interfaces inhibit interactions with low level commands and thereby creating a psychological gap.

Here we intend to develop Isphere with 24 degrees of freedom to bypass the mental load of low-level commands. Isphere is an intuitive device embedded with 12 capacitive sensors which enables object design using Top-down approach. The interface uses simple Push and Pull commands to interact with the user. We believe that Isphere can save lot of time by bypassing traditional Mice and keyboard based modeling.

Experimental results indicate that novices in 3D modeling learn faster with the help of Isphere.We claim that Isphere is designed to minimize the barrier between the humans cognitive model of what they want to accomplish and the computer's understanding of the user's task. As Isphere lacks reliability in its input mechanisms, this paper suggest new improved algorithms for sensor control and new novel methods to create 3D models.

For designers, a quick method to demonstrate an idea or principle might be Free- hand sketching. A sketch expresses an idea directly and interactively. Freehand sketching is a common way to model 2D objects but for 3D modeling it will be complex and unintuitive to visualize. Recent developments in computer aided de- sign(CAD) helps to address the problem effectively. It involves series of low-level commands and mode-switching operations to model a 3D object. This introduces a well-known problem for novice to learn commands as it takes months to became an expert to create 3D models intuitively.

Why iSphere?

The aim of this research was to develop a high-level modeling system which can reduce human cognitive load in 3D creation. It creates a new dimension to interact with 3D models intuitively. It projects designers idea into 3D model instantly as Isphere will manipulate 3D objects in a spatial way. Simply, an input device that should make us to focus what is in our mind and built 3D models. As shown in the Fig. 1, isphere models an object through spatial method.

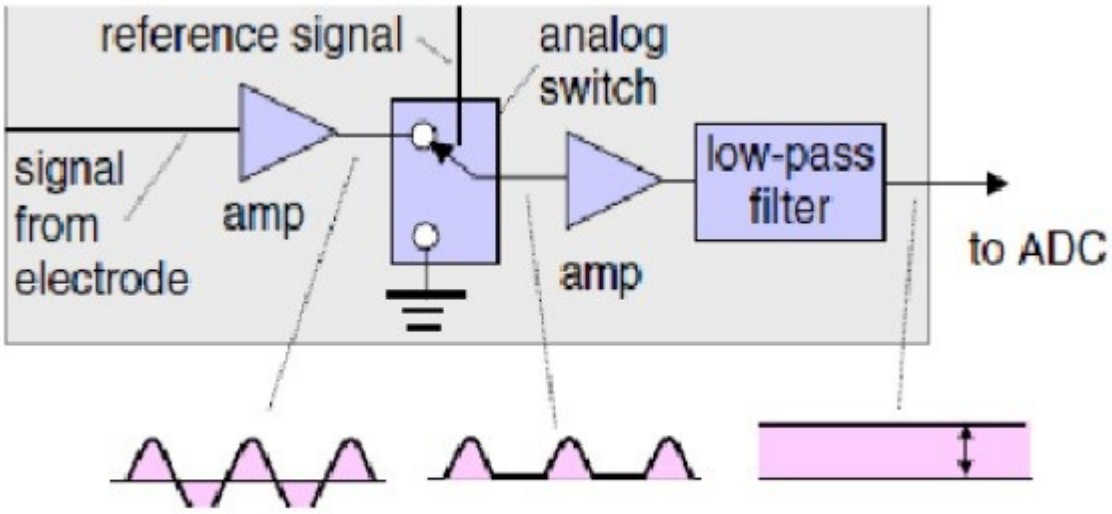
iSphere Technology

The hypothesis tested by conducting a study to compare the performance between command-based interfaces and Isphere.We claim that our approach to develop new 3D input interface is better than other research works conducted as it is a novel way to have '3D input interface'.

Hardware Implementation

Hardware gives a vivid picture of Isphere as it essentially captures all human hand action.Constructing a right shape for Isphere was a challenge.Nevertheless, We built a foldable dodecahedron with acrylic material which makes a Pentago- nal structure.Every face is capable of sensing hands for eight degrees above the surface.Capacitive sensors measures physical actions which are connected on the Isphere.Shunt mode operation is used to detect motions.Brie y, Shunt mode ca- pacitive sensing will work between a transmit and receive electrode.For Isphere, the hand movement of the performer changes the electric field between a trans- mit and receive electrode.Hence the current is measured at the second electrode correlates to the change in electrica field.Normally, the distance to the second electrode is known as Shunt mode[9](in our case less than six inches).Capacitive sensors detects the proximity of hands at twelve different directions which cor- responds to faces.

Fig. shows that received signal from capacitive sensors are level adjusted by signal conditioning circuit (Amplifier,Switch and a Low-pass filter).Finally, digital input will be received by PIC microcontroller. A Microcontroller interfaces the incoming digital input to software module.

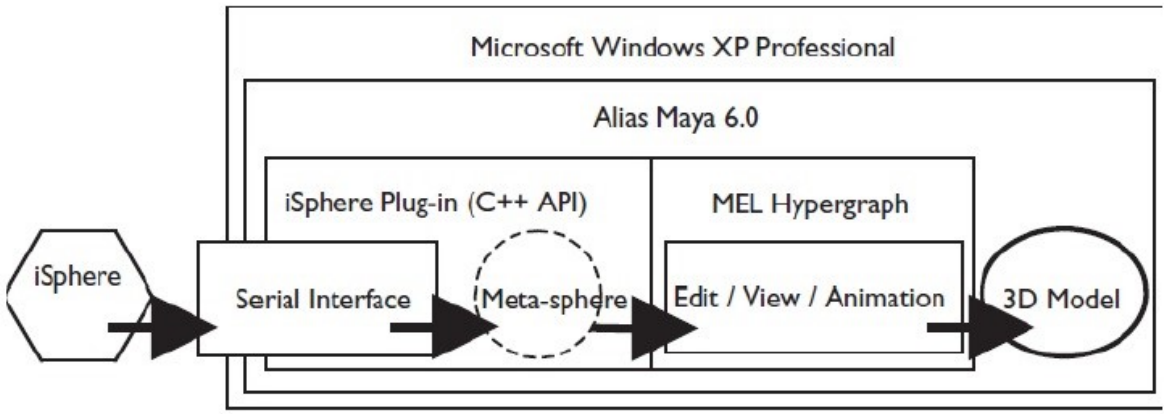


Circuit Diagram[Inspired from Smartskin]

Software Implementation

As shown in Fig. 7 Isphere hardware is connected to microcontroller through a Serial interface (RS232).Meta-sphere maps the input signals into a meta-sphere to a target 3D object.We use Alias-Wavefront Maya 6.0 C++ API (Applica- tion Programming Interface) as iSphere plug-

in.3D manipulation is realized by MEL(Maya Embedded Language).MEL modifies the functions by drawing rela- tionships from data.The system architecture is exible for future upgrade.New functions can easily be added into the system. Currently, iSphere manipulates 3D mesh-based model in Alias-Wavefront Maya, 3DS Max or Rhino.



Software Architecture

Discussion

We found that developing high-level 3D modeling can reduce low-level manip- ulations as it is modeled intuitively.Experimental results prove that modeling 3D objects using Isphere eliminates gap between novice and experts.As claimed, the paper suggests that developing a free hand 3D input modeling interface is a novel development in 3D input hardware. Data shows that Isphere has capability to enhance 3D modeling experience using natural human hand gestures.It bridges 3D modeling environment from non-interactive to Interactive.Isphere leads a new paradigm for 3D designers from abstract commands to natural hand interaction.The thought process becomes more intuitive and direct.Hence, learning becomes easier for novices to realize complex 3D objects. Although Isphere is intuitive and direct, it lacks fidelity when 3D objects need to modeled with minimal span of time.One possible solution to improve speed and accuracy will be by increas- ing the sensitivity of capacitive sensors.Yet, We need confirmatory studies in the area of sensor research. Readers may criticize that Sphere works for specialized modes. Nevertheless, it is important to understand each method performs better in certain mode it leads a new way to unanswered questions and future directions dealing with robust mapping into shapes and improving algorithms for sensing control. Our research implies that an intuitive free-hand modeling interface like Isphere presents an effective way to express ideas directly without any intense mental activities. It aims to improve the interactions between users and computers in-

tuitively.Whole idea was designed to minimize the barrier between the humans cognitive model of what they want to accomplish and the computer's under- standing of the user's task.

Shreya Kothari (0808CS161155)

3. Teradata

Abstract

Teradata is a relational database management system (RDBMS) that drives a company's data warehouse. Teradata provides the foundation to give a company the power to grow, to compete in today's dynamic marketplace, to achieve the goal of "Transforming Transactions into Relationships" and to evolve the business by getting answers to a new generation of questions.

Teradata's scalability allows the system to grow as the business grows, from gigabytes to terabytes and beyond. Teradata's unique technology has been proven at customer sites across industries and around the world.

Teradata is an open system, compliant with ANSI standards. It is currently available on UNIX MP-RAS and Windows 2000 operating systems. Teradata is a large database server that accommodates multiple client applications making inquiries against it concurrently. Various client platforms access the database through a TCP-IP connection across an IBM mainframe channel connection. The ability to manage large amounts of data is accomplished using the concept of parallelism, wherein many individual processors perform smaller tasks concurrently to accomplish an operation against a huge repository of data. To date, only parallel architectures can handle databases of this size.

What is Teradata ?

Teradata is a relational database management system initially created by the firm with the same name, founded in 1979. Teradata is part of the NCR Corporation which acquired the Teradata company on February 28, 1991. It is a massively parallel processing system running a shared nothing architecture. The main point with the Teradata DBMS is that it's linearly and predictably scalable in all dimensions of a database system workload (data volume, breadth, number of users, complexity of queries), explaining its popularity for enterprise data warehousing applications. Teradata is offered on Intel servers interconnected by the BYNET messaging fabric. Teradata systems are offered with either Engenio or EMC disk arrays for database storage.

Teradata offers a choice of several operating systems

NCR UNIX SVR4 MP-RAS, a variant of System V UNIX from AT&T Microsoft Windows 2000 and Windows Server 2003 SUSE Linux on 64-bit Intel servers has been pre-announced for 2006. Teradata Enterprise Data Warehouses are often accessed via ODBC or JDBC by applications running on operating system such as Microsoft Windows or flavors of UNIX. The warehouse typically sources data from operational systems via a combination of batch and trickle loads.

