5th Edition

‘Boot’ For Computer

Best of Outstanding Technology

Department of Computer Science & Engineering
Institute of Engineering and Science
IPS Academy, Indore
2016-17

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
Rajendra Nagar, A.B. Road,Indore-452012

Editorial

'BOOT' For Computer

Session 2016-17

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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 students 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	 Ms.Shruti Sharma Assistant Professor	 Ms.Shaba P Khan 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. Abhaydeep Seth 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 (RA)	 Mr. Dharmendra Choukse Senior Programmer	 Mr. Antriksha Somani Assistant Professor
 Ms. Archana Aapte System Analyst	 Mr. Pratik Gite Assistant Professor	 Mr. Kamal Borana Assistant Professor	 Mr. Sumit Devray Assistant Professor

Department Event

Two faculty development programs were organized in which, one week program on Android Application Development in the month of March 2016, six days program on JAVA technology in the month of May 2017, six days program on LATEX Technology in the month of May 2017.

One day Seminar on Cyber Security & Ethical Hacking in the month of March 2016.

10 different Workshops were organized on different topics covering Entrepreneurship Awareness Camp, INGENIUS COMPUTER HARDWARE, JAVA Business Application, Python, Web Application development lab PHP & MySql, Current Trends in Web Development and Cloud Computing Infrastructure, PHP & Web Development, Software Testing& JAVA.

Eight expert lectures were organized in which one day Orientation program on GATE by Mr. Dharmendra Gupata, in the month of November 2016, one day program on E Card System by Mr. Sumit Singh, SVELTOSE Tech. PVt. Ltd., Indore in the month of Novmeber 2016, one day program on JAVA Technologies by Mr. Vibhor Patidar in the month of February 2016. One Industrial Visit program was organized by Live Projects Demonstration in the month of August 2016, including one day program on latest trends in software industries, image processing, in the month of November 2016 and NP completeness, Business Etiquettes in the month of March 2017.

17 Training programs were organized Advanced JAVA , Hybrid Technology, PhpMySql, C & CPP, Firefox, Scilab, Advance C, Ubuntu, JAVA, Advance CPP, Libre Office, Latex.

Other Events were organized in which one day program on C++ in the month of September 2016, one day programme on Fundamental of computers in the month of December 2016, a brain storming competition AAGHAZ-2017 in the month of April 2017, a major and minor project competition cum exhibition UDAAN-2017.

Department Membership

Department of Computer science & engineering is having the membership of Computer society of India (CSI). SIX programs were organized under the banner of CSI in which 2 Day UDAAN-2017 Minor & Major Project Competition cum Exhibition was held for III YR and IV YR Students. Expert team was Mr. Divyansh Singh, Mr. Niket Chandrawanshi, Mr. Gaurav Yadav Mr. Akash Sharma (Innovative Business Solution, Bhopal).Aagaz'2017 A Brainstorming Competition was held for III YR and II YR students under the banner of CSI.A Workshop was organized on Software Testing for III YR student's .Mr. Shivanad Gautam Concept Solution, and Indore was the Expert Member of this Workshop. A Seminar was organized on"Thought Technology" for III YR & IV YR Students."Ms. Archana Sharma, Corporate Trainer & Founder of Roccia Bliss was the Expert Member for this workshop." An Online Quiz on "C++"was held for II YR students in Department Level.

Placements

Students were placed in top companies in the year 2017. 10 students got placed in NIIT Techonologies, 10 Students got placed in Tata Consultancy Services(TCS), 7 students in AnyLinuxWork, 7 students in InnoEye Techonologies, 5 students in Excellon Software, 4 students in Process Master Softwares P.Ltd., 3 students each in Verdantis and Hidden Brains Infotech P.Ltd., 2 students each in GGK Tech, G.S. Lab, Krabimi Techonologies, Just Dial, Jade Global and one student each in IPCA Laboratories, Path(India) Ltd., Calsoft, Systematix Infotech P.Ltd., Hiteshi Infotech Pvt.Ltd., Diaspark Infotech Pvt.Ltd., iLEAD GROUP.

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 seven in numbers. Journals are International Journal of Advance Research In Science And Engineering, International Journal of Software & Hardware Research in engineering, IJRCEE, International Research journal of engineering and technology, Springer, International journal of engineering science and management, IJSET, IJSER, IJERGS, IJTRA, IJARCCE, IJECS, IJCSIT, IJCEM, International journal of emerging trends in science and technology, by the faculty was 3, Paper Presented in Seminar/Conference organized by Conference on social ethics of technology & business in entrepreneurship management.

Ms. Vaishali Gupta is being conferred with Young Scientist Award during 32nd M.P. Young Scientist Congress held at M.P. Council of Science & Technology, Bhopal.

Five seminars/conferences were conducted under different areas on Thought Technology, Professional Counseling, GATE UP.

Eleven Expert Lectures were delivered by Faculties in Seminars and Workshop on Basic Computer Skills, Women Entrepreneurship, IPR, Cloud Computing & Security, Power Point, MS Word, MS Excel, Computer Fundamentals, MS Office.

Three Seminars & Workshops were attended by the faculty members on different topics like use of ICT in Education for Online and Blended Learning at IES,IPSA, Robotics at IIST, Indore and Orientation workshop for remote centre coordinators at IIT Bombay.

Eleven SDPs/FDPs were attended by the faculty member on the topic Net beans, JAVA, Introduction to research methodology, Cloud Competency Centre, Entrepreneurship, Android, Android Application Development, Cloud Computing Technology, Advanced JAVA, Hybrid Technology.

Student Achievements

Twenty one different Academic Awards: winner & runner up awards in events like Paper Presentation, “UDAAN2017” Minor Competition Cum Exhibition, “UDAAN2017” Major Project Competition Cum Exhibition, Technical Quiz, Dewang Mehta IT Awards 2016.

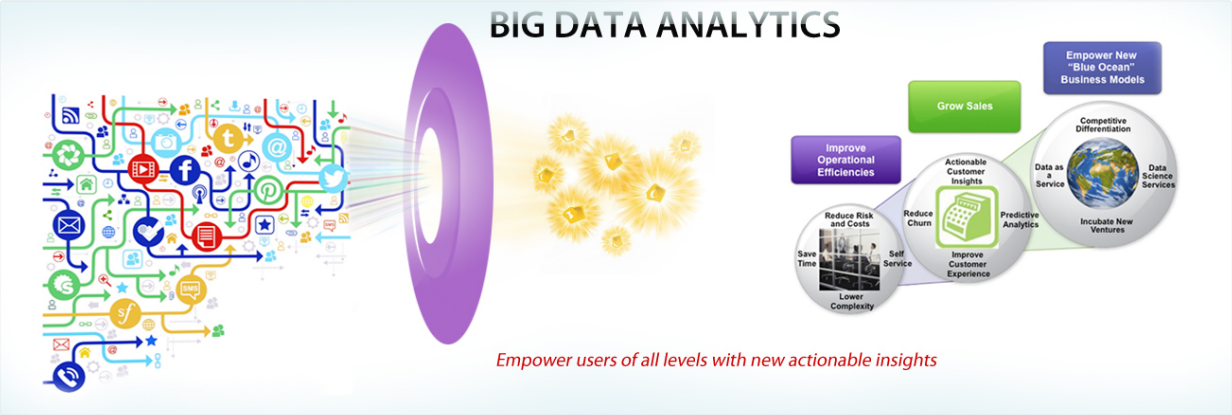
Papers published in Journals were four in numbers. Journals are International Journal of Software & Hardware Research in engineering, International Research journal of engineering and technology, International journal of engineering science and management, IJRCEE, IJDACR, IJERGS, IJTRA, IJSER, IJARCCE, IJECS, IJCSIT, IRCEE, Global Journal of Computer Science & Technology, IJCEM, International journal of emerging trends in science and technology.

Two Papers were presented in Seminar on Secure Cryptographic cloud communication using DNA cryptographic technique and Neural Hyper computation: A Decisional Approach.

Twenty eight Workshops/Seminars were attended on topic like Microsoft Azure, Core JAVA, Live Projects Demonstration, Research Methodology, Hybrid Technology, Cloud Computing Technology, Net beans, Android, Cloud Infrastructure Services, ISM, Programming Fundamentals, Cloud Computing & Security, LINUX, Data Communication, JAVA, Introduction to research methodology, Database Fundamentals, HADOOP, Cloud Computing, Cyber Security, Advanced JAVA & Android, Advanced JAVA, Cloud Computing Technology, Research Methodology, Live Projects Demonstration, Games Development, JAVA Technologies, Microsoft Azure Camp, Cyber Security & Ethical Hacking, Python, Android Application Development, PhpMySql, C & CPP, Firefox, Scilab, Advance C, Ubuntu, Advance CPP, Libre Office, Latex.

1. Big Data Analytics & SAS: An Overview

Big data is form of large unstructured data which cannot be handled by a normal Relational Database Management System. Big data is now a reality: The volume, variety and velocity of data coming into your organization continue to reach unprecedented levels. This phenomenal growth means that not only must you understand big data in order to decipher the information that truly counts, but you also must understand the possibilities of what you can do with big data analytics.



What is big data analytics? Big data analytics is the process of examining big data to uncover hidden patterns, unknown correlations and other useful information that can be used to make better decisions. With big data analytics, data scientists and others can analyze huge volumes of data that conventional analytics and business intelligence solutions can't touch. Consider this; it's possible that your organization could accumulate (if it hasn't already) billions of rows of data with hundreds of millions of data combinations in multiple data stores and abundant formats. High-performance analytics is necessary to process that much data in order to figure out what's important and what isn't. Enter big data analytics.

With new advances in computing technology, there's no need to avoid tackling even the most difficult and challenging business problems. For simpler and faster processing of only relevant data, you can use high-performance analytics. Using high-performance data mining, predictive analytics, text mining, forecasting and optimization on big data enables you to continuously drive innovation and make the best possible decisions. In addition, organizations are discovering

that the unique properties of machine learning are ideally suited to addressing their fast-paced big data needs in new ways.

Big data and analytics are the next competitive advantages that businesses will have over their competitors, according to John Hagerty, program director of IBM."We're seeing a fundamental shift internally; where big data and analytics is fuelling interactions from management processes to the way applications work within an organization. It is also strengthening a business' potential engagement with customers. In some ways, it has become an engine to help drive a business forward."

