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IEEE THE INSTITUTE OF ELECTRICAL & ELECTRONICS ENGINEERS

[A Publication of IEEE, Delhi Section]

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Gordon W. Day, Ph.D.
2012 IEEE President and
Chief Executive Officer

Dear Members and Leaders of the IEEE Delhi Section:

On behalf of the IEEE Board of Directors, and the more than 400,000 IEEE members around the world, I offer greetings to the Delhi Section.

Your Section is among the fastest growing in IEEE. In just three years, you have nearly doubled your membership, to more than 4600 members at the end of 2011. Yours is now the 18th largest among the approximately 330 IEEE Sections in IEEE.

Your Section is obviously thriving. Your leaders understand that the role of IEEE is to help technologists do their jobs well. And your growing membership surely indicates success in that mission. I note that education and professional development are important priorities in Section activities. I commend you for that and encourage you to expand those kinds of programs further.

The recent founding of an IEEE Student Branch at the Mody Institute of Technology and Science is a good example of the importance of your work. Engineering students of today, the engineers of the 21st century, will surely shape our future quality-of-life just as their predecessors have done for the past century or more. We need to support them, encourage them, and challenge them to be creative and innovative.

I'd like to take this opportunity to congratulate Ranjan K. Mallik, a member of the Delhi Section, who is a member of the 2012 class of IEEE Fellows. This is an exceptional honor and an international recognition of his achievements in wireless communications. Only one of every thousand IEEE members can be elevated to the grade of Fellow in any year, and the total number of IEEE Fellows is only about 2% of the membership.

And I just learned that another member of the Delhi Section, Ram Gopal Gupta, will receive one of the IEEE Member and Geographic Activities Board's Leadership Awards.

I look forward to seeing another year of dynamic growth and achievements in the Delhi Section. I admire the energy of your membership, the passion you bring to your work, the dedication you have demonstrated in advancing technology for the benefit of the people of India, Region 10, and the world.

My very best wishes for 2012.

Sincerely,

Gordon W. Day, Ph.D.
2012 IEEE President and
Chief Executive Officer

Email: g.day@ieee.org

Message from the Chairperson's Desk

Shiban K Koul
Chairperson, IEEE Delhi Section

Dear Members

It is my pleasure to be in touch with you through this communication in BEACON. Before I present some of the highlights of the activities of our Section, I take this opportunity to thank all IEEE Members including Student, Gold, Associate, Senior and Fellows for electing me to the post of Chairperson Delhi Section for the year 2011. I am also thankful to all the Section Executive Committee Members and the past Chairpersons for their whole hearted support and guidance.

I am glad to share with you that for the first time the membership strength of our Section has crossed 5000. As on 26th January 2012, Delhi section has a total of 5128 members (27- Affiliates, 67- Associate Members, 7- Fellows, 406- Graduate Student Members, 3- Honorary Members, 3- Life Fellows, 5- Life Members, 15- Life Senior Members, 1120- Members, 175- Senior Members and 3300- Student Members).

Elevation of the Membership grade is recognition to the Section. This year Professor Ranjan K Malik of IIT Delhi and Professor R.K. Shevgaonkar, Director, IIT Delhi were elevated to the 2012 class of IEEE Fellows. Both Prof. Malik and Prof. Shevgaonkar are being felicitated at the AGM to be held on the 19th February 2012. In addition to this, 7 members of the section were elevated to the level of Senior Membership.

It is a matter of great pride that Delhi Section bagged several awards this year. The awards are: Section Growth Incentive Award of US$ 500 from R10 for the highest number of member recruitment in 2011; Member-get-a member section award of US$ 1000.00 for recruiting highest MTT-S members worldwide and IEEE R-10 WIE support fund of US$ 300.00. In addition, PELS received the best chapter award and WIE IEEE JMI received Star funds of US$200.00. At the individual level, Dr. R.G.Gupta