The largest and most prominent customer of this DBMS is Wal-Mart, which runs its central inventory and other financial systems on Teradata. Wal-Mart's Teradata Data Warehouse is generally regarded by the DBS industry as being the largest data warehouse in the world. Other Teradata customers include companies like AT&T (formerly SBC), Dell, Continental Airlines, National Australia Bank, FedEx, Vodafone, Gap Inc, Safeway Inc, eBay and Kaiser Permanente.

Teradata's main competitors are other high-end solutions such as Oracle and IBM's DB2.

Why Teradata?

Teradata is the world's leading Enterprise Data Warehousing solutions provider . Today, more than 60% of the world's most admired global companies use Teradata technology, including:

• 90% of the Top Global Telecommunications Companies

• 50% of the Top Global Retailers

• 70% of the Top Global Airlines

• 60% of the Top Global Transportation Logistics Companies

• 40% of the Top Global Commercial and Savings Banks

Along with our proven, time-tested leadership in data warehousing, Teradata offers a wide variety of solutions for Customer Relationship Management, Supply and Demand Chain Management, Financial Services, Enterprise Risk Management and much more. Add accolades and awards from Gartner, Intelligent Enterprise, DM Review and many other industry experts, and Teradata is clearly the best choice.

Things Teradata Database Administrators Never Have to Do

Teradata DBAs never have to do the following tasks:

• Reorganize data or index space.

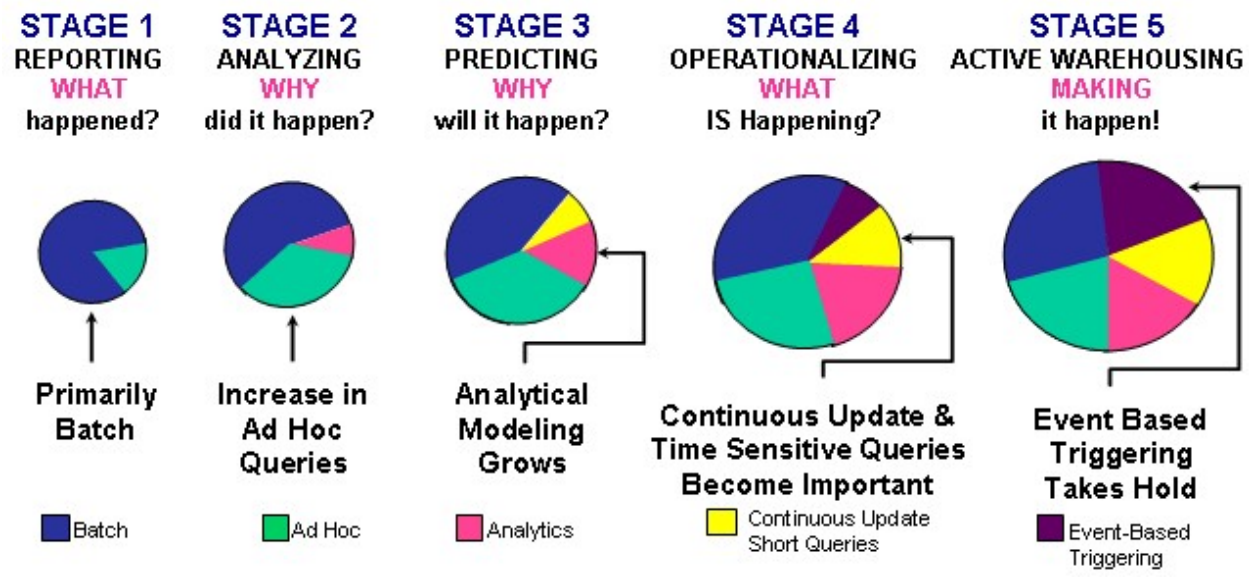
• Pre-allocate table/index space and format partitioning. While it is possible to have partitioned indexes in Teradata, they are not required.

• Pre-prepare data for loading (convert, sort, split, etc.).

• Unload/reload data spaces due to expansion. With Teradata, the data can be redistributed on the larger configuration with no offloading and reloading required.

• Write or run programs to split input source files into partitions for loading.

Data Warehouse Usage Evolution



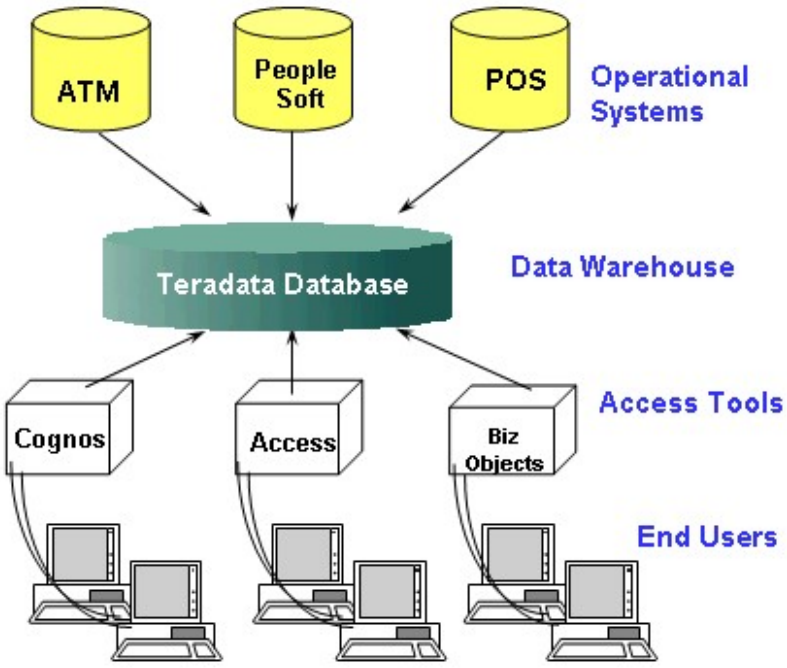
With Teradata, the workload for creating a table of 100 rows is the same as creating a table with 1,000,000,000 rows. Teradata DBAs know that if data doubles, the system can expand easily to accommodate it. Teradata provides huge cost advantages, especially when it comes to staffing Database Administrators. Customers tell us that their DBA staff requirements for administering non-Teradata databases are three to 10 times higher.

Teradata Architecture

Teradata acts as a single data store, with multiple client applications making inquiries against it concurrently. Instead of replicating a database for different purposes, with Teradata you store the

data once and use it for all clients. Teradata provides the same connectivity for an entry-level system as it does for a massive enterprise data warehouse.

Teradata Architecture



A Teradata system contains one or more nodes. A node is a term for a processing unit under the control of a single operating system. The node is where the processing occurs for the Teradata Database. There are two types of Teradata systems:

• Symmetric multiprocessing (SMP) - An SMP Teradata system has a single node that contains multiple CPUs sharing a memory pool.

• Massively parallel processing (MPP) - Multiple SMP nodes working together comprise a larger, MPP implementation of Teradata. The nodes are connected using the BYNET, which allows multiple virtual processors on multiple nodes to communicate with each other.

Teradata is the future of the Data Mining. In future everyone we start using Teradata Database. Now it is costly, works are going on to reduce its cost. So, it will reach to small business people also.

Pragati shukla (0808cs161108)

4. ZForce Touch Screen

Abstract

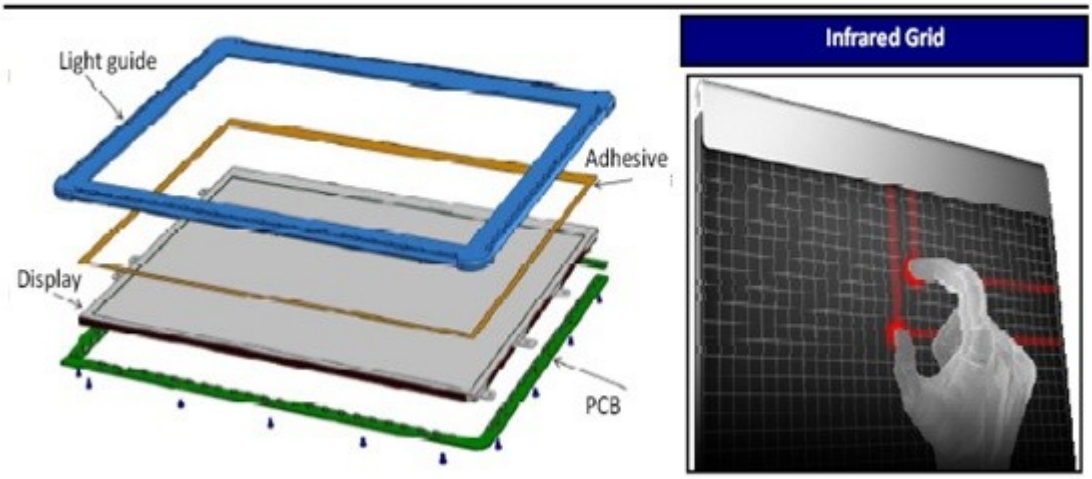
Neonode has patented and commercialized the ZForce (an abbreviation for “zero force necessary”) touch technology, which was designed to overcome many of the limitations of today’s touchscreens.The premise of the Company’s approach entails the projection of an infrared grid across an electronic display. As users tap, swipe, or write on the screen, ZForce detects the location of the touch based on the interruption in infrared light projecting across the screen, which translates to coordinates on the grid. The ZForce architecture and input method is believed to be unique to Neonode.A ZForce Touch Screen can be activated by multiple modes of input, including bare fingers, gloves, styluses, and (multiple simultaneous touches). It is uncommon today to find both of pens, as well as recognizes multi-touch these features innately built into the same touch screen. The resistive touch technology used on most PDAs to recognize stylus writing works as a spot on the screen is pressed inward, causing one layer of the touch screen to make contact with a layer beneath. This contact sends a signal to the device to recognize the touch. Although relatively low cost, resistive touch screens do not typically allow multi-touch (swiping, gesturing)

ZFORCE: A NEXTGENERATION ALTERNATIVE

Neonode overcomes limitations of both resistive and capacitive screens with its ZForce technology—creating a next-generation touch surface that the Company believes can be more economical as well as higher performing than either of the main technologies in use today. Currently, projected-capacitance touch screens represent the mainstream technology for multi-touch interfaces. However, ZForce also enables the convenient multi-touch features of capacitive screens but at the cost structure of more affordable resistive technologies. Further, as overviewed on, in February 2012, the Company introduced a new Multi Sense component to the ZForce technology that is intended to improve upon standard multi-touch processes.