SAS (Statistical Analysis System) is a software suite developed by SAS Institute for advanced analytics, business intelligence, data management, and predictive analytics. It is the largest market-share holder for advanced analytics.

SAS was developed at North Carolina State University from 1966 until 1976, when SAS Institute was incorporated. SAS was further developed in the 1980s and 1990s with the addition of new statistical procedures, additional components and the introduction of JMP. A point-and-click interface was added in version 9 in 2004. A social media analytics product was added in 2010.

SAS is a software suite that can mine, alter, manage and retrieve data from a variety of sources and perform statistical analysis on it. SAS provides a graphical point-and-click user interface for non-technical users and more advanced options through the SAS programming language. SAS programs have a DATA step, which retrieves and manipulates data, usually creating a SAS data set, and a PROC step, which analyzes the data.

Each step consists of a series of statements. The DATA step has executable statements that result in the software taking an action, and declarative statements that provide instructions to read a data set or alter the data's appearance. The DATA step has two phases, compilation and execution. In the compilation phase, declarative statements are processed and syntax errors are identified. Afterwards, the execution phase processes each executable statement sequentially. Data sets are organized into tables with rows called "observations" and columns called "variables". Additionally, each piece of data has a descriptor and a value.

The PROC step consists of PROC statements that call upon named procedures. Procedures perform analysis and reporting on data sets to produce statistics, analyses and graphics. There are more than 300 procedures and each one contains a substantial body of programming and statistical work. PROC statements can also display results, sort data or perform other operations. SAS Macros are pieces of code or variables that are coded once and referenced to perform repetitive tasks.

SAS data can be published in HTML, PDF, Excel and other formats using the Output Delivery System, which was first introduced in 2007. The SAS Enterprise Guide is SAS' point-and-click interface. It generates code to manipulate data or perform analysis automatically and does not require SAS programming experience to use.

In a nutshell, big data analytics is the latest trend in the industry. For the advanced analysis of this large unstructured set of data, SAS is a useful and efficient tool. Knowledge of SAS is a prerequisite nowadays, if a person is interested in the field of analytics.

Ravindra Kumar Singh (0808CS161127)

2. Invisible Eye

Abstract

The main agenda of this work is to design advanced security with affordable and less complex system referred as “Invisible Eye”. In this modern era, property crimes are more predominant which necessitates developing an advanced security system.

It is a single camera based security system which is used to protect the valuables kept in room. This system can be used when slew around the room and recorded when it is alerted by the presence of any intrusion . Manager can only view the footage which was alerted on the presence of intrusion.

This type of system would lead to less time consuming and this will help to keep track of the intruder easily in less time. Once the intruder has been detected this information about intrusion will be directed to the cop through the E-mail. Such a system would consist three components – sensors that detect intrusion; the camera that slews to the point of intrusion and takes pictures; and the keypad that is used to interface with the system which allows any person to disable the system by entering the right password

DESIGN METHODOLOGY

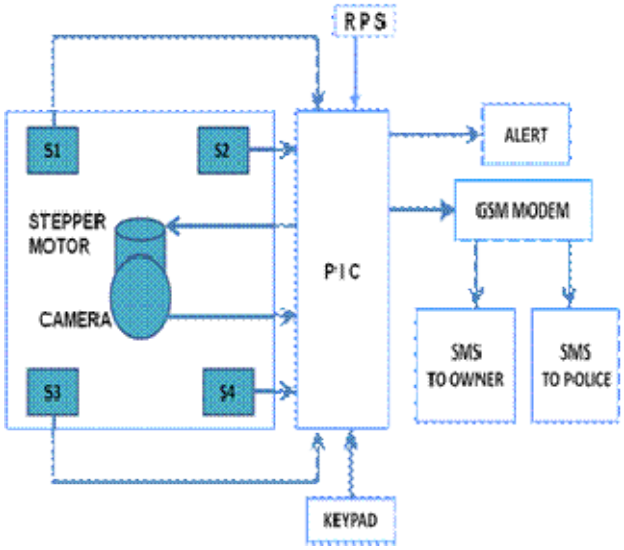
Invisible eye an advanced security system is mainly designed to use a single camera to perform the security. The reason for security is, the user of a system may have valuable belongings kept in his home, or a jewellery shop owner need security at night times for his property. The present technologies have many disadvantages like multiple camera’s, more cost, power consumption, the owner has to always view the recording of the footage without any assurance of the theft. One can design the model using different sensors like motion sensor, vibration sensor, the motion sensor detects the motion of a human being in that particular area where a sensor is placed. Once the sensor, senses the motion or vibration it sends that information of motion to the Microcontroller. Here we are using stepper motor, wireless camera and also a PC.

Modern Systems:

Today's security systems are extremely effective in preventing burglary and thefts as well as helping police respond to emergency situations. The mainstay of the home security system is definitely the high decibel siren. Today the siren is used to ward off would be intruders not for monitoring purposes. In most cases home security systems are monitored by large companies with multiple monitoring centers. These centers house countless trained professionals who are there in times of need for residences and businesses across the country. These monitoring centers also can provide support for other potential disasters such as carbon monoxide, fire, freezing pipes, and much more.

Modern security systems use alarms, infrared motion sensors, digital surveillance and contemporary monitoring stations. Monitoring is extremely efficient and emergency response time for triggered alarms has improved dramatically due to technology

HARDWARE PART



PIC16F877A belongs to a class of 8-bit microcontrollers of RISC Architecture. PIC microcontroller is an amazing powerful fully featured processor with Internal RAM, EEPROM FLASH memory and peripherals

PIR Motion Detector Module:

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared","Pyroelectric", or "IR motion" sensors.

To increase the efficiency of SIP signaling, yet maintain 100% standards compatibility with external VoIP systems and soft switches, xG has created patent pending SIP compression technology for the Invisible Eye system that reduces SIP overhead bandwidth from 400% to 66% on the over the air links and backhaul links from the Base Stations to the Invisible Eye MSCs. The MSCs do the SIP compression and decompression to maintain 100% interoperability with third-party VoIP systems. This also has the benefit of making more bandwidth available for mobile data applications being carried alongside voice traffic.

Shreya Kothari (0808CS161155)

3. 4D Visualization

Abstract

Visualizable objects in biology and medicine extend across a vast range of scale, from individual molecules and cells through the varieties of tissue and interstitial interfaces to complete organs, organ systems, and body parts.

The practice of medicine and study of biology have always relied on visualizations to study the relationship of an atomic structure to biologic function and to detect and treat disease and trauma that disturb or threaten normal life processes. Traditionally, these visualizations have been either direct, via surgery or biopsy, or indirect, requiring extensive mental reconstruction. The potential for revolutionary innovation in the practice of medicine and in biologic investigations lies in direct, fully immersive, real-time multi sensory fusion of real and virtual information data streams into online, real-time visualizations available during actual clinical procedures or biological experiments. In the field of scientific visualization, the term "four dimensional visualization" usually refers to the process of rendering a three dimensional field of scalar values.

"4D" is shorthand for "four-dimensional"- the fourth dimension being time. 4D visualization takes three-dimensional images and adds the element of time to the process. The revolutionary capabilities of new three-dimensional (3-D) and four-dimensional (4-D) medical imaging modalities along with computer reconstruction and rendering of multidimensional medical and histological volume image data, obviate the need for physical dissection or abstract assembly of anatomy and provide powerful new opportunities for medical diagnosis and treatment, as well as for biological investigations. In contrast to 3D imaging diagnostic processes, 4D allows doctor to visualize internal anatomy moving in real-time. So physicians and sonographers can detect or rule out any number of issues, from vascular anomalies and genetic syndromes. Time will reveal the importance of 4d visualization

4D-THE MODERN DIMENSION

"4D" is shorthand for "four-dimensional"- the fourth dimension being time. 4D visualization takes three-dimensional images and adds the element of time to the process.

In contrast to 3D imaging diagnostic processes, 4D allows doctor to visualize internal anatomy moving in real-time. For example: Movement patterns of fetuses allows conclusions to be drawn about their development; increase of accuracy in ultrasound guided biopsies thanks to the visualization of needle movements in real time in all 3 planes. So physicians and sonographers can detect or rule out any number of issues, from vascular anomalies and genetic syndromes

3D GIVES LIFE TO 4D:

Locked within 3-D biomedical images is significant information about the objects and their properties from which the images are derived. Efforts to unlock this information to reveal answers to the mysteries of form and function are couched in the domain of image processing and visualization. A variety of both standard and sophisticated methods have been developed to process (modify) images to selectively enhance the visibility and measurability of desired object features and properties. For example, both realism-preserving and perception-modulating approaches to image display have significantly advanced the practical usefulness of 4-D biomedical imaging.

Many life-threatening diseases and/or quality-of-life afflictions still require physical interventions into the body to reduce or remove disease or to alleviate harmful or painful conditions. But minimally invasive or noninvasive interventions are now within reach that effectively increase physician performance in arresting or curing disease; reduce risk, pain, complications, and reoccurrence for the patient; and decrease healthcare costs. What is yet required is focused reduction of recent and continuing advances in visualization technology to the level of practice, so that they can provide new tools and procedures that physicians ‘‘must have’’ to treat their patients and empower scientists in biomedical studies of structure-to function relationships.