was conferred with the IEEE MGA Leadership Award for the year 2011; Daman Dev Sood selected as one of the 40 IEEE Global Ambassadors; Prof. S.K. Koul selected as a Distinguished Microwave Lecturer by the IEEE MTT-S Society for the period 2011-2014, Prof. Mini Thomas elected as IEEE MGA Vice Chair, Dr. R.G. Gupta elected as Member Board of Governors, IEEE AESS and Mr. Rajendra K Asthana elected as IEEE - R 10, Industry Relations Coordinator. My sincere and heartfelt congratulations to all members involved. I would also like to take this opportunity to share that an old publications titled " Standard Parameter of 800 KV Class Transmission System in India" from Central Electricity Authority (CEA) presented in a conference in Russia in 2003 has been cited none other than Novel Laureate Professor Robert B. Laughlin on Stanford website. My heartiest congratulations to Subrata Mukhopadhyay, his team and Harbans Lal Bajaj who was the CEA chairperson at that time.

Under the guidance of Student Activity Chair (SAC) Dr. Prerna Gaur, the student branches have organized many events in their respective colleges. This year the student membership under Delhi section has gone up to 3300, an increase of nearly 750 as compared with the last year. In addition, 10 new students branches, student chapters and WIE affinity groups were opened under the Section. The Section currently has 64 student branches/chapters. In the year 2011, the section organized four quarterly meets in different Institutions. I take this opportunity to thank Dr. Prerna Gaur and her team members for making these events successful. The Section extended financial support to students, SAC past chairperson and Gold Chair for participation in R-10 student congress held in Auckland, New Zealand.

Women in Engineering (WIE) and Graduate of Last Decade (GOLD) affinity groups organized several activities during the year 2011. The WIE Affinity groups at NSIT and DTU have been quite active. The groups organized workshops on personality development, computer training programs, and science workshops for children of weaker sections. The Gold Chair conducted several meetings for the benefit of GOLD members under the Section. I thank the WIE Chair (Rachna Garg) and the Gold Chair (Ayush Jain) for organizing these events.

The section organized total of 194 activities comprising of 131 technical, 5-professional, 41- administrative and 17 non technical meetings in the year 2011. These include lectures by several Society Distinguished lecturers as well. A team from IEEE Standard Association visited Delhi to interact with the Section Executive Committee members. The team also conducted three workshops on Cloud computing, Design Automation and Smart Grid during their visit. Mr. Matthew S. Loeb, IEEE Foundation Executive Director also

visited Delhi to have interaction with selected Section Executive members. The Section organized a talk by Thomas M. Coughlin President Coughlin Associates and Vice President (Operations and Planning), IEEE Consumer Electronics Society. JMI is in the process of formation of a new Consumer Electronics Chapter under Delhi Section . A talk by the Communication Section President Professor Vijay Bhargava was also organized under the Section. Professor Hugh Griffiths, IEEE AESS President visited India and delivered talks at Delhi, Jaipur and Bangalore. He also interacted with the Section Executive Committee members during the 4th Execom meeting held at IIC, Annex. In addition to these, the Section supported financially/technically many seminars/workshops/short courses/ national and international conferences.

This year two major events were organized under the Section. Professor Mini Thomas organized All India Student Congress (AISC-2011) at the JMI, Delhi. The congress that was attended by more than 130 volunteers from 8 Sections was a grand success. Shri Ravinder Joshi organized a Global Warming Awareness cum Innovative Idea Generation program in collaboration with the UN Information Centre (UNIC) in Select Citywalk, Saket in Delhi. The program generated lot of interest in general public. I thank both Prof. Mini Thomas and Mr. Ravinder Joshi for their initiative and organization of these major events.

I attended the Section Congress held in San Francisco in August 2011. The Congress was attended by about 1133 delegates from 92 countries. Two Section Execom members, Dr. Mini Thomas (MGA Vice Chair) and Dr. R.G.Gupta (Chair India Council) also attended the meeting. I am happy to inform you that during the congress, IEEE awarded our Hon'ble past president Dr. A.P.J. Abdul Kalam with the Honorary Membership. The section is proud of the rare honor bestowed on his Excellency Dr. Kalam.