Figure 11

LAYERS OF THE ZFORCE® OPTICAL INTERFACE



In contrast to capacitive and resistive screens, which have microscopic circuits embedded on a glass substrate, Neonode's controller projects a grid of infrared light beams across the display layer. Importantly, the Company's technology is display agnostic and can be added to variety of display surfaces, including liquid-crystal display (LCD), eink, organic Light emitting diodes (OLED),and electronic paper displays (EPD).

Touch is detected as a finger or object interrupts (by obstructing or reflecting) the light beams projected across the screen surface, which identifies the X and Y coordinates of the touch. The ZForce infrared optical touch screen relies neither on pressure nor conduction, enabling consumers to use a Neonode touch screen barehanded or while wearing gloves, holding pens or styluses, etcetera. As illustrated in Figure 11, there is no glass substrate or glass overlay required.

In Fig, a plastic light guide is located under the bezel on top of the display. It serves to reflect and focus light are shown attached to a around the zForce® display. LEDs and photo diodes printed circuit board (PCB) display (also shown in Figure 12). The zForce Technology pulses an infrared light across the screen at a rate of up to 120 times a second so the grid is continuously refreshed. As the user's fingers move across the screen, the grid's coordinates where the screen is touched are converted into mathematical algorithms in a process that is unique to Neonode. The Company holds patents worldwide related to the zForce® architecture and input method.

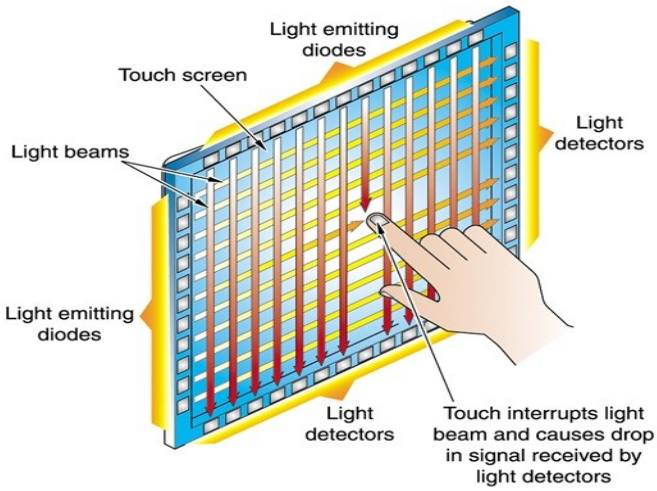
The newer and higher-cost capacitive technology, such as that used on Apple Inc.'s (AAPL NASDAQ) iPhone, is activated by conductive material rather than applied pressure. Electrodes in the display contact with an electrical conductor, such as a finger. Capacitive devices perform multi touch but cannot be activated by standard pointers or gloves as these are nonconductive.. As a result, many users find that their touchscreen can recognize taps from their fingers but not finger nails. In contrast, the zForce® screens offer full finger touch capabilities (e.g., gestures like "pinching" the screen to zoom in or out) as well as high-resolution pen support in the same solution

Working Principle Of Neonode zFORCE

Infrared Touch Screen is a touch frame which is usually installed in front of the display screen. The frame is integrated with printed circuit board which contains a line of IR-LEDs and photo transistors hidden behind the bezel of the touch frame. Each of IR-LEDs and photo transistors is set on the opposite sides to create a grid of invisible infrared light. The bezel shields the parts from the operation environment while allowing the IR beams to pass through.

The Infrared Touch Screen controller sequentially pulses LEDs to create a grid of IR light beams. When a user touches the screen, enters the grid by a stylus which can interrupt the IR light beams, the photo transistors from X and Y axes detect the IR light beams which have been interrupted and transmit exact signals that identify the X and Y axes coordinates to the host

Working Principle Of Neonode zFORCE



Neonode zForce is set to replace capacitive touch screens. Back to using infrared bezel sensing touchscreens of the past. Back in 1981, the PLATO V terminal used infrared bezel sensing touchscreens. Fast forward 31 years, we have the Neonode zForce. It does not use the electrical properties of the human body to track movement. An array of infrared LEDs are used to track where fingers on the screen are. The drawback of this kind of technology is that a raised bezel is placed around the screen. This raised bezel houses an array of infrared LEDs and sensors. The new technology has already been licensed to companies such as Sony and Barnes & Noble. It won't be long till we see future devices from these companies to use this technology. The Swiss company has noted that power consumption is as low as 1mW at 100Hz. Battery life of tablet devices will benefit from such a new type of touch screen. 1ms response times are quite possible with this new technology and there is little to no lag.

Benefits:

1. 100% light transmission (not an overlay)
2. Long service life
3. Can be scaled to any size without losing resolution
4. High chemical, scratch, breakage, and liquid resistance
5. Touch can be activated by anything including finger, gloved hand, or stylus

Renuka Parmar (0808CS161133)

5. Wireless Body Area Network

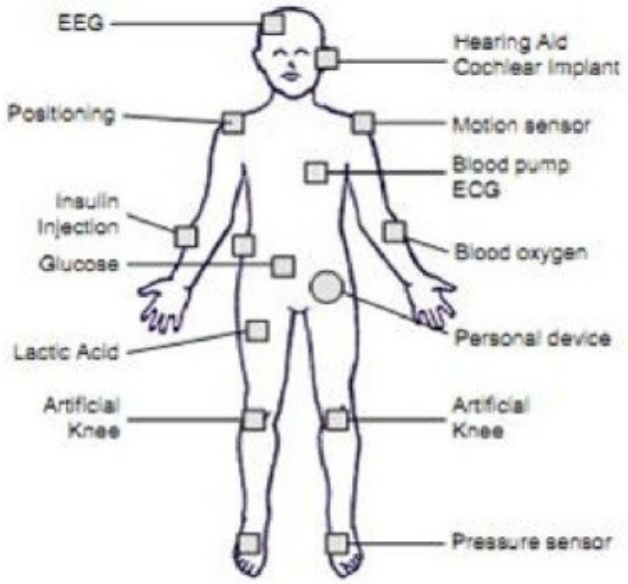
Abstract

Future communication systems are driven by the concept of being connected any-where at any time. This is not limited to even in medical area. Wireless medical communications assisting peoples work and replacing wires in a hospital are the applying wireless communications in medical healthcare.

The increasing use of wireless networks and the constant miniaturization of electrical devices has empowered the development of wireless body area networks (WBANs).In these networks various sensors are attached on clothing or on the body or even implanted under the skin.

These devices provide continuous health monitoring and real-time feedback to the user or medical personnel. The wire-less nature of the network and the wide variety of sensors offer numerous new, practical and innovative applications to improve healthcare and the quality of life. The sensor measures certain parameters of human body, either externally or internally. Examples include measuring the heartbeat, body temperature or recording a prolonged electrocardiogram (ECG).

Several sensors are placed in clothes, directly on the body or under the skin of a person and measure the temperature, blood pressure, heart rate, ECG, EEG, respiration rate, SpO2 levels etc. Next to sensing devices, the patient has actuators which act as drug delivery systems. The medicine can be delivered on predetermined moments, triggered by an external source or immediately when a sensor notices problem. The sensor monitors a sudden drop of glucose, a signal can be sent to the actuator in order to start the injection of insulin. Consequently, the patients will experiences fewer nuisances from his disease. An example of a medical WBAN used for patient monitoring.



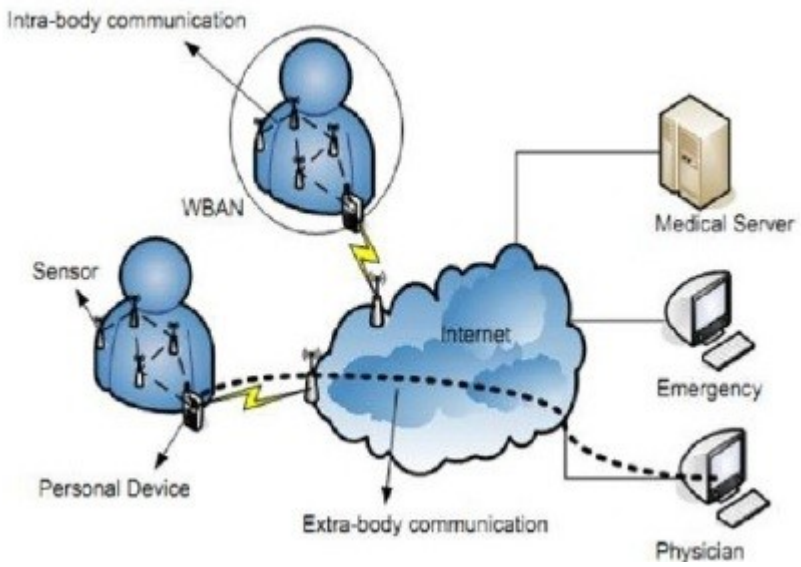
A WBAN can also be used to offer assistance to the disabled. For example, a paraplegic can be equipped with sensors determining the position of the legs or with sensors attached to the nerves. In addition, actuators positioned on the legs can stimulate the muscles. Interaction between the data from the sensors and the actuators makes it possible to restore the ability to move. Another example is aid for the visually impaired. An artificial retina, consisting of a matrix of micro sensors, can be implanted into the eye beneath the surface of the retina. The artificial retina translates the electrical impulses into neurological signals. Another area of application can be found in the domain of public safety where the WBAN can be used by firefighters, policemen or in a military environment. The WBAN monitors for example the level of toxics in the air and warns the firefighters or soldiers if a life threatening level is detected. The introduction of a WBAN further enables to tune more effectively the training schedules of professional athletes.