Forming an image is mapping some property of an object onto image space. This space is used to visualize the object and its properties and may be used to characterize quantitatively its structure or function. Imaging science may be defined as the study of these mappings and the development of ways to better understand them, to improve them, and to use them productively. The challenge

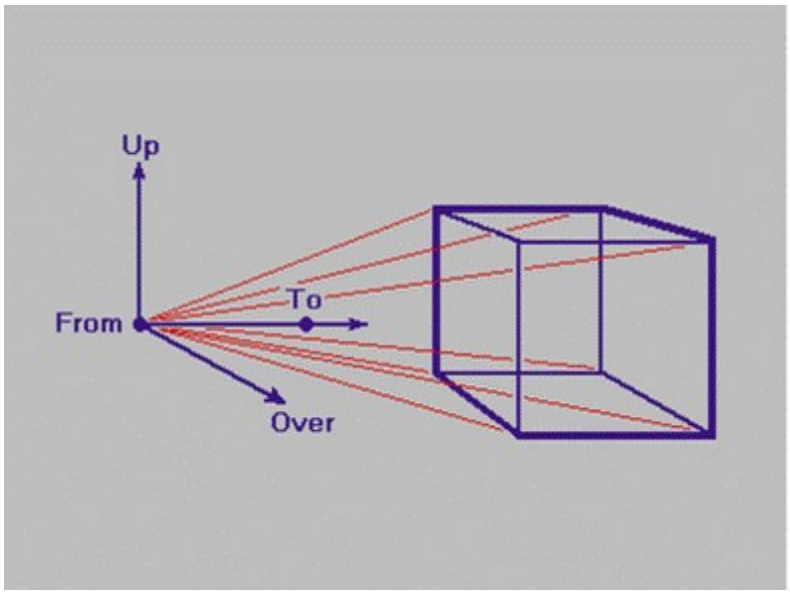
of imaging science is to provide advanced capabilities for acquisition, processing, visualization, and quantitative analysis of biomedical images to increase substantially the faithful extraction of useful information that they contain.

Concept of 4D Visualization:

In the field of scientific visualization, the term "four dimensional visualization" usually refers to the process of rendering a three dimensional field of scalar values. While this paradigm applies to many different data sets, there are also uses for visualizing data that correspond to actual four-dimensional structures. Four dimensional structures have typically been visualized via wire frame methods, but this process alone is usually insufficient for an intuitive understanding. The visualization of four dimensional objects is possible through wire frame methods with extended visualization cues, and through ray tracing methods. Both the methods employ true four-space viewing parameters and geometry.

The ray tracing approach easily solves the hidden surface and shadowing problems of 4D objects, and yields an image in the form of a three-dimensional field of RGB values, which can be rendered with a variety of existing methods. The 4D ray tracer also supports true four-dimensional lighting, reflections and refractions. The display of four-dimensional data is usually accomplished by assigning three dimensions to location in three-space, and the remaining dimension to some scalar property at each three-dimensional location. This assignment is quite apt for a variety of four-dimensional data, such as tissue density in a region of a human body, pressure values in a volume of air, or temperature distribution throughout a mechanical object

4D Viewing Vectors and Viewing Frustum:



4D Viewing Vectors

The viewing-angle is defined as for three-dimensional viewing, and is used to size one side of the projection-parallelepiped; the other two sides are sized to fit the dimensions of the projection-parallelepiped. For this work, all three dimensions of the projection parallelepiped are equal, so all three viewing angles are the same.

RAY TRACING ALGORITHM:

Ray tracing solves several rendering problems in a straight-forward manner, including hidden surfaces, shadows, reflection, and refraction. In addition, ray tracing is not restricted to rendering polygonal meshes; it can handle any object that can be interrogated to find the intersection point of a given ray with the surface of the object. This property is especially nice for rendering four-dimensional objects, since many N-dimensional objects can be easily described with implicit equations.

4D IMAGE WARPING

For robustly measuring temporal morphological brain changes, a 4D image warping mechanism can be used. Longitudinal stability is achieved by considering all temporal MR images of an individual simultaneously in image warping, rather than by individually warping a 3D template

to an individual, or by warping the images of one time-point to those of another time-point. Moreover, image features that are consistently recognized in all time-points guide the warping procedure, whereas spurious features that appear inconsistently at different time-points are eliminated. This deformation strategy significantly improves robustness in detecting anatomical correspondences, thereby producing smooth and accurate estimations of longitudinal changes. The experimental results show the significant improvement of 4D warping method over previous 3D warping method in measuring subtle longitudinal changes of brain structures.

METHOD:

4D-HAMMER, involves the following two steps:

(1) Rigid alignment of 3D images of a given subject acquired at different time points, in order to produce a 4D image. 3D-HAMMER is employed to establish the correspondences between neighboring 3D images, and then align one image (time t) to its previous-time image (t-1) by a rigid transformation calculated from the established correspondences.

(2) Hierarchical deformation of the 4D atlas to the 4D subject images, via a hierarchical attribute-based matching method. Initially, the deformation of the atlas is influenced primarily by voxels with distinctive attribute vectors, thereby minimizing the chances of poor matches and also reducing computational burden. As the deformation proceeds, voxels with less distinctive attribute vectors gradually gain influence over the deformation

CONCLUSION:

Advanced medical imaging technology allows the acquisition of high resolved 3D images over time i.e.4D images of the beating heart. 4D visualization and computer supported precise measurement of medical indicators (ventricle volume, ejection fraction, wall motion etc.) have the high potential to greatly simplify understanding of the morphology and dynamics of heart cavities, simultaneously reduce the possibility of a false diagnosis. 4D visualization aims at providing all information conveniently in single, stereo, or interactively rotating animated views.

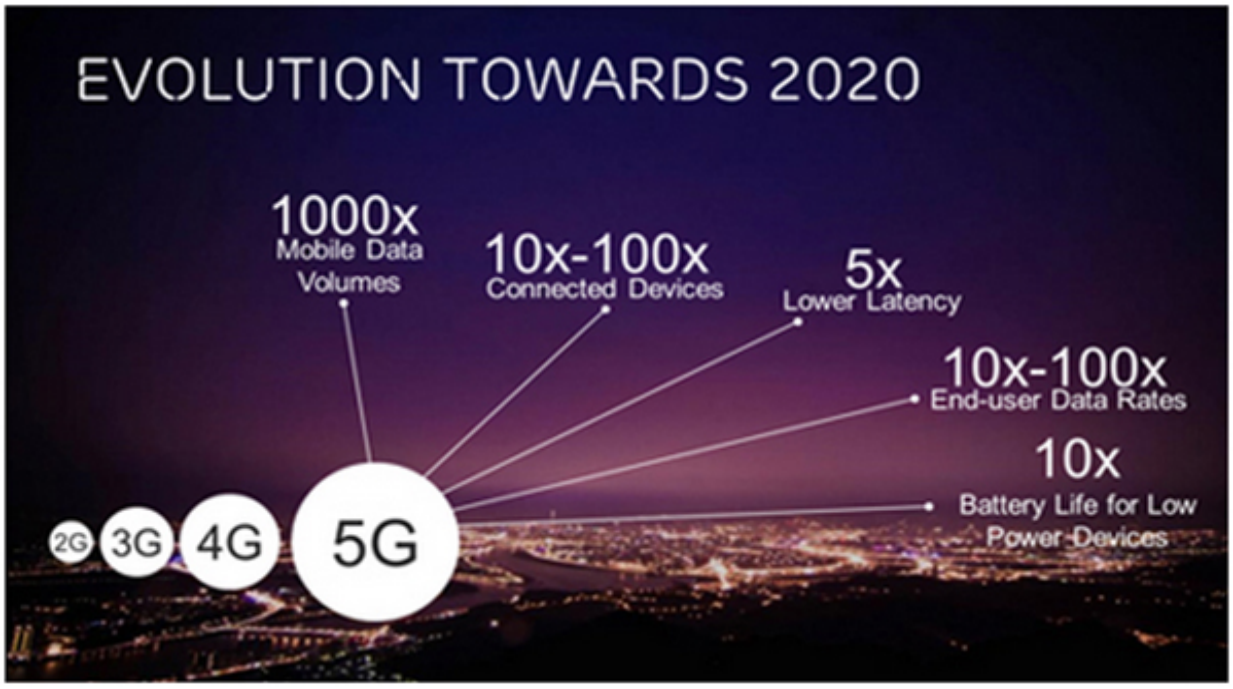
The goal of the 2nd year of the Med-SANARE project is twofold. On one hand a virtual table metaphor will be utilized to set up a visionary high-end cardiac diagnosis demonstrator for

educational purpose that makes use of augmented reality (AR) techniques. On the other hand a Cardiac Station will be implemented as functional reduced solution that supports image evaluation making use of standard PC-based technology. The functionality offered will be sufficient to successfully perform the tasks required by the diagnostic procedure. For both systems realistic and detailed modeling and visualization plays a crucial role.

Vipin Sahu (0808CS161179)

4. 5G Technology

INTRODUCTION - If you take a stroll outside today, you'll see a lot of people with mobile phones, phablets or tablets in their hands making calls, using the internet to catch up on the news, watch videos, or interacting with others via Face book, Tumbler or Twitter including you. In doing so, we all are using a mobile data network. Many of these applications particularly video consume a lot of bandwidth, so telecommunications companies across the world always try to talk about upgrading to the latest generation of mobile data to help speed things up. As we approach 2020 it is likely that there will be more than 50 billion connected devices worldwide and The Internet of Things will no longer be something we think about but will be all around us. Everything from home appliances to our cars will be connected to the network and 5G is being designed and built with this in mind.5G is not just a mobile technology, its ubiquitous access to high & low data rate services. The technology is still a long way from becoming a reality, but it has the potential to completely change the way we interact with wireless devices, from the smart phones in our pockets to the cars we drive.



Not only will more devices be connected to the 5G network than we've ever imagined, but the network will do everything better than 4G. This includes providing the capability and capacity for high resolution video streaming such as ultra-high definition 4K video. Privacy and security are also key considerations, so 5G will include extra capabilities to ensure that customer information is protected and our devices are harder to hack.

Battery life is essential aspect of our mobile connectivity. The target for 5G networks is handsets, phablets, tablets and other devices with five times the battery life of existing 4G devices. Imagine not having to recharge for a couple of days or being able to watch a couple of movies without having to find a power outlet to plug into.

Features of 5G Technology-

- 5G technology offer high resolution for crazy cell phone user and bi-directional large bandwidth shaping.
- The advanced billing interfaces of 5G technology makes it more attractive and effective.
- 5G technology will be also providing subscriber supervision tools for fast action.
- The high quality services of 5G technology based on Policy to avoid error.
- 5G technology will be providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.
- 6.5G technology offer transporter class gateway with unparalleled consistency.
- The traffic statistics by 5G technology makes it more accurate.
- Through remote management offered by 5G technology a user can get better and fast solution.
- The remote diagnostics is also a great feature of 5G technology.
- The 5G technology will be providing up to 25 Mbps connectivity speed.
- It will be globally accessible.