For the benefit of members of the Delhi section, the top 5 recommendations as ranked by the primary section delegates at the section congress are: IEEE to develop a comprehensive long-term strategy to increase the number of next generation youth pursuing science and engineering careers; As members maintain their IEEE membership over their years, IEEE must reward them for their loyalty; IEEE membership (including e-Membership) should include a Society membership as part of the basic membership fee; Increased support to students in technical activities with grants to attend conferences and organization of technical competitions; To encourage interest in pre-university students in engineering careers through publication of a periodical targeted to high school students that highlights engineering activities of interest.

Some of the important events scheduled for future are: First Security and Mobility Conference, 23rd February 2012 at IIT Delhi; International Conference on Signal Processing, Computing and Control (ISPCC) from 15-17th March 2012 at JUIT Waknaghat, Solan; Fifth India International Conference on Power Electronics from 6-8th Dec. 2012 at Delhi Technological University; Fifth Power India Conference from 19-22th Dec. 2012 at Deenbandhu Chhotu Ram University of Science & Technology, Murthal. I appeal to all the members and others interested to actively participate in these conferences.

Dr RGS Asthana, Chairperson Public Relations and Publication Committee, has put in lot of effort in bringing out this issue of BEACON. My sincere thanks to him and his team members. The IEEE Delhi Section website is maintained by Dr. Subrata Mukhopadhyay. I am thankful to him for timely updating of the website and also brining out the section news letter on time. I also thank Dr. V.R. Singh, Prof. S.C. Dutta Roy and Dr. H.L. Bajaj, (Nomination committee members) for preparing the slate for the year 2012.

M/S Agilent Technologies India Pvt. Ltd financially supported AISC-2011 held at JMI and also gave funds for advertisement in BEACON-2012. Their support is gratefully acknowledged.

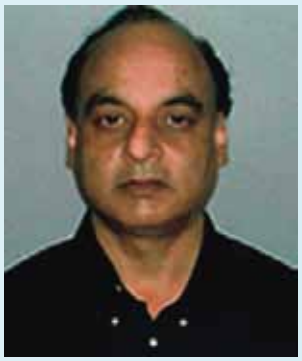
I've had a great year as Chairperson of the Delhi Section. Definitely not all fun, lot of work, some frustration, meeting and working with Executive Committee Members and other IEEE people all over the world, seeing the achievements of our members, seeing significant growth in membership, the opportunities to speak to and with the brilliant and really nice people that comprise our Section has been a wonderful learning experience overall. I have enjoyed in 2011.

My best wishes to all our members and their families. Wish all of you a very HAPPY and Prosperous NEW YEAR 2012.

With warm regards,

Shiban K Koul
Chairperson IEEE Delhi Section
February 05, 2012

message



Dr RGS Asthana,
Chairman

Public Relations and Publication
Standing Committee

Dear Members,

Welcome to the latest, revamped edition of IEEE Beacon [Delhi Section] 2012. The new look reflects the fresh ideas gained from our experience of bringing e – book last year and we very much hope you enjoy both the style and content. You have option to download the whole e-book or individual papers.

This issue includes articles written by authors from industry, academics and student community. The articles covera range of topics viz. Kinetic data structures, TV human interface, mobile operating systems, auto pilot for car, detection of pulmonary edema, additive watermarking and adaptive relaying for power system protection. This issue alsoincludes articles onmedical tourism discussing the India advantage and sustainability in Information Technology.

We bring to you reports on activities of Delhi section carried out in the year 2011 under dynamic leadership of Dr. Prerna Gaur, Chair, Standing Committee - Students and Educational Activities, Prof. Abdul Quaiyum Ansari, Chair, Standing Committee - Technical & Professional Activities and Mr. Ravindra Joshi, Chair, Standing Committee - HTC (Human Technology Challenge).

The success of this enterprise truly depends on your participation!If you would like to offer your views to help us to improve the magazine or on any other subject pertaining to Beacon, please e-mail me at rgsasthana@gmail.com.