Positioning WBANS

The protocols developed for WBANs can span from communication between the sensors on the body to communication from a body node to a data center connected to the internet. Thus communication in WBAN is divided into:

1. Intra body communication

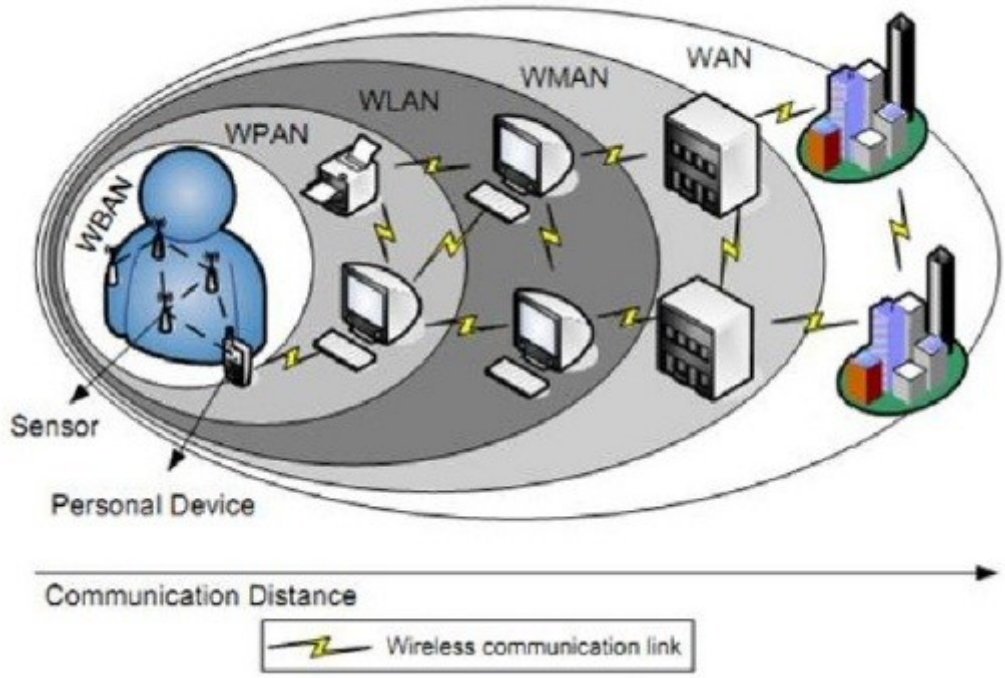
2. Extra body communication



Intra-body and extra- body Communication in WBAN

Intra body communication controls the information handling on the body between the sensors or actuators and personal device. And extra body communication ensures communication between the personal devices and an external net-work . This segmentation is similar to the one defined in where a multi-tiered telemedicine system is presented. Tier 1 encompasses the intra-body communication, tier 2 the extra-body communication between the personal device and the Internet and tier 3 represents the extra-body communication from internet to the medical server.

To date development has been mainly focused on building the system architecture and service platform for extra-body communication. Much of these implementations focus on the repackaging of traditional sensors (e.g. ECG, heart rate) with existing wireless devices. They consider a very limited WBAN consisting of only a few sensors that are directly and wirelessly connected to a personal device. Further they use transceivers with large and large antennas that are not adapted for use on a body.



In the fig, a WBAN is compared with other types of wireless networks, such as Wireless Personal (WPAN), Wireless Local (WLAN), Wireless Metropolitan (WMAN), and Wide area networks (WAN). A WBAN is operated close to human body and its communication range will be restricted to a few meters, with typical values around 1-2 meters. While a WBAN is devoted to interconnection of one person's wearable devices, a WPAN is a network in the environment around the person.

Physical Layer

The characteristics of the physical layer are different for a WBAN compared to a regular sensor network due to the proximity of the human body. Tests with TelosB motes (using the CC2420 transceiver) showed lack of communications between nodes located on the chest and nodes located on the back of the patient. This was accentuated when the transmit power was set to a minimum for energy savings reasons. When a person was sitting on a sofa, no communication was possible between the chest and the ankle. Better results were obtained when the antenna was placed 1 cm above the body. As the devices get smaller and more ubiquitous, a direct connection to the personal device will no longer be possible and more

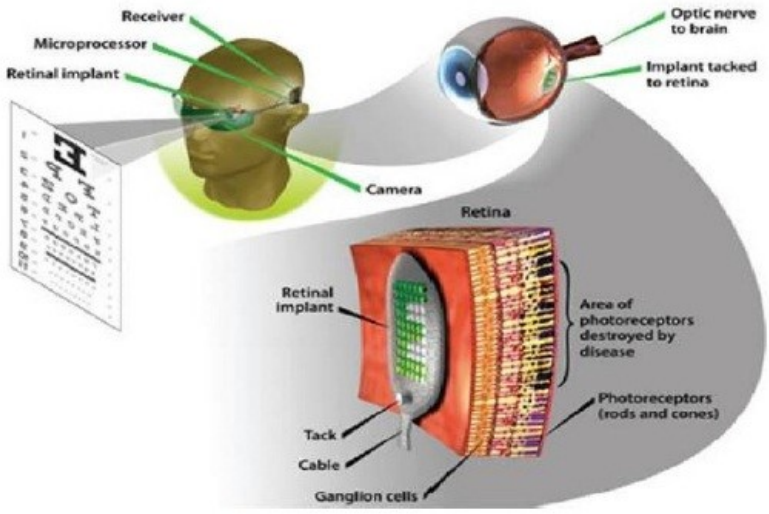
complex network topologies will be needed. The characteristics of the propagation of radio waves in a WBAN and other types of communication are as follows.

RF Communication

There exists several path loss along and inside the human body either using narrowband radio signals or Ultra Wide Band (UWB). All of them came to the conclusion that the radio signals experience great losses. Generally in wireless networks, the transmitted power drops off is defined as P = dn (5.1) where d represents the distance between the sender and the receiver and n the coefficient of the path loss. In free space, n has a value of 2. Other kinds of losses include fading of signals due to multi-path propagation. The propagation can be classified according to where it takes place: inside the body or along the body.

The body acts as a communication channel where losses are mainly due to absorption of power in the tissue, which is dissipated as heat. As the tissue is lossy and mostly consists of water, the EM-waves are attenuated considerably before they reach the receiver. In order to determine the amount of power lost due to heat dissipation, a standard measure of how much power is absorbed in tissue is used: the specific absorption rate (SAR). It is concluded that the path loss is very high and that, compared to the free space propagation, an additional 30-35 dB at small distances is noticed. It is argued that considering energy consumption is not enough and that the tissue is sensitive to temperature increase.

Artificial Retina



WBANs can also assist blind people. Patients with no vision or limited vision can see at a reasonable level by using retina prosthesis chips implanted within a human eye, as shown in Figure.

A WBAN is expected to be a very useful technology with potential to offer a wide range of benefits to patients, medical personnel and society through continuous monitoring and early detection of possible problems. With the current technological evolution, sensors and radios will soon be applied as skin patches. Doing so, the sensors will seamlessly be integrated in a WBAN. Step by step, these evolutions will bring us closer to a fully operational WBAN that acts as an enabler for improving the Quality of Life.

Shivam Shrotriya(0808CS161151)

6. E-Ball Technology

Abstract

A new concept of pc is coming now that is E-Ball Concept pc. The E-Ball concept pc is a sphere shaped computer which is the smallest design among all the laptops and desktops. This computer has all the feature like a traditional computer, elements like keyboard or mouse, DVD, large screen display.

E Ball is designed that pc is be placed on two stands, opens by pressing and holding the two buttons located on each side of the E-Ball pc, this pc is the latest concept technology. The E-Ball is a sphere shaped computer concept which is the smallest design among all the laptops and desktops have ever made.

This PC concept features all the traditional elements like mouse, keyboard, large screen display, DVD recorder, etc, all in an innovative manner. E-Ball is designed to be placed on two stands, opens by simultaneously pressing and holding the two buttons located on each side. After opening the stand and turning ON the PC, pressing the detaching mouse button will allow you to detach the optical mouse from the PC body. This concept features a laser keyboard that can be activated by pressing the particular button. E-Ball is very small, it is having only 6 inch diameter sphere. It is having 120×120mm motherboard.

E Ball concept pc don't have any external display unit, it has a button when you press this button a projector will pop and it focus the computer screen on the wall which can be adjusted with navigation keys. If there is no wall then it has a paper sheet holder that divides into three pieces like an umbrella just after popping up, and it will show desktop on the paper sheet. Also, the E-Ball PC supports a paper holder and the paper sheet on the holder could act like a screen where you can watch movies or something. This concept PC will measure 160mm in diameter and it was designed for Microsoft Windows OS, sorry about the others. For the moment there is no word on pricing or when it’s going to be available, however, I am sure that everybody would like to see a small spherical PC like this one

Elements of E-Ball

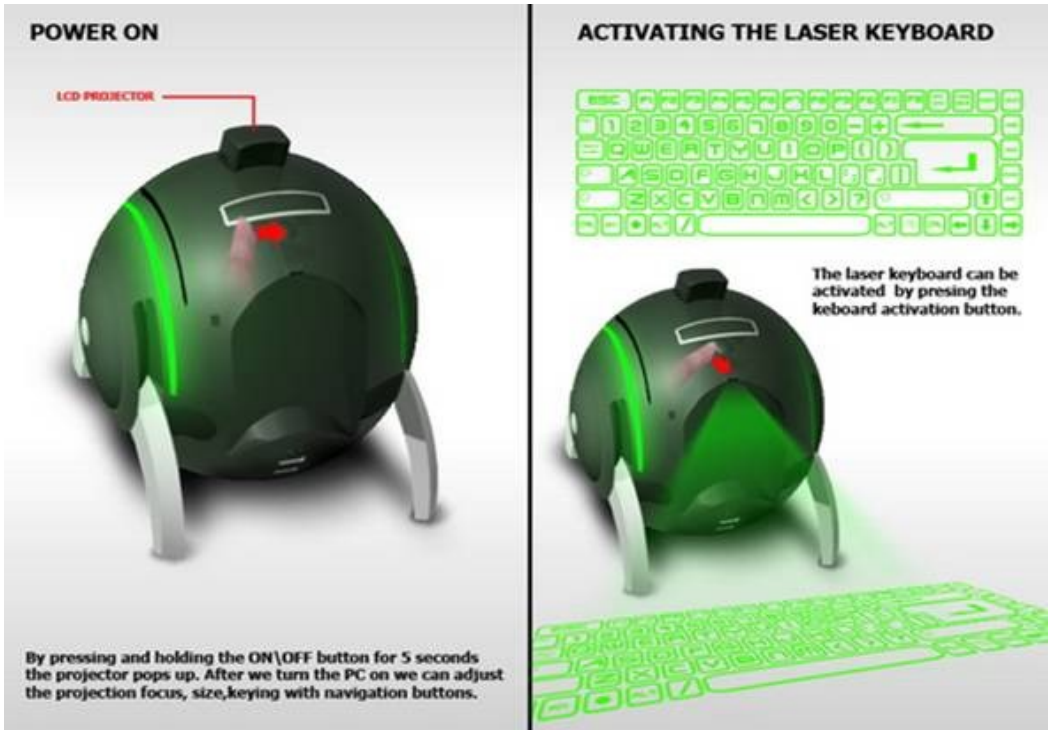
Aren't you tired of your PC? By his ugly shape and the way that it looks? Well, this is exactly what designer Apostol Tnokovski was feeling when he decided to create the smallest PC ever made. It's not going to be like a PDA, it's going to be a PC with all conventional components (mouse, keyboard, normal screen). The concept PC is called E-Ball and it's shaped like a sphere because in Tnokovski's opinion this is the best shape in nature and it draws everybody's attention.E-Ball will feature a dual core processor, 250-500GB HDD, 2GB of RAM, integrated graphic card and sound card, 2 x 50W speakers, HD-DVD recorder, wireless optical mouse and laser keyboard, LAN and WLAN card, modem, Web cam and integrated LCD projector.