- It will be having 6^{th} sense technology.
- The 5G technology also support virtual private network.
- The new 5G technology will take all delivery service out of business prospect.
- The uploading and downloading speed of 5G technology will be touching the peak.
- The 5G technology network offering enhanced and available connectivity just about the world.

Current Research -There are several key areas that are being investigated by research organizations. These include:

Millimeter-Wave technologies - Using frequencies much higher in the frequency spectrum opens up more spectrum and also provides the possibility of having much wide channel bandwidth, possibly 1 - 2 GHz. However this poses new challenges for handset development where maximum frequencies of around 2 GHz and bandwidths of 10 - 20 MHz are currently in use. For 5G, frequencies of above 50GHz are being considered and this will present some real challenges in terms of the circuit design, the technology, and also the way the system is used as these frequencies do not travel as far and are absorbed almost completely by obstacles.

Future PHY / MAC - This area presents many possibilities from the use of new modulation formats including GFDM, Generalized Frequency Division Multiplexing, as well as FBMC, Filter Bank Multi-Carrier, UFMC, Universal Filtered Multicarrier and other schemes to the management of the multiple access schemes. All these need to be developed. Higher levels of processing that will be available by the time 5G is launched mean that multicarrier systems will not require to be orthogonal as in the case of OFDM. This provides considerably more flexibility.

·**Massive MIMO**- Although MIMO is being used in many applications from LTE to Wi-Fi, etc., the numbers of antennas is fairly limited, Using microwave frequencies opens up the possibility of using many tens of antennas on single equipment becomes a real possibility because of the antenna sizes and spacing in terms of a wavelength.

Dense networks - Reducing the size of cells provides a much more overall effective use of the available spectrum. Techniques to ensure that small cells in the macro-network and deployed as femtocells can operate satisfactorily are required.

Pervasive networks- This technology is being considered for 5G cellular systems is where a user can concurrently be connected to several wireless access technologies and seamlessly move between them.

Group cooperative relay- This is a technique that is being considered to make the high data rates available over a wider area of the cell. Currently data rates fall towards the cell edge where interference levels are higher and signal levels lower.

Cognitive radio technology - If cognitive radio technology was used for 5th generation, 5G cellular systems, then it would enable the user equipment / handset to look at the radio landscape in which it is located and choose the optimum radio access network, modulation scheme and other parameters to configure it to gain the best connection and optimum performance.

Challenges for 5G:

· ***Standardization***- One of the big challenges facing 5G is standardization. There are already multiple groups working to come up with standards around interoperability, backward compatibility with older technologies (4G, 3G), and making sure the network will be future-proof. While many companies agree that a global standard is needed, whether they'll be able to come together and agree on one is another story.

Infrastructure - Building the infrastructure for 5G is also a huge task, with issues around spectrum and installing new antennas. 5G is likely going to rely, at least in part, on higher-frequency bands. There is more space in those airwaves available, but at such high frequencies, signals can't travel nearly as far as they can over the frequencies used for 4G, resulting in a poor connection.

One major enabler for 5G will be the release of frequency spectrum and this need to be managed on a global scale to ensure commonality and also the reduction of interference between services, especially those operating globally. This process is managed under the auspices of the International Telecommunications Union, ITU. Obstacles like buildings and trees and even bad weather can also cause interference, according to Nokia's Dropmann. To offset that, carriers will

need to install more base stations to ensure better coverage, and use antenna technologies like MIMO (multiple-input and multiple-output).

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5. 3D Glasses

Abstract

We've seen that although there might be something complex going on behind the scenes, with the right equipment we can just sit back and let our eyes do the work. Of course, the technology wasn't always so simple; there have, in fact, been four generations leading up to today's 3-D glasses.

The first generation modified the games themselves to make them compatible with stereoscopic 3-D. The games' creators had to specifically support each type of LCD glasses -- hardly an ideal situation. There was no guarantee that the glasses you'd bought would work with your favorite game.

As you can imagine, that didn't appeal to many people; so a second solution was developed. This second solution was to override the game, actually taking over the computer's screen and altering what was displayed. As far as the game was concerned, it was just doing what it normally did, except, of course, that some of the computer's time was taken up processing the image to make it 3-D. The result was slower performance and low-resolution, blocky images. It did work with hundreds of games, though, and that was a definite improvement.

The third generation worked in a similar way, modifying the graphics driver but also maintaining the resolution of the images -- no more blocky graphics! Unfortunately, it wasn't compatible with many games, though it was a definite forerunner to the 3-D glasses we have nowadays. In the fourth-generation models, compatibility is high, the complicated work is done by the graphics card, and the lightweight LCD glasses flick so rapidly between the two images that all we see is crystal-clear, 3-D images.

Overview

3D PC glasses are designed for the serious gamer in mind. What are these specialized glasses, you ask? They are glasses that make the video games come to life in a way that increases the overall gaming experience for gamers of any age. You can do many things with these incredible glasses. You can enjoy games like never before.

These glasses are specifically designed to help convince your brain that you're literally right in the middle as part of the gaming experience. You don't have to use any fancy equipment. All you have to do is slip these glasses onto your head and all types of PC video games from RPGs to first person shooters are going to come to life in a way that they simply can't in two dimensions.

These glasses are used to turn a normal computer monitor into a real 3D object. What appears on the monitor from your game will look like it’s really right there, as well. Feel free to play any game that you want. It doesn't matter if it's "World or War craft" or "Modern Warfare," or any other game. You'll have a lot of fun with these 3D PC glasses. You'll find your online games to be a lot more interactive. Imagine the games you can play while wearing these glasses. You can play shooting games, airplane games, or any game you want. There's no limit to what games you can play.

These 3D PC glasses are perfect for children! They can bring all their learning games to life. Make their educational games much more interactive and fun. With these glasses, their imagination can run wild. There's no limit to what they can do.

You can find these 3D glasses online or at any game store. All you have to is search for them online. You can even read more information on these unique 3D glasses. You definitely won't find these 3D PC glasses anywhere else! Make the most out of your gaming experience with your own 3D PC glasses. You'll be glad that you made this decision

3-D glasses

Stereoscopy:

Stereoscopy (also called stereoscopic or 3-D imaging) refers to a technique for creating or enhancing the illusion of depth in an image by presenting two offset images separately to the left and right eye of the viewer. Both of these 2-D offset images are then combined in the brain to give the perception of 3-D depth. Three strategies have been used to accomplish this: have the viewer wear eyeglasses to combine separate images from two offset sources, have the viewer wear eyeglasses to filter offset images from a single source separated to each eye, or have the light source split the images directionally into the viewer's eyes.

Human vision uses several cues to determine relative depths in a perceived scene. Some of these cues are:

- Stereo sis
- Accommodation of the eyeball (eyeball focus)
- Occlusion of one object by another
- Subtended visual angle of an object of known size
- Linear perspective (convergence of parallel edges)
- Vertical position (objects higher in the scene generally tend to be perceived as further away)
- Haze, desideration, and a shift to bluishness

- Change in size of textured pattern detail

All the above cues, with the exception of the first two, are present in traditional two-dimensional images such as paintings, photographs, and television. Stereoscopy is the enhancement of the illusion of depth in a photograph, movie or other two-dimensional image by presenting a slightly different image to each eye and thereby adding the first of these cues (stereo sis) as well. It is important to note that the second cue is still not satisfied and therefore the illusion of depth is incomplete.

Many 3D displays use this method to convey images. It was first invented by Sir Charles Wheatstone in 1838. Stereoscopy is used in photogrammetric and also for entertainment through the production of stereogram's. Stereoscopy is useful in viewing images rendered from large multi-dimensional data sets such as are produced by experimental data. Modern industrial three dimensional photography may use 3D scanners to detect and record 3 dimensional information. The three-dimensional depth information can be reconstructed from two images using a computer by corresponding the pixels in the left and right images (e.g.). Solving the Correspondence problem in the field of Computer Vision aims to create meaningful depth information from two images

Stereographic cards and the stereoscope:

Two separate images are printed side-by-side. When viewed without a stereoscopic viewer the user is required to force his eyes either to cross, or to diverge, so that the two images appear to be

three. Then as each eye sees a different image, the effect of depth is achieved in the central image of the three.

The stereoscope offers several advantages:

•Using positive curvature (magnifying) lenses, the focus point of the image is changed from its short distance (about 30 to 40 cm) to a virtual distance at infinity. This allows the focus of the eyes to be consistent with the parallel lines of sight, greatly reducing eye strain.

•The card image is magnified, offering a wider field of view and the ability to examine the detail of the photograph.

•The viewer provides a partition between the images, avoiding a potential distraction to the user.

Stereogram's cards are frequently used by orthoptists and vision therapists in the treatment of many binocular vision and accommodative disorders

Complementary Color Anaglyphs:

Complementary color anaglyphs employ one of a pair of complementary color filters for each eye. The most common color filters used are red and cyan. Employing tristimulus theory, the eye is sensitive to three primary colors, red, green, and blue. The red filter admits only red, while the cyan filter blocks red, passing blue and green (the combination of blue and green is perceived as cyan). If a paper viewer containing red and cyan filters is folded so that light passes through both, the image will appear black. Another recently introduced form employs blue and yellow filters. (Yellow is the color perceived when both red and green light passes through the filter.)

Anaglyph images have seen a recent resurgence because of the presentation of images on the Internet. Where traditionally, this has been a largely black & white format, recent digital camera and processing advances have brought very acceptable color images to the internet and DVD field. With the online availability of low cost paper glasses with improved red-cyan filters, and plastic framed glasses of increasing quality, the field of 3D imaging is growing quickly. Scientific images where depth perception is useful include, for instance, the presentation of complex multi-dimensional data sets and stereographic images of the surface of Mars.