It contains wireless optical mouse and laser keyboard, and LCD projector. It has around 350-600GB of Hard Disk Drive. It contains 5GB RAM. It has two 50W speakers. It has LAN and WLAN card and a Web cam. When you want to carry it around you can easily "pack it" into a ball. This is a futuristic concept, and this, I think, is how the future computers will look like. This device has an optical keyboard and an holographic display. So you don't have a physical keyboard and no monitor! Still, the mouse is physical but it fits in to the computer when you want to carry it around. The bad thing about using a virtual keyboard is that you need a smooth

surface, otherwise I don't know how will you be able to use it. It is strange enough to call this device a computer, because it is so small, but as far as I know it doesn't lack any hardware part and tends to be a future machine found in any house or office. I don't know exactly how this computer will be powered but I think it will have a powerful battery so you will have a great stand by time.

Working of E-Ball:

E Ball concept pc don't have any external display unit, it has a button when you press this button a projector will pop and it focus the computer screen on the wall which can be adjusted with navigation keys. If there is no wall then it has a paper sheet holder that divides into three pieces like an umbrella just after popping up, and it will show desktop on the paper sheet. Also, the E-Ball PC supports a paper holder and the paper sheet on the holder could act like a screen where you can watch movies or something. This concept PC will measure 160mm in diameter and it was designed for Microsoft Windows OS, sorry about the others. For the moment there is no word on pricing or when it's going to be available, however, I am sure that everybody would like to see a small spherical PC like this one.



E-Ball concept pc has a laser keyboard that is fully a concept keyboard that is visible when the pc is in working. The keyboard is not physical - it is interpreted by lasers that appear after you

press the respective button. It recognizes your fingers with the help of an IR sensor when you are typing at a particular place, while the mouse is a pop out wonder making this an exiting piece of technology.

The software interface of E-Ball concept pc is highly stylized with icons that can be remembered easily that support all type of windows operating system. E-Ball concept pc work very easy while you are making video presentations, listening music watching large screen movies, and chatting on the net.

As years passes, the computer size is becoming smaller. This ball is known as E-Ball and its design is given by Apostol Tnokovski. He was trying to create the smallest PC in the world when he came across this idea.It is shaped like a sphere because in Tnokovski's opinion this is the best shape in nature and it draws everybody's attention. you'll see the pop-out laser mouse, a pico projector inside that illuminates either the wall or a sheet of paper for a screen, and that laser keyboard that would almost certainly be a clumsy input device. Fix that, and find a motherboard that'll fit inside this palm-sized baby, and Apostol might be onto something here.E-Ball will feature a dual core processor, 250-500GB HDD, 2GB of RAM, integrated graphic card and sound card, 2 x 50W speakers, HD-DVD recorder, wireless optical mouse and laser keyboard, LAN and WLAN card, modem, Web cam and integrated LCD projector.

Pranavapasha sharma (0808CS161110)

7. Google Glass

Abstract

The emergence of Google Glass, a prototype for a transparent Heads-Up Display (HUD) worn over one eye, is significant. It is the first conceptualization of a mainstream augmented reality wearable eye display by a large company.

This paper argues that Glass's birth is not only a marketing phenomenon heralding a technical prototype, it also argues and speculates that Glass's popularization is an instigator for the adoption of a new paradigm in human-computer interaction, the wearable eye display. Google Glass is deliberately framed in media as the brainchild of Google co-founder Sergey Brin. Glass's process of adoption operates in the context of mainstream and popular culture discourses, such as the Batman myth, a phenomenon that warrants attention.

Project Glass is a research and development program by Google to develop an augmented reality Head-Mounted Display (HMD). The intended purpose of Project Glass products would be the hands-free displaying of information currently available to most Smartphone users, and allowing for interaction with the Internet via natural language voice commands. These glasses will have the combined features of virtual reality and augmented reality. Google glasses are basically wearable computers that will use the same Android software that powers Android smart phones and tablets. Google Glass is as futuristic a gadget we've seen in recent times. A useful technology for all kinds of people including handicapped/disabled.

Background

Google Glass is a prototype for an augmented reality, heads-up display developed by Google X lab slated to run on the Android operating system (see Figure 1). Augmented reality involves technology that augments the real world with a virtual component . The first appearance of Glass was on Sergey Brin who wore it to an April 5, 2012 public event in San Francisco. Provocative headlines emerged such as "Google 'Project Glass' Replaces the Smartphone with Glasses" and "Google X Labs: First Project Glass, next space elevators". A groundswell of anticipation

surrounds Glass because it implies a revolutionary transition to a new platform, even though release for developers is only planned for 2013. At the time of our writing this paper, it is not available for consumers who can only see it in promotional materials.

Heads-up eye displays are not new. The Land Warrior system, developed by the U.S. army over the past decade, for example, includes a heads-up eye display with an augmented reality visual overlay for soldier communication. Many well-known inventors have contributed eye display technology, research or applications over the past two decades including Steve Mann (Visual Memory Prosthetic), Thad Starner (Remembrance Agent), and Rob Spence (Eyeborg). Commercially, Vuzix is a company that currently manufactures transparent eye displays.

Science fiction and popular references to the eye display are almost too numerous to list, but most are featured in military uses: Arnold Schwarzenegger's Terminator from the 1984 film had an integrated head's up display that identified possible targets, Tom Cruise's Maverick in Top Gun had a rudimentary display to indicate an enemy plane's target acquisition and current G-forces, and Bungie's landmark video game series Halo features a head's up display that gives the player real-time status updates on player enemy locations, shield levels, remaining ammunition and waypoint information. In most popular culture uses, a head's up display is transparently overlaid upon the real world. However, in video games, the display is considered to be part of the entire game interface. While many film and television shows are adding HUDs to their storytelling to add a science fiction or futuristic feel, there is a movement in game development away from any artificial HUDs as many consider them to be "screen clutter" and block a player's view of a created world. The video game Dead Space by Electronic Arts is an exemplar of this

new style: traditional game information such as health and ammunition have been woven into character design, allowing for an unobstructed view.

How it Works?

The device will probably communicate with mobile phones through Wi-Fi and display contents on the video screen as well as respond to the voice commands of the user. Google put together a short video demonstrating the features and apps of Google glasses. It mainly concentrates on the social networking, navigation and communication. The video camera senses the environment and recognizes the objects and people around. The whole working of the Google glasses depends upon the user voice commands itself.

Sergey Brin has been loosely associated with Batman since the fall of 2011, setting persuasive discursive grounds for actions that Google takes. A compelling character in the narrative that charts this technology's emergence, the name "Sergey Brin" appears 713 times in the corpus of 1,000 print and online news articles about Google Glass. Often the story concentrates on Brin's activities, comments, whereabouts, and future expectations amid news of a technology that only exists as an artifact of the press for the public. Rupert Till explains the definition of how an individual must amass popular fame in order to form a "cult of personality": A celebrity is someone who is well known for being famous, and whose name alone is recognizable, associated with their image, and is capable of generating money. . . For a star to progress to a point where they are described as a popular icon requires their achievement of a level of fame at which they are treated with the sort of respect traditionally reserved for religious figures. In order to be described as a popular icon, a star has to become a religious figure, to develop their own personality cult and recruit followers.

Benefits:

1. Easy to wear and use.
2. Sensitive and responsive to the presence of people.
3. Fast access of maps, documents, videos, chats and much more.
4. A new trend for fashion lovers together being an innovative technology.
5. A spectacle based computer to reside directly on your eyes rather than in your pouch or pocket.

Yash Solanki (0808CS161187)

8. E-Paper Technology

Abstract

E-paper is a revolutionary material that can be used to make next generation I, electronic displays. It is portable reusable storage and display medium that look like paper but can be repeatedly written one thousands of times.

These displays make the beginning of a new area for battery power information applications such as cell phones, pagers, watches and hand-held computers etc. Two companies are carrying our pioneering works in the field of development of electronic ink and both have developed ingenious methods to produce electronic ink. One is E-ink, a company based at Cambridge, in U.S.A.

The other company is Xerox doing research work at the Xerox's Palo Alto Research Centre. Both technologies being developed commercially for electronically configurable paper like displays rely on microscopic beads that change color in response to the charges on nearby electrodes. Like traditional paper, E-paper must be lightweight, flexible, glare free and low cost. Research found that in just few years this technology could replace paper in many situations and leading us ink a truly paperless world.

Electronic ink is a pioneering invention that combines all the desired features of a modern electronic display and the sheer convenience and physical versatility of sheet of paper. E-paper or electronic paper is sometimes called radio paper or smart paper. Paper would be perfect except for one obvious thing: printed words can't change. The effort is to create a dynamic high-resolution electronic display that's thin and flexible enough to become the next generation of paper.

The technology has been identified and developed is well under way. Within five years, it is envisioned electronic books that can display volumes of information as easily as flipping a page and permanent newspapers that update themselves daily via wireless broadcast. They deliver the readability of paper under b virtually any condition, without backlighting. And electronic ink displays are persistent without power, drawing current only when they change, which means batteries can be smaller and last longer.