With the recent release of 3D DVDs, they are more commonly being used for entertainment. Anaglyph images are much easier to view than either parallel sighting or crossed eye stereograms, although these types do offer more bright and accurate color rendering, most particularly in the red component, which is commonly muted or desiderated with even the best color anaglyphs. A compensating technique, commonly known as Ana chrome, uses a slightly more transparent cyan filter in the patented glasses associated with the technique. Processing reconfigures the typical anaglyph image to have less parallax to obtain a more useful image when viewed without filters

CONCLUSION

I think we can safely say that the sci-fi hologram is a long way off, and may never happen. On the other hand, volumetric displays may happen in our life times. There are still technical obstacles to overcome, not to mention being able to manufacture them at a price that people will pay. In the meantime, other illusionary 3D displays, such as lenticular video may become popular, offering a 3D experience without cumbersome glasses. This is the end of this article; I hope that you enjoyed reading it.

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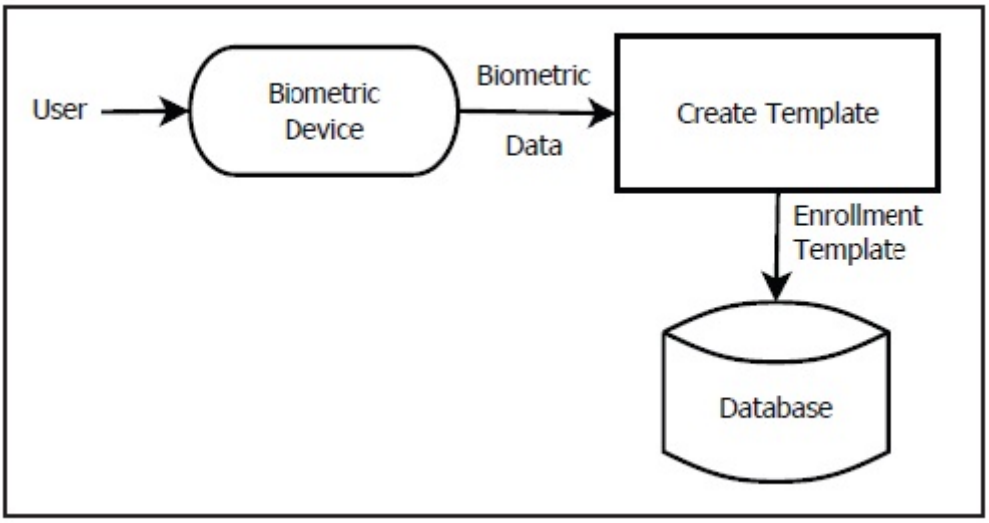
6. Finger Vein Recognition

Abstract

In Finger Vein Recongnition a robust method for finger vein recognition with gray level co-occurrence matrix based on the discrete wavelet transform. In first step for compression of the image we used wavelet Daubechies 4. Also we used local binary pattern for feature extraction. The combination of local binary pattern and gray level co- occurrence matrix with discrete wavelet transform is not used before for finger vein recognition. The simulation results show that this method is robust and fast for feature extraction and classification.

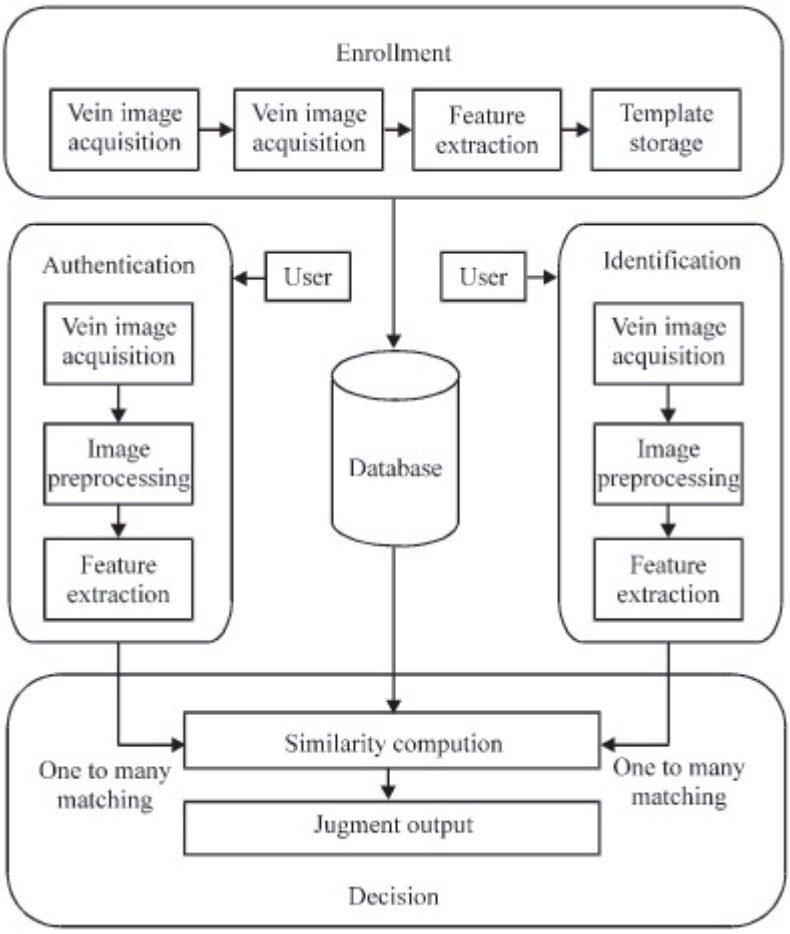
INTRODUCTION:

Biometrics is identifying humans by their physiological, behavioral and biological characteristics. Biometrics can be divided into two categories: physiological biometrics and behavioral biometrics. Physiological biometrics are those which recognize individuals from physiological or biological attributes like face, iris, fingerprint, finger vein, hand geometry, etc. Behavioral biometrics on the other hand, are those which recognize individuals from human attitudes such as hand writing, signature or voice recognition. Fig. 1, illustrate enrollment to and authentication with the biometric system.



Finger Vein

A general framework of vein recognition is shown in fig. 2. For the feature extraction step of the finger-vein recognition, which is the most important step, popular methods such as Line Tracking (LT), Maximum Curvature (MC) and Wide Line Detector (WL) are used in the literature. Among these, the LT method is very slow in the feature extraction phase. Moreover, LT, MC and WL methods are susceptible to rotation, translation and noise.

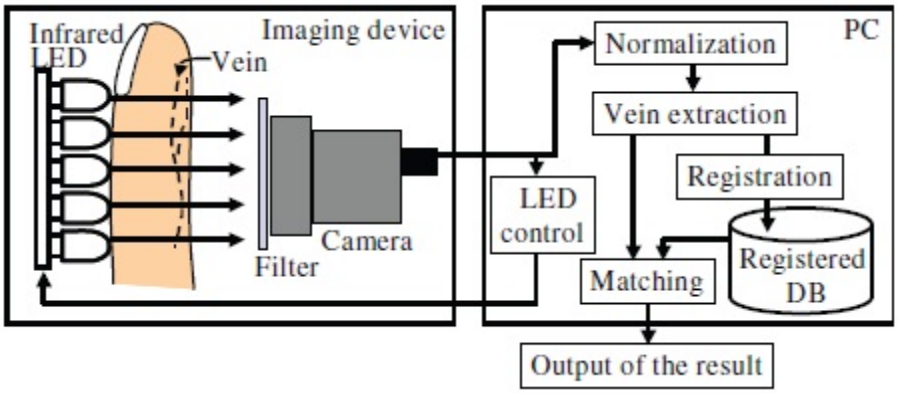


Finger – Vein Recognition

Disadvantages of fingerprint technology made scientists to think about using what is underneath the skin. Under the skin there are blood vessels which are unique to individuals (even in twins) and this uniqueness made a new biometric system based on finger veins. Biometrics based on veins, i.e., vascular biometrics are not limited to the fingers. Retina, face and hands can be identified using vascular properties too, however, the hardware devices used for finger vein identification are more preferred than the others because people are used to using their fingers for identification already. For capturing a vascular network, hemoglobin plays an important role by absorbing infrared light and after absorbing infrared light vein patterns are captured. Distance is very important in absorbing infrared light between skin and vessels: bigger distance leads to more noise in the captured image. Palms, back of the hands and fingers can be used as biometric data, however, people mostly prefer to use their fingers.

Devices for Finger-vein Image Acquisition

Finger-vein biometric systems use infrared (IR) light to capture blood vessels, however, the position of infrared light source affects the quality of the images. Moreover, the image acquisition device should be small and cheap, and it should provide high resolution images. In captured images, the veins appear as gray patterns. As can be seen in Figure 3 finger is placed between the Infrared Light Emitting Diodes (IR-LEDs) and imaging device



Advantages and Disadvantages

1. Internal nature: Vein patterns are inside the skin and cannot be seen by naked eye, therefore, damaged skin will not reduce the chance of finding veins behind the skin. Furthermore, dry, wet or dirty hands would not affect the system.

2. Duplicate protection: Vein patterns are difficult to copy because blood needs to flow during image capturing. Scientists in Hitachi proved that it is impossible to cut the finger and register it to the system because blood will seep out.

3. Hygienic readers: In contrast to fingerprint and hand geometry systems, readers are believed to be free of germs because users do not touch the sensor.

4. Usability: These systems are very easy to use.

5. No cultural resistance.

6. Uniqueness: Finger veins are unique even between twins and do not change by aging.

Finger vein recognition is one of the forefront methods in biometric technology in recent years. Many successful methods such as Line Tracking (LT), Maximum Curvature (MC) and Wide Line Detector (WL) have been proposed for finger vein recognition. Among these methods, LT has a very slow matching and feature extraction phase. Moreover, LT, MC and WL are rotation dependent, and they are affected by image noise. To overcome these drawbacks, using some popular feature descriptors widely used for several Computer Vision or Pattern Recognition (CVPR) is proposed.

These descriptors include Fourier Descriptors (FD), Zernike Moments (ZM) [8], Histogram of Oriented Gradients (HOG) Local Binary Patterns (LBP) and Global Binary Patterns (GBP) . Among these, FD, ZM, HOG, LBP and GBP have not been applied to the finger vein recognition before. These descriptors are compared against LT, MC and WL. The novelty of the thesis is in (i) applying new feature extraction methods that have not been used for finger vein recognition before and (ii) evaluating the performance of all these methods under translation, rotation and noise. The focus is on the "feature extraction" step, and the preprocessing step is kept as simple as possible. As for matching, the matching method specific to LT, MC and WL which is called mismatch ratio is used and for all other descriptors, three different distance metrics called Euclidean distance, X2 (Chi- Square distance) and Earth Mover's Distance (EMD) have been applied and compared to each other.