Gyricon

Electronic paper was first developed in the 1970s by Nick Sheridon at Xerox's Palo Alto Research Center. The first electronic paper, called Gyricon, consisted of polyethylene spheres between 75 and 106 micrometers across. Each sphere is a Janus particle composed of negatively charged black plastic on one side and positively charged white plastic on the other(each bead is thus a dipole).

The spheres are embedded in a transparent silicone sheet, with each sphere suspended in a bubble of oil so that they can rotate freely. The polarity of the voltage applied to each pair of electrodes then determines whether the white or black side is face-up, thus giving the pixel a white or black appearance. At the FPD 2008 exhibition, Japanese company Soken has demonstrated a wall with electronic wall-paper using this technology

Electrophoretic

An electrophoretic display forms visible images by rearranging charged pigment particles using an applied electric field.

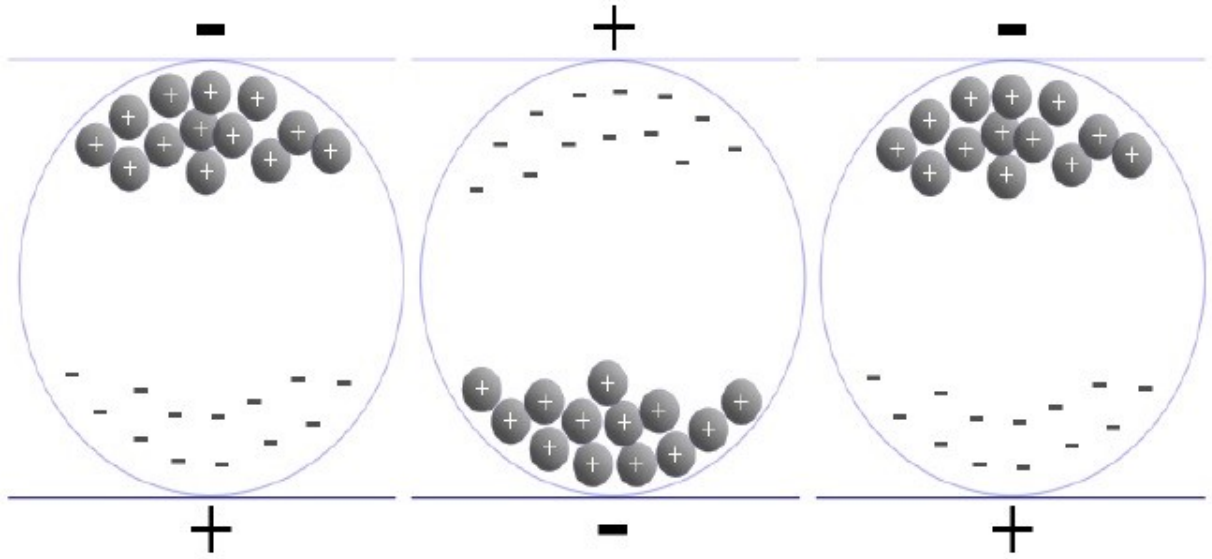


Fig-2.1: Basic Scheme of an Electrophoretic Display

In the simplest implementation of an electrophoretic display, titanium dioxide particles approximately one micrometer in diameter are dispersed in hydrocarbon oil. A dark-colored dye is also added to the oil, along with surfactants and charging agents that cause the particles to take on an electric charge. This mixture is placed between two parallel, conductive plates separated by a gap of 10 to 100 micrometers. When a voltage is applied across the two plates, the particles will migrate electrophoretically to the plate bearing the opposite charge from that on the particles. When the particles are located at the front (viewing) side of the display, it appears white, because light is scattered back to the viewer by the high- index titanium particles.

When the particles are located at the rear side of the display, it appears dark, because the incident light is absorbed by the colored dye. If the rear electrode is divided into a number of small picture elements (pixels), then an image can be formed by applying the appropriate voltage to each region of the display to create a pattern of reflecting and absorbing regions. Electrophoretic displays are considered prime examples of the electronic paper category, because of their paper-like appearance and low power consumption. Electrophoretic displays can be manufactured using the Electronics on Plastic by Laser Release (EPLaR) process developed by Philips Research to enable existing AM-LCD (Active matrix liquid crystal display) manufacturing plants to create flexible plastic displays.

Electronics on Plastic by Laser Release (EPLaR)

Electronics on Plastic by Laser Release (EPLaR) is a method for manufacturing flexible electrophoretic display using conventional AM-LCD manufacturing equipment avoiding the need to build new factories. The technology can also be used to manufacture flexible OLED (Organic LED) displays using standard OLED fabrication facilities. The technology was developed by Philips Research and uses standard display glass as used in TFT-LCD processing plants. It is coated with a layer of polyimide using a standard spin-coating procedure used in the production of AM-LCD displays. This polymide coating can now have a regular TFT matrix formed on top of it in a standard TFT processing plant to form the plastic display, which can then be removed using a laser to finish the display and the glass reused thus lowering the total cost of manufacture.

Development in Electrophoretic Display:

In the 1990s another type of electronic paper was invented by Joseph Jacobson, who later co-founded the E Ink Corporation which formed a partnership with Philips Components two years later to develop and market the technology. In 2005, Philips sold the electronic paper business as well as its related patents to Prime View International. This used tiny microcapsules filled with electrically charged white particles suspended in colored oil. In early versions, the underlying circuitry controlled whether the white particles were at the top of the capsule (so it looked white to the viewer) or at the bottom of the capsule (so the viewer saw the color of the oil). This was essentially a reintroduction of the wellknown electrophoretic display technology, but the use of microcapsules allowed the display to be used on flexible plastic sheets instead of glass.

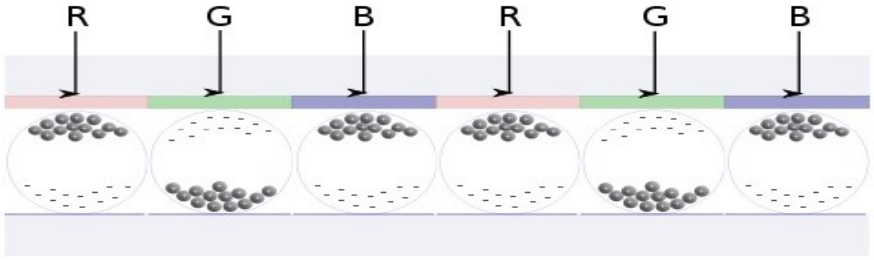


Fig-2.2: Basic Scheme of an Electrophoretic Display using color filters

One early version of electronic paper consists of a sheet of very small transparent capsules, each about 40 micrometers across. Each capsule contains an oily solution containing black dye (the electronic ink), with numerous white titanium dioxide particles suspended within. The particles are slightly negatively charged, and each one is naturally white. The microcapsules are held in a layer of liquid polymer, sandwiched between two arrays of electrodes, the upper of which is made transparent. The two arrays are aligned so that the sheet is divided into pixels, which each pixel corresponding to a pair of electrodes situated either side of the sheet. The sheet is laminated with transparent plastic for protection, resulting in an overall thickness of 80 micrometers, or twice that of ordinary paper.

The network of electrodes is connected to display circuitry, which turns the electronic ink 'on' and 'off' at specific pixels by applying a voltage to specific pairs of electrodes. Applying a negative charge to the surface electrode repels the particles to the bottom of local capsules, forcing the black dye to the surface and giving the pixel a black appearance. Reversing the voltage has the opposite effect - the particles are forced from the surface, giving the pixel a white appearance. A more recent incarnation of this concept requires only one layer of electrodes beneath the microcapsules.

Electro wetting

Electro-wetting display (EWD) is based on controlling the shape of a confined water/oil interface by an applied voltage. With no voltage applied, the (coloured) oil forms a flat film between the water and a hydrophobic (water-repellent), insulating coating of an electrode, resulting in a coloured pixel. When a voltage is applied between the electrode and the water, the interfacial tension between the water and the coating changes. As a result the stacked state is no longer stable, causing the water to move the oil aside. This results in a partly transparent pixel, or, in case a reflective white surface is used under the switchable element, a white pixel. Because of the small size of the p ixel, the user only experiences the average reflection, which means that a high-brightness, high-contrast switchable element is obtained, which forms the basis of the reflective display. Displays based on electro-wetting have several attractive features.

The switching between white and coloured reflection is fast enough to display video content. It is a low-power and low-voltage technology, and displays based on the effect can be made flat and thin. The reflectivity and contrast are better or equal to those of other reflective display types and

are approaching those of paper. In addition, the technology offers a unique path toward high-brightness full-colour displays, leading to displays that are four times brighter than reflective LCDs and twice as bright as other emerging technologies. Instead of using red, green and blue (RGB) filters or alternating segments of the three primary colours, which effectively result in only one third of the display reflecting light in the desired colour, electro-wetting allows for a system in which one sub-pixel is able to switch two different colours independently. This results in the availability of two thirds of the display area to reflect light in any desired colour. This is achieved by building up a pixel with a stack of two independently controllable coloured oil films plus a colour filter.

Electrofluidic

Electrofluidic displays are a variation of an electrowetting display. Electrofluidic displays place an aqueous pigment dispersion inside a tiny reservoir. The reservoir comprises <5-10% of the viewable pixel area and therefore the pigment is substantially hidden from view. Voltage is used to electromechanically pull the pigment out of the reservoir and spread it as a film directly behind the viewing substrate. As a result, the display takes on color and brightness similar to that of conventional pigments printed on paper. When voltage is removed liquid surface tension causes the pigment dispersion to rapidly recoil into the reservoir. As reported in the May 2009 Issue of Nature Photonics, the technology can potentially provide >85% white state reflectance for electronic paper.

Conclusion

The Holy Grail of electronic ink technology is a digital book that can typeset itself and that readers could leaf through just as if it were made of regular paper. Such a book could be programmed to display the text from a literary work and once you've finished that tale, you could automatically replace it by wirelessly downloading the latest book from a computer database. Xerox had introduced plants to insert a memory device into the spine of the book, which would allow users to alternate between up to 10 books stored on the device. Just as electronic ink could radically change the way we read books, it could change the way you receive your daily newspaper. It could very well bring an end to newspaper delivery, as we know it.

Instead of delivery people tossing the paper from their bike or out their car window, a new high-tech breed of paper deliverers who simply press a button on their computer that would simultaneously update thousands of electronic newspapers each morning. Sure, it would look and feel like your old paper, but you wouldn't have to worry about the newsprint getting smudged on your fingers, and it would also eliminate the piles of old newspapers that need recycling. Prior to developing digital books and newspapers E-Ink will be developing a marketable electronic display screen for cell phones, PDA's, pagers and digital watches.

Electronic ink is not intended to diminish or do away with traditional displays. Instead electronic ink will initially co-exist with traditional paper and other display technologies. In the long run, electronic ink may have a multibillion-dollar impact on the publishing industry. Ultimately electronic ink will permit almost any surface to become a display, bringing information out of the confines of traditional devices and into the world around us.

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9. Measuring Universal Intelligence

Abstract

The idea of a universal anytime intelligence test is introduced here. The meaning of the terms "universal" and "anytime" is manifold: the test should be able to measure the intelligence of any biological or artificial system that exists at this time or in the future.

It should also be able to evaluate both inept and brilliant systems (any intelligence level) as well as very slow to very fast systems (any time scale). Also, the test may be interrupted at any time, producing an approximation to the intelligence score, in such a way that the more time is left for the test, the better the assessment will be.

In order to do this, the test proposal is based on previous works on the measurement of machine intelligence based on Kolmogorov complexity and universal distributions, which were developed in the late 1990s (C-tests and compression-enhanced Turing tests). It is also based on the more recent idea of measuring intelligence through dynamic/interactive tests held against a universal distribution of environments. Some of these tests are analysed and their limitations are highlighted so as to construct a test that is both general and practical. Consequently, ideas for a more recent definition of "universal intelligence" in order to design new "universal intelligence tests" are introduced, where a feasible implementation has been a design requirement. One of these tests is the "anytime intelligence test", which adapts to the examinee's level of intelligence in order to obtain an intelligence score within a limited time

MATHEMATICAL DEFINITIONS AND MEASURING INTELLIGENCE

Works on enhancing or substituting the Turing Test by inductive inference tests were developed, using Solomonoff prediction theory and related notions, such as the Minimum Message Length (MML) principle. This resulted in the introduction of induction-enhanced amd compression enhance turing tests. The basic idea was to construct a test as a set of series whose shortest pattern had no alternative projectible patterns of similar complexity. That means that the "explanation" of the series had to be much more plausible than other plausible hypotheses

The definition was given as the result of a test, called C-test, formed by computationally-obtained series of increasing complexity. The sequences were formatted and presented in a quite similar way to psychometric tests and, as a result, the test was administered to humans, showing a high correlation with the results of a classical psychometric (IQ) test on the same individuals. Nonetheless, the main goal was that the test could eventually be administered to other kinds of intelligent beings and systems. This was planned to be done, but the work from showed that machine learning programs could be specialised in such a way that they could score reasonably well on some of the typical IQ tests.

This unexpected result confirmed that C-tests had important limitations and could not be considered universal, i.e., embracing the whole notion of intelligence, but perhaps only a part of it. Other intelligent tests using ideas from algorithmic information theory or compression theory have also been developed. Recent works by Legg and Hutter , gave a new definition of machine intelligence, dubbed "universal intelligence", also grounded in Kolmogorov complexity and Solomonoff's ("inductive inference" or) prediction theory. The key idea is that the intelligence of an agent is evaluated as some kind of sum (or weighted average) of performances in all the possible environments. Taking Legg and Hutter's definition of Universal Intelligence as a basis, a refinement and improvement of their work was done. First some issues require a clarification or a correction was addressed and, once they are clarified, an anytime universal intelligence test was developed.

ADDRESSING THE PROBLEMS OF UNIVERSAL INTELLIGENCE MEASUREMENT

The above definition captures one of the broadest definitions of intelligence: "the ability to adapt to a wide range of environments". However, there are three obvious problems in this definition regarding making it practical. First, we have two infinite sums in the definition: one is the sum over all environments, and the second is the sum over all possible actions (agent's life in each environment is infinite). And, finally, K is not computable.

Thus, just making a random finite sample on environments, limiting the number of interactions or cycles of the agent with respect to the environment and using some computable variant of K, is sufficient to make it a practical test. 4.1 SAMPLING ENVIRONMENTS Among the infinite number of environments, many environments (either simple or complex) will be completely useless for evaluating intelligence, e.g., environments that stop interacting, environments with

constant rewards, or environments that are very similar to other previously used environments, etc. Including some, or most, of them in the sample of environments is a waste of testing resources; if we are able to make a more accurate sample, we will be able to make a more efficient test procedure. In an interactive environment, a clear requirement for an environment to be discriminative is that what the agent does must have consequences on rewards.

Without any restriction, many (most) simple environments would be completely insensitive to agents' actions. So, number of environments are restricted to be sensitive to agents' actions. That means that a wrong action (e.g., going through a wrong door) might lead the agent to part of the environment from which it can never return, but at least the actions taken by the agent can modify the rewards in that subenvironment. More precisely, we want an agent to be able to influence rewards at any point in any subenvironment. Such an environment is knoen as reward sensitive environment.

TIME AND INTELLIGENCE

The definition given above is now feasible and stable with respect to varying m and ni. But there is no reference to physical time. Universal test had been considered to be generalising C-test from passive environments to active environments. Time should be considered in the measurement. Therefore , reference to time is important. the use of physical time may refer either to the environment or to the agent since both interact and both of them can be either fast or slow. If we consider how physical time may affect an environment, i.e., the environment's speed, it is unacceptable to have an interactive test where the agent has to wait several hours after each action in order to see the reward and the observation.

On the other hand, when we generally refer to time when measuring intelligence, especially in noninteractive tests, it is assumed that we are talking about the agent's speed. Slow agents cannot be considered equal with fast agents. 5.1 TIME AND REWARDS Consider time either as a limit to get agents' actions or as a component of the final score. there are many options for incorporating time. Considering that we have an overall time τ for an environment, one option is to set a time-out τo for each action (with $\tau o <= \tau$) such that if the agent does not select an action within that time, reward 0 is given (or a random action is performed). The shorter the time-out is, the more difficult the test is. An alternative possible solution would be to set a fixed time, a time-

slot τs (instead of a time-out) for each interaction (with τs<= τ). But, again, given an overall time τ ,we do not know how much slots we need to generate.

Considering (randomly chosen) different-length time-slots for several interactions, a quick agent would be able to perform appropriate actions for more interactions than a slow agent with the same potential intelligence. However, it is not easy to tune these time-slots independently from the agent and, in any case, it is not very sensible to make the agent wait for some observations and rewards if we want to make a practical and efficient test.

As a result, if we do not assign time-slots, necessarily the rewards obtained in an environment during an overall time τ must be averaged, otherwise very fast but dull (slightly better than random) agents would perform well. The natural idea is to average by the number of interactions that the agent finally performs in time τ. However, a shrewd policy here would be to act as a fast random agent until the average reward becomes larger than a threshold (this can happen with greater or lower probability depending on the threshold) and then stop acting. For instance, consider an agent that performs one action randomly. If the reward is positive, then stop (no other action is performed). If the reward is negative, then act fast and randomly until the average reward is positive and then stop. Note that this strategy ensures a positive reward in balanced environments. Consequently, an agent could get a very good result by very fast (and possibly lucky) first interactions and then rest on its laurels, because the average so far was good.

DISCUSSION ON THE NEW INTELLIGENCE MEASURE

The following items summaries the main features of the various new intelligence tests we have introduced:

• The distribution of environments is based on Ktmax (a bounded and computable version of K). There are many reasons for this: we cannot wait indefinitely for the environment; it is also computable and allows us to make the sample.

• The definition now includes a sample of environments, instead of all environments. The most important constraint to make this sample more discriminative is that the environment must be reward-sensitive.

• In the anytime versions of the test, the complexity of the environments is also progressively adjusted in order to make the test more effective and less dependent on the chosen distribution and preference over simple or complex environments.

• Interactions are not infinite. Rewards are averaged by the number of actions instead of accumulated. This makes the score expectation less dependent on the available test time.

• Time is included. The agent can only play with a single environment for a fixed time. This time limit progressively grows to make the test anytime.

• Rewards and penalties are both included (rewards can range from −1 to 1). Environments are required to be balanced, meaning that a random agent would score 0 in the limit in these environments. Otherwise, a very inept but proactive/quick agent would obtain good results.

CONCLUSION AND FUTURE WORKS

A very important challenge which might have strong and direct implications in many fields (e.g., artificial intelligence, psychometrics, comparative cognition, and philosophy) were given through these concepts. A set of tests and, especially, an anytime intelligence test that can be applied to any kind of intelligent system (biological or artificial, fast or slow) were developed. The name anytime comes from the idea that we can obtain a rough approximation of the intelligence of an agent in a small amount of time and much better approximations in more time.

The term also originates from the fact that we introduce time in the definition of intelligence and we also adapt the time scale to the agent's in order to be able to evaluate very slow and very fast intelligent agents, by also incorporating these times into the measurement. The acceptance and use of these tests could allow new research breakthroughs to take place:

Progress in AI could be boosted because systems could be evaluated.

• New generations of CAPTCHAS that take the ideas of -anytime intelligence test could be evolved.

• Certification would be devised to decide whether an unknown agent can be accepted as a service or a project.

• In the long term, these tests will be necessary to determine when we reach the “Technological Singularity”.

It represents the point at which one intelligent system is capable of constructing another intelligent system of the same intelligence. Much needs to be done on the reliability and optimality of the test. Constructs from Computerized Adaptive Testing and Item Response Theory (IRT) can be adapted here. The relation between speed and intelligence is also an area where further research is needed. It may be possible to develop tests that are able to measure intelligence and speed at the same time, without a batch combination of tests. There is also much theoretical work ahead.

Some of the assumptions made in some of the definitions could be presumably refined or improved. Some theoretical results could be obtained for some of the tests (convergence, optimality, etc.), as well as some expected scores proven for different kinds of agents and classes of environments.

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10.

10 Java Database Connectivity

Abstract

JDBCT is a JavaT API for executing SQL statements. (As a point of interest, JDBC is a trademarked name and is not an acronym; nevertheless, JDBC is often thought of as standing for "Java Database Connectivity".)