Database

The database in this study is carried out from SDUMLA-HMT finger-vein database that is publicly available [4]. This database contains 3; 816 images from both hands and provided images are index finger, middle finger and ring finger and for each finger six different images are captured. Fig. 4 displays small sample of the database.

The original images are of size 320*240, however, for the sake of faster analysis, the size is reduced to 160*120 using nearest neighbor interpolation. The images are gray scale images in the intensity range of [0-255]. Using Prewitt edge detector, strong edges are extracted, the boundaries of the finger are found and the mask image is produced. Masking the image is a very important step since it eliminates the irrelevant areas.

Finger Vein

It contains finger vein images acquired from different persons and with different skin colors according to the evaluation of average image gray value, image contrast and entropy on the images from the available databases, the acquired images in MMCBNU_6000 have comparable image quality. The second vein finger data base called HKPU-FV [13] which was created by Ajay and Zhou. UTFV FV database was from University of Twente, Recently, 2 finger vein databases were produced, that were from Chonbuk Nation University [14] and Tsinghua University [15]. SDUMLAHMT[16] is an open finger vein database where every subject who involved was asked to produce images of his/her index finger, middle finger and ring finger of both hands, and the collection for each of the 6 fingers is repeated for 6 times to obtain 6 finger vein images. The largest scale of finger vein database as reported is PKU Finger Vein Database [14] from Peking University which was established based on the checking attendance system.

CONCLUSION:

This article presents a survey of human identification with finger vein recognition. In this paper some method and database is investigated. There are different feature description methods in the literature that can be analyzed. For example, there are extensions of LBP, HOG and GBP that provide several invariance's, such as rotation invariance, scale invariance. These extensions are worth analyzing as future work. For analyzing resilience to rotation and translation, rotating the finger in different directions and axes will be much realistic, moreover, changing the distance between the finger and camera can be tested instead of artificially rotating, translating and adding noise to the images.

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7. Future of IOT

Abstract

No matter which way you look at it, technology has been headed towards automation for a long time now. In fact, isn't the very basic principle of technology to make our lives easier by leaving fewer things to be explicitly done by us? It might be making us all lazier every day, or one might argue that it is giving us far greater time to pursue whatever we desire. Whatever might be the effect, there is no doubt that automation is the future and place that it is happening the most significantly is right in our homes.

INTRODUCTION:

IoT has become so vital in our daily life and it is going to create a big impact in the near future. For example, solutions can be provided instantly for the traffic flows, reminding about the vehicle maintenance, reduce energy consumption. Monitoring sensors will diagnose pending maintenance issues, and even prioritize maintenance crew schedules for repair equipment. Data analysis systems will help metropolitan and cosmopolitan cities to function easily in terms of traffic management, waste management, pollution control, law enforcement and other major functions efficiently.

Considering it to the next level, linked devices can help the people personally like you get an alert from the refrigerator reminding you to shop some vegetables when the vegetable tray is empty, your home security systems enables you to open the door for some guest with help of connected devices(IoT). Since there is a massive growth in number of devices day by day, the amount of data generated would also be enormous. Here is where Big Data and IoT go hand in hand.

Big Data manages the enormous amount of data generated using its technologies. The Internet of Things (IoT) and big data are two vital subjects in commercial, industrial, and many other applications. The name IoT was framed in approximately a decade ago and refers to the world of machines or devices connected to the Internet, by which a large amount of big data is collected,

stored and managed. Big data additionally refers to the analysis of this generated data to produce useful results. The main motivating power behind the IoT and big data has been the collection and analysis of data related to consumer activities in order to find out why and what customers buy.

It was not too long ago that we visualized houses of the future where things would be done on their own- lights coming on by themselves, coffee being brewed just the way you like as you are about to wake up and your shower knowing the weather outside and adjusting the water temperature accordingly. And now we are at a point where technology to achieve all that has been around for a while and has now become affordable. Hence, it is not a particularly big surprise that we are witnessing some amazing things happening in the world of automation.

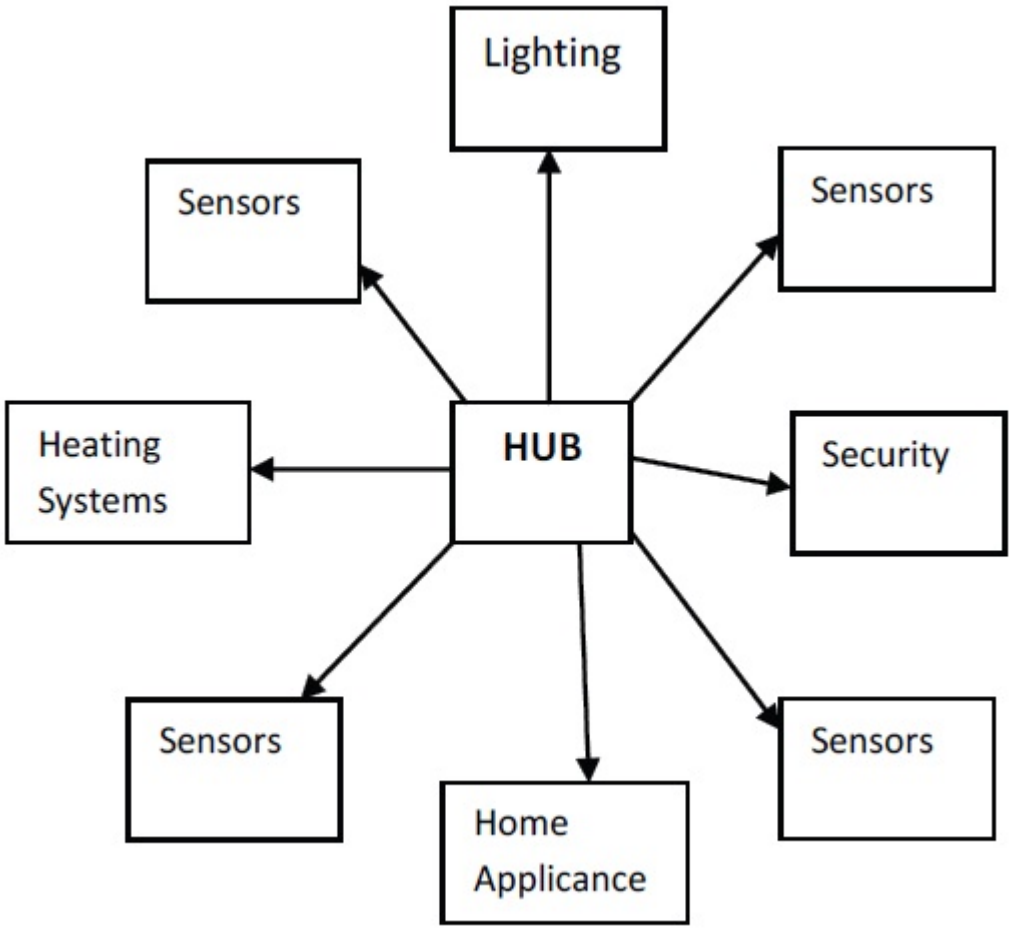
Home Automation System

It doesn't take a genius to figure out what home automation entails: it's pretty much just the usage of smart phones and other easily available computing devices to automate and control household items and devices-from electrical appliances to lights to doors-with the help of hardware that can be controlled remotely. Most home automation begins small-people start with controlling simple binary devices, that could either be in an "on" or "off" state. But it's when these devices are hooked up to the internet that they become truly smart and enter the realm of the internet of things. In fact, most automation systems nowadays use their internet=enabled abilities to record and analyses usage patterns of devices, mostly lighting and heating systems, to reduce monthly electricity bills and overall energy expenditure.

While setting up a home automation system, the best place to start investing in is your personal nuisances, for many people, the most obvious problem is their electricity bill, so most people purchase a few smart lights as their first home automation product. Or if you are the kind of person who is constantly paranoid about whether they left the geyser on, smart switches would ease your paranoia. From there, you slowly build up a full lighting system that can be remotely controlled and would respond to human presence, or an automated home theatre comprising a smart TV with smart ambient lighting.

Any smart home automation system today is generally a central hub that can be configured to control a bunch of smart devices, sensors and switches, all of which communicate with the hub using certain communication protocols. The hub, in turn, is instructed through an app or the web. The main takeaway is the distribution of monitoring and computing functions between the hub and the remote app. For example: in smart lighting system, a hub would act as the central interface between multiple smart devices, say, a bulb and a door contact sensor.

Future of IOT



The smart devices and hub communicate using certain common communication technologies, and an app would be used to control the lighting system. If you are still unclear about the role of the Hub, you can draw close parallels between it and a standard Wi-Fi router. In simple terms, both are devices that route signals from multiple sources to one another. In a few products, the

hub and router are integrated together, thus reducing the need for two devices. However, in the cases when they are separate, the hub, which needs to be internet enables to function, is connected to the router, so basically, a smart hub provides a centralized method to control all your smart devices, as they can connect all your devices to the cloud and consolidate all apps into the one provided by the hub manufacturer.

IOT in Future

The 5G will enable connected cars to send and receive messages 10 times faster. According to a recent report, the global connected car market is expected to grow from 5.1 Million units in 2015 to 37.7 million units by 2022. Adoption of telemetric units and advances in tech with emphasis on driver and passenger experience along with safety and cyber security are ushering in a new era of growth for connected cars globally. India is expected to emerge as a huge market for such vehicles. Currently, less than 2 percent of all vehicles sold in the country have some form of connectivity embedded in them. But our experience with smart phones has shown that mass adoption of technology can happen fast provided we are comfortable with the price tag.

Safe Driving

With connected cars, insurance companies can offer incentives to drivers to drive well in return for lower premiums. This will make our roads safer and improve the driving experience. Drivers can also use this information to evaluate and improve their driving skills. In a country where we constantly complain about traffic jams, thanks to big data, your car will someday soon wake you up early to remind you that if you don't reach office early, you will have to deal with more traffic. Big data will bring in more predictability in traffic management with data from each vehicle adding up.

B. Predictive Maintenance

Drivers and fleet managers will now get inputs on vital vehicle diagnostics data leading to detection of issues before they turn into a major problem. This will reduce vehicle breakdowns and ensure hassle free driving as well as improved mileage. Well maintained vehicles also minimize emissions.

C. The Data Opportunity

According to a recent research, a single connected vehicle has the potential to generate more revenue than 10 conventional no connected vehicles. In the future, the market share of OEMs will not be based on units sold but on the data revenue generated per vehicle. Data monetization in an IoT context is still in its infancy and we will see plenty of actions on this front in the near future.

CONCLUSION:

A connected car can dig into its database to come out with suggestions on your favorite number or best route available to pick up your child from her piano class every Friday. With the arrival of 5G, connectivity issues will be a thing of the past. 5G will enable connected cars to send and receive messages faster (up to 10 times a second). 5G will also enable more situational awareness and provide advance warning in case any roadblock or hindrance were to appear on the road you are driving on thereby giving you more time to react.

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Cloud Computing

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnesses to solve problems too intensive for any stand-alone machine. In cloud computing, the word cloud (also phrased as "the cloud") is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services — such as servers, storage and applications —are delivered to an organization's computers and devices through the Internet.

How Cloud Computing Works:

The goal of cloud computing is to apply traditional supercomputing, or high-performance computing power, normally used by military and research facilities, to perform tens of trillions of computations per second, in consumer-oriented applications such as financial portfolios, to deliver personalized information, to provide data storage or to power large, immersive online computer games. Cloud computing uses nsetworks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data-processing chores across them. This shared IT infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing.

Cloud Computing Standards:

The standards for connecting the computer systems and the software needed to make cloud computing work are not fully defined at present time, leaving many companies to define their own cloud computing technologies. Cloud computing systems offered by companies, like IBM's "Blue Cloud" technologies for example, are based on open standards and open source software which link together computers that are used to deliver Web 2.0 capabilities like mash-ups or mobile commerce. Cloud computing promises several attractive benefits for businesses and end users. Three of the main benefits of cloud computing includes:

• Self-service provisioning: End users can spin up computing resources for almost any type of workload on-demand.

• Elasticity: Companies can scale up as computing needs increase and then scale down again as demands decrease.

• Pay per use: Computing resources are measured at a granular level, allowing users to pay only for the resources and workloads they use.

Cloud computing services can be private, public or hybrid. Private cloud services are delivered from a business' data center to internal users. This model offers versatility and convenience, while preserving management, control and security. Internal customers may or may not be billed for services through IT chargeback. In the public cloud model, a third-party provider delivers the cloud service over the Internet. Public cloud services are sold on-demand, typically by the minute or the hour. Customers only pay for the CPU cycles, storage or bandwidth they consume. Leading public cloud providers include Amazon Web Services (AWS), Microsoft Azure, IBM/Soft Layer and Google Compute Engine.

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9. Prescription Eyeglasses

Abstract

Vision-correcting eyeglasses have improved the lives of millions of people. Eyeglasses significantly affect the wearer's appearance, and the selection of new pairs of eyeglasses is largely based on how the glasses look when wearers try them on. However, an often overlooked fact is that corrective lenses introduce distortion caused by the refraction effect. As Figure 1 illustrates, the eyes of a person wearing corrective lenses for nearsightedness appear smaller compared with wearing nonprescription lenses, whereas the eyes of a person wearing lenses for farsightedness appear larger. The traditional process of trying on and picking new eyeglasses frames in a brick-and mortar shop has a significant shortcoming: eyeglasses on the display are equipped with demo lenses that have zero corrective power, and thus refraction does not deform the eyes.

Thus, customers cannot see what they will actually look like until their custom prescription lenses are installed in the frames and the sale is final. Their appearance will differ from the in-store trial, which may cause disappointment and buyer's remorse, especially for customers with strong eyeglasses prescriptions. A similar issue occurs with online stores, which allow customer to virtually try-on eyeglasses frames by overlaying them onto an input image. The online systems still do not adjust the image for the refraction effect.

INTRODUCTION:

We present a system for virtually trying on prescription eyeglasses. Our system acts as a virtual mirror, allowing users to try on a variety of eyeglasses with corrective lenses based on their prescription (see Figure 2). We use an image sequence of the user without eyeglasses as input, along with the user's eyeglasses prescription and a 3D model of the desired eyeglasses frame. Our system generates a 3D representation of the corrective lenses mounted into the eyeglasses frame and modifies the video sequence to virtually insert the eyeglasses using image-based

rendering. This approach simulates the distortion introduced by the prescription lenses and gives users a better idea of how they would look when wearing the new pair of eyeglasses.

To the best of our knowledge, the proposed virtual try-on system for prescription eyeglasses is the first to account for refraction effects. (See the "Related Work in Virtual Try-On Applications" sidebar for more details.) Our system was inspired by the traditional eyeglasses manufacturing pipeline followed by opticians. We generate a 3D representation of the corrective lenses that fit the user's eyeglasses prescription and the chosen eyeglasses frame. Then, an image-based rendering technique virtually inserts prescription eyeglasses into the input video, while taking into account the effects of refraction, reflection, and shading. The findings from our user study highlight the importance of refraction and reflection in the perceived realism of virtual try-on results.

System Overview

The virtual try-on system we developed inserts prescription eyeglasses onto the user's face and simulates important changes to the appearance due to refraction, reflection, or shadows cast on the face. The system uses the following three elements as input:

1. Image sequence.

An image sequence of the user without eyeglasses is captured with a color camera.

2. User's eyeglasses prescription.

An eyeglasses prescription, usually provided by an optometrist, specifies the value of all parameters necessary to correct blurred vision due to refractive errors, including myopia, hyperopia, presbyopia, and astigmatism. Table 1 shows typical eyeglasses prescription.

3. Eyeglasses frame.

The user chooses the desired eyeglasses frame. The eyeglasses geometry is typically accessible from online stores, which scan and digitize the eyeglasses frames.

For this work, we purchased 3D models for six different commercially available eyeglasses frames from Turbo Squid (www.turbosquid.com/3d-model/ glasses/). Figure 3 gives an overview

of our approach's pipeline, which consists of two main stages: virtual eyeglasses generation and video synthesis. In the first stage, we generate a 3D representation of the prescription eyeglasses (the frame and corrective lenses), with an appropriate position relative to the user's face geometry. Inspired by the traditional eyeglasses manufacturing pipeline, this virtual eyeglasses generation stage has three steps:

Prescription Eyeglasses

1. Positioning the eyeglasses on the user's face. After an initial manual positioning step for the first frame, we use face tracking to automatically align the eyeglasses with the user's face in the following frames.

2. Creating a parametric lens model. Based on the user's prescription and desired lens properties, this model describes the geometry of the uncut lens before mounting.

3. Cutting and mounting the lens. We trim the lens geometry according to the shape of the eyeglasses frame and insert the virtual lenses into the eyeglasses frame.

Virtual Eyeglasses Generation

To begin our discussion, we briefly describe the traditional eyeglasses manufacturing process, before introducing our proposed system. Once the customer has chosen an eyeglasses frame for purchase, the optician measures the pupillary distance (PD), which is the horizontal distance between the left and right pupils. This can be done by marking the position of the pupils on the demo lenses, while the customer has the glasses on. This step is essential to ensuring that the prescription lenses will be appropriately positioned with respect to the eyes.

The next step is to choose lens blanks based on the strength of the correction needed and desired lens properties (for example, lens material). Lens blanks are circular, uncut lenses that are usually stocked by the lens manufacturers, with a variety of front surface curvatures. If necessary, the back surface of the lens is ground and polished to produce a lens according to the desired prescription. The eyeglasses frame is then inserted into a dedicated tracing machine in order to measure its inner contours, which will be used to cut the lens blanks to the appropriate shapes. Each lens blank is placed into an instrument to locate and mark its optical center; these

points will be positioned in front of the customer's pupils to ensure optimal vision. Finally, an edging machine is used to trim the lens blanks into the proper lens shapes, according to the previously measured contours. The cut lenses are then inserted into the eyeglasses frame. We create virtual eyeglasses with a similar process. First, we place the eyeglasses frame appropriately onto the user's face geometry. Next, we build a parametric model representing the geometry of each lens according to the user's eyeglasses prescription. Finally, lenses are cut and mounted into the eyeglasses frame.

Prescription Eyeglasses

Eyeglasses Positioning

Similar to the optician pipeline, we first place the eyeglasses frame with respect to the user's face geometry. We obtain the geometry and pose of the user's face for each frame by tracking the face using the Face shift software1 and a Prime sense Carmine 1.09 RGBD sensor. Calibration between the RGBD sensor and the color camera, which is used to capture the user's input image sequence, is performed with a camera calibration toolbox.2 The camera's intrinsic and extrinsic parameters let us align the face geometry with the input color images. Next, we manually position the eyeglasses onto the face mesh for the first frame.

For all the examples we tested, this process took less than 5 minutes on average. A fully automatic option would use affine transformation computed based on preselected feature points on face and eyeglasses 3D model3 or a physics-driven technique.4 After the initial manual positioning of the eyeglasses for the first frame, we track the head pose to automatically align the eyeglasses with the user's face in the subsequent frames. This is achieved by calculating the relative pose change in each frame.

Parametric Lens Model

Given the user's eyeglasses prescription, we generate the 3D lens geometry based on a parametric model so that the optical power of the virtual lens corresponds to the user's prescription. A lens is a 3D transparent and closed object. It consists of two main surfaces: a front surface and a back surface. The lens thickness is defined as the distance between front and

back surface along its optical axis. Physical lenses are made of a transparent material with a certain refraction index, which affects lens thickness, weight, and optical properties.

Optical power refers to a lens' ability to bend light rays, as specified by the eyeglasses prescription. The front and back surface curves determine the lens' optical power. Spherical lenses are rotationally symmetric, and their front and back surfaces have a constant curvature. In contrast, the surface curvature of toroidal lenses, which are used to correct astigmatism, varies with the direction; it is usually defined along two orthogonal directions called the axis meridian and power meridian. Modern lenses generally take a meniscus shape, with convex front curves and concave back curves.