It consists of a set of classes and interfaces written in the Java programming language. JDBC provides a standard API for tool/database developers and makes it possible to write database applications using a pure Java API.

Using JDBC, it is easy to send SQL statements to virtually any relational database. In other words, with the JDBC API, it isn't necessary to write one program to access a Sybase database, another program to access an Oracle database, another program to access an Informix database, and so on. One can write a single program using the JDBC API, and the program will be able to send SQL statements to the appropriate database. And, with an application written in the Java programming language, one also doesn't have to worry about writing different applications to run on different platforms. The combination of Java and JDBC lets a programmer write it once and run it anywhere

Introduction of Java Database Connectivity:

Java, being robust, secure, easy to use, easy to understand, and automatically Downloadable on a network, is an excellent language basis for database applications. What is needed is a way for Java applications to talk to a variety of different databases. JDBC is the mechanism for doing this. JDBC extends what can be done in Java. For example, with Java and the JDBC API, it is possible to publish a web page containing an applet that uses information obtained from a remote database. Or an enterprise can use JDBC to connect all its employees (even if they are using a conglomeration of Windows, Macintosh, and UNIX machines) to one or more internal databases via an intranet.

With more and more programmers using the Java programming language, the need for easy database access from Java is continuing to grow. MIS managers like the combination of Java and JDBC because it makes disseminating information easy and economical. Businesses can

continue to use their installed databases and access information easily even if it is stored on different database management systems. Development time for new applications is short. Installation and version control are greatly simplified.

What Does JDBC Do?

Simply put, JDBC makes it possible to do three things:

1. Establish a connection with a database

2. Send SQL statements

3. Process the results.

The following code fragment gives a basic example of these three steps:

```
Connection con = DriverManager.getConnection (
"jdbc:odbc:wombat", "login", "password");
Statement stmt = con.createStatement();
ResultSet rs = stmt.executeQuery("SELECT a, b, c FROM Table1");
while (rs.next()) {
int x = getInt("a");
String s = getString("b");
float f = getFloat("c"); }
```

JavaSoft provides three JDBC product components as part of the Java Developer's Kit (JDK):

. the JDBC driver manager,

. the JDBC driver test suite, and

. the JDBC-ODBC bridge.

The JDBC driver manager is the backbone of the JDB architecture. It actually is quite small and simple; its primary function is to connect Java applications to the correct JDBC driver and then get out of the way.

11 Einstein at Home

Abstract

Einstein@Home is a distributed computing project to search for signals from rotating neutron stars in data from the LIGO gravitational-wave detectors, from large radio telescopes, and from the Fermi Gamma-ray Space Telescope. These radio signals are weak and the real signal is embedded with a lot of noise. Computational processing of these leads to detection of Neutron stars Einstein@Home project aims to enable researchers to tap into the huge processing assets of multiple personal computers around the world voluntarily.

Introduction

Better connectivity and proliferation of computing power available at ease has paved the way for Distributed computing. According to Wikipedia[1]-

> *"Distributed computing is a field of computer science that studies distributed systems. A distributed system is a system whose components are located on different networked computers, which then communicate and coordinate their actions by passing messages to one other. The components interact with one other in order to achieve a common goal. Distributed computing also refers to the use of distributed systems to solve computational problems. In distributed computing, a problem is divided into many tasks, each of which is solved by one or more computers, which communicate with each other via message passing."*

A computer program that runs within a distributed system is called a distributed program. Assigning the tasks on heterogeneous environment and combing the computations results in real-time required message passing between hosts and central authority. There are many different types of implementations for the message passing mechanism, including pure HTTP, RPC-like connectors and message queues.

Methodology

Einstein@Home[2] utilize the Berkeley Open Infrastructure for Network Computing (BOINC[3]) which is an open-source middleware system, supports volunteer and grid computing. It is

available on various operating systems like Windows, macOS, Linux, Android etc. It is developed by Space Sciences Laboratory (SSL) at the University of California, Berkeley.

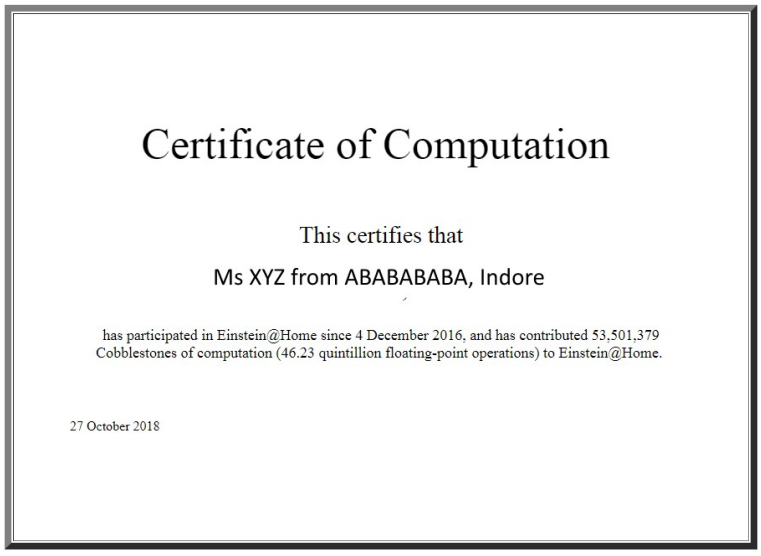
This Guinness World Record winner middleware is unique in many ways. It used for extensive computation performed for application ranging from Gravitational wave detection, computational drug design, simulates protein folding for medical research into Alzheimer's disease, Huntington's disease, and many forms of cancer, searching for signs of extraterrestrial intelligence to name a few. It forms the largest computing grid in the world with more than 3 Lakh active participants and 8.3 Lakh active computers worldwide processing on average 26.431 PetaFLOPS as reported recently in June, 2018.

Architecture

The project uses the idle processing resources of thousands of personal computers owned by volunteers who have installed the BOINC software on their systems including graphics processing units (GPUs), PlayStation 3s, Sony Xperia smartphones etc.

As part of the client–server model network architecture, the volunteered machines each receive pieces of a task, complete them, and return them to the project's servers, where the sub units are compiled into an overall result.

Volunteers can track their computing contributions on the Einstein@home website, which makes volunteers' participation competitive and encourages them to share their more resources. The reward volunteers Einstein@Home issues Certificate of Computation as shown below.



Certificate of Computation

This certifies that

Ms XYZ from ABABABABA, Indore

has participated in Einstein@Home since 4 December 2016, and has contributed 53,501,379 Cobblestones of computation (46.23 quintillion floating-point operations) to Einstein@Home.

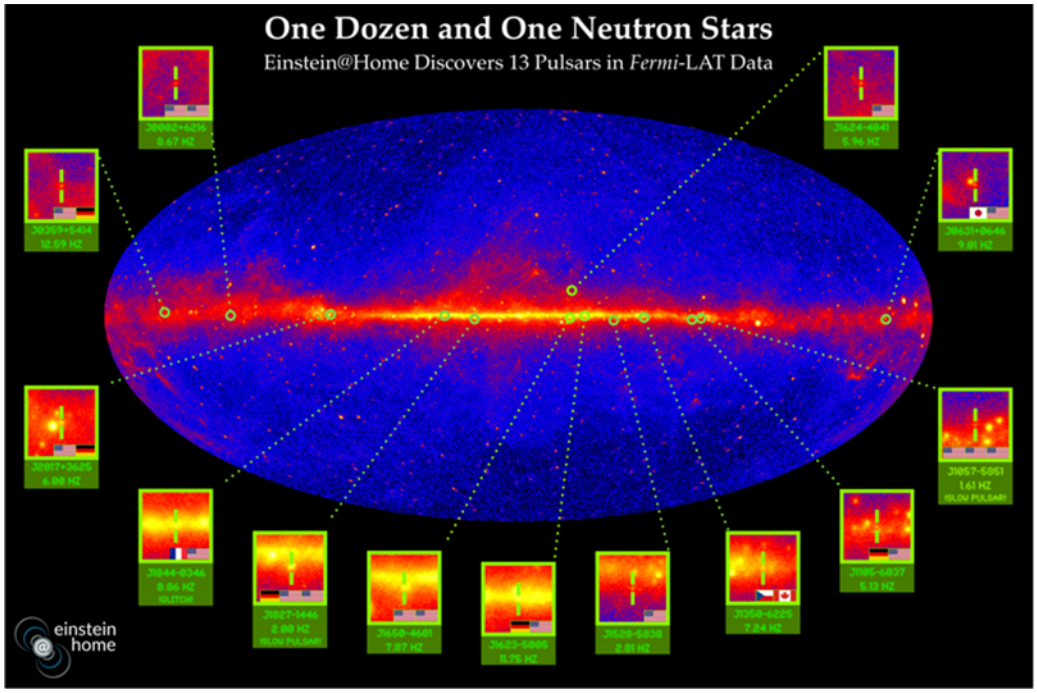
27 October 2018

Einstein@Home is not the only one project with BOINC. One more popular project is Folding@home. It is developed and operated by the Prof. Vijay Pande of Pande Laboratory at Stanford University and is shared by various scientific institutions and research laboratories

across the world. This is of significant academic interest with major implications for medical research in applications in drug design.

Conclusion

Gravitational waves were predicted by Albert Einstein a century ago, and were directly seen for the first time on September 14, 2015. This observation of gravitational waves from a pair of merging black holes opens up a new window on the universe, and ushers in a new era in astronomy. This distributed computation has improved the performance of detection of Gravitational wave from its large-scale computing network has allowed researchers to run computationally costly computations thousands of times faster with the help of volunteers.



The success of Einstein@Home started way back in 2010 with discovery of a previously undetected radio pulsar J2007+2722, found in archive data from the Arecibo Observatory. Since then the project had discovered 55 radio pulsars, 18 previously unknown gamma-ray pulsars in data from the Large Area Telescope on board the Fermi Gamma-ray Space Telescope. The Einstein@Home search makes use of novel and more efficient data-analysis methods and discovered pulsars missed in other analyses of the same data.

References:

1. Wikipedia www.wikipedia.org
2. Einstein@Home official website https://einsteinathome.org
3. University of California, Berkeley https://github.com/BOINC/boinc

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