The optical power P of a lens measured in diopters is given by

$$\mathbf{P = F + B + (t/h) * F2,}$$

Where F and B are the front and back power in diopters, t is the lens center thickness in meters, and η is the index of refraction. The focal power P is specified by the user in the form of an eyeglasses prescription.

Virtual Lens Cutting and Mounting

Inspired by real lens-cutting machines, we detect the 2D inner contour of the eyeglasses frame from a front-facing view and extrude that contour to cut the lens. In the process, the uncut lens is aligned with the optical axis of the eye, making sure that the lens optical center sits in front of the pupil. The cut lens is represented using a triangle mesh with a fine tessellation. After the lens cutting, we insert each corrective lens into the eyeglasses frame by translating it along its optical axis.

Scene Description

We first prepare a virtual scene for the rendering process, where the user is wearing the prescription eyeglasses. Obtained from the previous steps, there are four objects in the scene: two corrective lenses, the eyeglasses frame, the user's face mesh, and the background. In ray tracing, each primary ray traced from the camera and intersecting the scene geometry is assigned a color,

which depends on the local material and shading (that is, the quantity of light received at the intersection point). Primary rays that do not intersect any of the scene objects are assigned the same color as in the input image.

To produce plausible shading, we first build a representation of the incident lighting that surrounds the scene. A simple way to capture this is to place a chrome sphere in the scene, before capturing the input video. A photograph of the sphere is then unwrapped into an environment map,6 which represents the amount of incident light coming from every direction. Other approaches for estimating the incident lighting include automatic methods such as shape-from-shading7–9 and the real-time method.10 In this system, we utilize the chrome sphere.

Alternatively, we could use a precaptured default environment map. Each object in the scene has an associated material. For virtual objects, the material is set by default or preselected by users. The color on the eyeglasses frame is determined using Phong shading, 11 the properties (secularity) of which can be adjusted to change the eyeglasses color. The lenses are associated with a dielectric material that refracts or reflects light rays. For the user's face mesh and background, the materials come from the input image sequences. The user's face is considered a diffuse surface. To insert plausible shadows while still preserving the details from the input image sequence, we employ an image based approach.

CONCLUSION:

We currently insert the eyeglasses based on face tracking. Although individual frames are well rendered, errors in pose estimation could result in wobbling eyeglasses, especially when people turn their heads quickly. This could be alleviated by smoothed head poses. Mapping the rendering to the GPU would let the system function in real time. Future work might employ those alternative techniques to develop a robust real-time system.

Tanay Bhatey (0808CS161171)

10. Smart Dustbins for Smart Cities

Abstract

The govt. of India has recently launched a smart city project and for these smart cities to be smarter it is necessary that the garbage collection system has to be smarter and in addition to that the people need easy accessibility to the garbage disposing points and garbage collection process has to be efficient in terms of time and fuel cost.

INTRODUCTION:

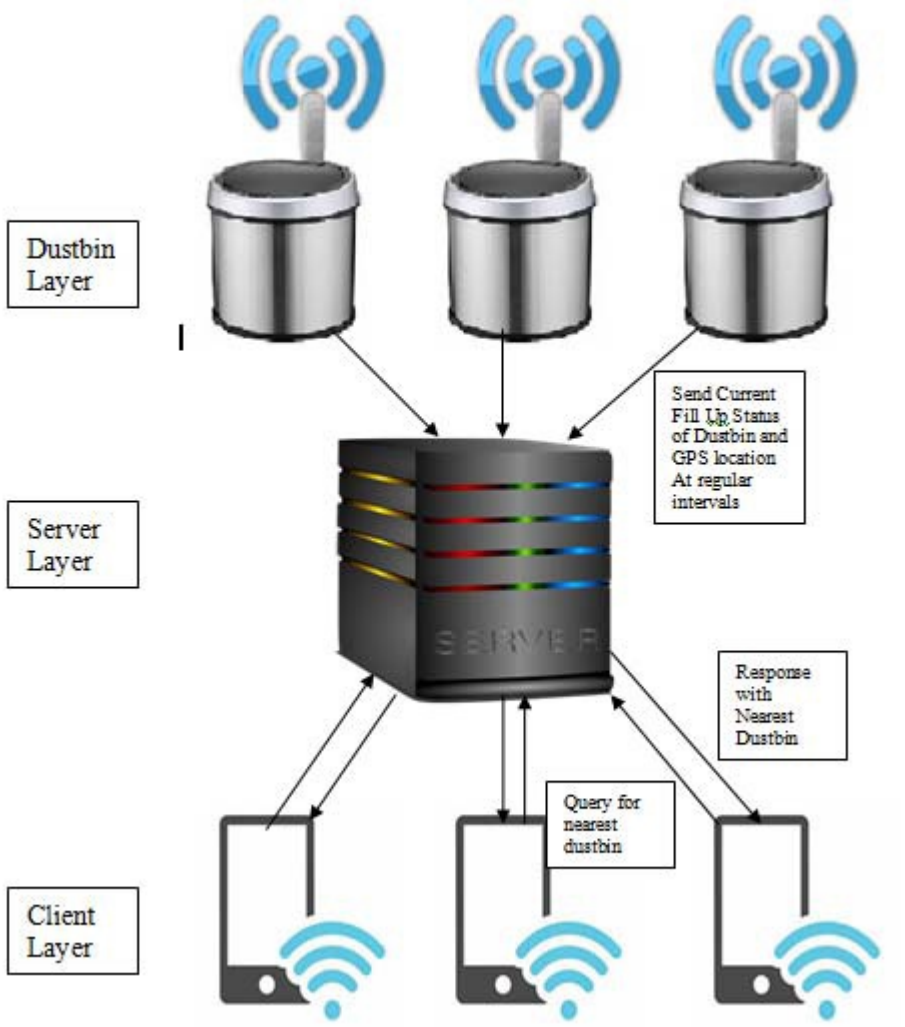
Most of the urban cities and town in India are not well designed to facilitate the proper garbage disposing and collection mechanism. Also the cities are expanding rapidly putting the pressure on existing infrastructure which is not expanding at the same pace that of urbanization .As the govt. of India has launched smart city project to utilize the IT enabled solution so there is an implicit need to make the city cleaner. Our proposed system provide an IT based solution to garbage collection providing greater accessibility, planning appropriately for disposing process and at the same time enabling collection of garbage generation data. Our proposed system solves three related problems:-

1) Greater access to the garbage disposing points (public dustbin)

2) Efficient in terms of time and fuel cost.

3) Provide data collection facility on how much a city generates garbage and accordingly plan disposing process.

DESCRIPTION



This proposed system has been divided into three layers:

Smart Dustbins

1) Dustbin Layer: -

This layer consists of internet and Wi-Fi enabled dustbins. Every dustbin contains a sensor which senses the fill up status of dustbin and sends the data to the server. It also sends it current GPS location to the server at regular intervals.

2) Server layer:

Server collects the fill up status and location of dustbins. It processes the clients query and it respond with nearest dustbin location and with direction to access dustbin.

3) Client layer: -

Clients request for the nearest location of the IT enabled dustbin to the server using Mobile App designed for this purpose

WORKING PRINCIPLE OF A SMART DUSTBIN

X is current fill up status, T is time duration between generation of wave and wave received by receiver and C is the speed of light. And we will calculate the value of X using formula given below

$X=L-(CT)/2$

And similarly percentage of fill up is calculated using formula given below

$P=(X/L)*100$

Where P is the % fill up Here we are assuming the wave path is almost vertical..

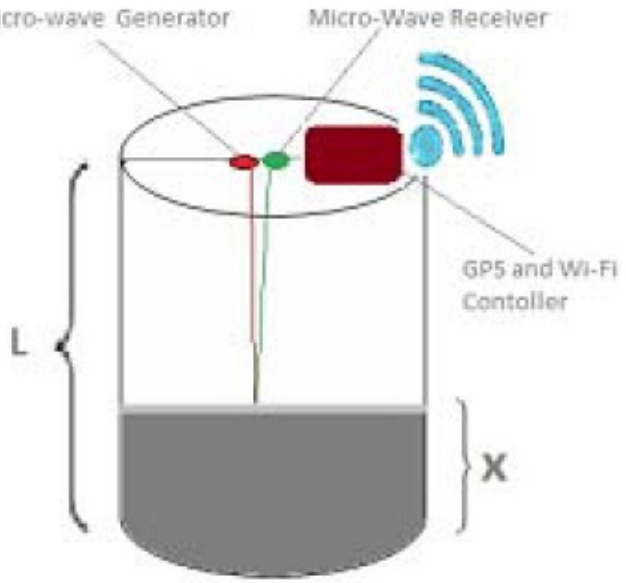


Fig.2 shows the Working principle of dustbin

IMPLEMENTATION

Now the question arises how we collect the garbage optimally from these dustbins for this purpose we can use following three scheduling Algorithm.

1) Fixed Scheduling: -

In this scheduling collection process carried out after fixed interval for example collect after every three days. Here we can use the Traveling salesman problem algorithm for route planning.

2) Priority Scheduling: -

In this scheduling the dustbins are collected according to the decreasing current fill up status. For example if we have 3 dustbins with fill up status 92%, 80% and 96%. Then collect in this order 96%, 92% and then 80%

3) Average Threshold Scheduling: -

In this scheduling we first find out the average of all fill up status of all dustbins. Then if average is greater than some threshold like 70% then schedule the collection process and within that scheduling collect according to the Priority scheduling or Traveling salesman problem.

4) Full Dustbin Capacity Utilization Scheduling: -

In this scheduling we will carry the collection process only when all the dustbins are completely filled up. Here we can again use the traveling salesman problem algorithm for route planning.

ADVANTAGES

1. Our system provides greater accessibility to the dustbin.

2. In our system if dustbin is relocated to another location it will automatically registered with the server with the new GPS location.

3. It will save fuel and time using appropriate route planning. Here we can use traveling salesman problem for route planning.

4. It will generate less pollution as we are saving fuel here which is mostly diesel and petrol.

5. We can plan and design the collection process as here we can estimate the current garbage disposing levels on monthly basis using the data provided by IT enabled dustbin.

CONCLUSION:

One of the utility of our system is that the Govt. can use the garbage generations statistics for policy and program design. If the system is implemented properly it will really make the cities cleaner and greener and makes the smart city a reality.

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