With kind regards,

Dr. RGS Asthana

Members of Public Relations and Publication Standing Committee

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Optimized Kinetic Data Structures Based Algorithms For Collision Detection In Robot Motion Planning

Neha Arora and Deepak Garg
Thapar University, Patiala

article

Abstract

This paper discusses about the collision detection algorithms used in Robotics. Classical methods were based on bounding volumes which were not suitable for real environment. Hence, new algorithms and technologies are implemented to improve the "Motion planning" process. Also a few optimizations have been made in classical methods like optimized spatial hashing technique and greedy pseudo triangulations. Latest projects and softwares used for this purpose have also been discussed. HAPTICS and GENETIC algorithms play an important role in this area. Moreover effort has been made to accelerate the performance of earlier methods using high speed graphic hardware and pipelines. And also a further research has been made on SEMIDEFINITE PROGRAMMING (A new form of optimization technique).

1. Introduction

Collision detection is a tool whose performance is very important in order to achieve efficiency in many robotics applications primarily "Motion Planning" which has arisen in context of obstacle avoidance and path planning. It has been listed as the major bottleneck towards real time virtual environment simulations of human intervention. Visual sensors have evolved but they have yet not been able to extract wealth information in visual scenes.

In order for Humanoid robots to become practical they must be able to operate safely. Even self collisions are harmful. These occur when one or more links of a Bot collide which results into damage. Hence, ageometric approach is followed.

A humanoid consists of a tree of connected links which can be viewed as a set of five serial chain manipulators (2 arms, 2 legs, and 1 neck head chain) all attached to a free floating trunk. Hypothetically, joint limits prevent collision between a given link and a parent link. Example Protocol is ARMAR with 23 degrees of freedom.

The main goal here is to develop optimized and efficient methods that do not require recomputations at fixed time intervals but detect collisions exactly when they happen. For this purpose we use "Kinetic Data Structures".

2. Kinetic Data Structures

The idea originates from a fact that computational geometry structures are built using predicates - functions on quantities defining geometric input which return a discrete set of values such as a convex hull of closest pair of points. While modeling motion, the data must be sampled and combinatorial structure of the data must be updated periodically. Dynamic data structures do not suffice this condition. Hence, a KDS framework was introduced. These are based on assertions about the world called certificates which are geometric relations among few features of moving objects. As long as certificates remain valid, this computation can be used to get value of relevant system attributes. At each certificate failure, certificate set being maintained, must be repaired, is the and essence of good kinetic structure. The certificate failure time must be either detected or predicted. The predicted failure times of kinetic structures are placed in an event queue i.e priority queue based on their time of expiration and the system clock can be advanced until either one of the objects changes its motion plan. The following four measures are used to describe quality of KDS as suggested by Guibas [7] :

Respon siveness	Effic- iency	Comp actness	Loc ality
O(nlogn)	O(logn)	O(n)	O(logn)

Table 1 Complexities

3. Application Of KDS

A KDS provides with event based algorithms. As we know, the roots of collision detection lies in computational geometry where the problem is to report intersections among static objects. However, in motion planning of Robots the problem is more difficult as they are moving. The practical approach is to study collision among polyhedral objects simulating robots in real world. Earlier moving polyhedral objects solved problem instances from scratch at every time step. These algorithms required running time that was quadratic in nature. They were too slow as they neglected the fact that objects in motion discretize the time axis and update the structures based on relative position. If all objects move continuously then in general their configuration does not change significantly between time steps. Time discretization can exploit spatial and temporal coherence. Temporal Coherence is necessary to detect precisely those points in time where there is an actual change in structure. Hence there are certain discrete moments in time when combinatorial structure of object changes and certificates constitute a property of interest as they assert facts like" point c lies on left of directed line through a and b". This property leads to development of constant time algorithms. The most efficient method uses "Pseudo Dynamic or two phase detection algorithms". Each possible state or pose of a robot is a point, and a path is a

curve in space. Hence, it requires expensive precomputations.

4 Pseudo-Dynamic Collision Detection Algorithms(Probabilistic methods):

The methods use point cloud data as inputs. Firstly, the collision query is made between two point objects and then for polygonal objects. It is used to uncover uncertainity modeled as

$x_i|S \sim p(x_i|S) = \int p(x_i|S)p(x_i|x_i';\sum_i)dx_i$

The outcome of which is a probability $P_{c1,c2}$ which estimates whether two point clouds are in collision. P is the separating surface. However, separating surface is not the sufficient condition for point data as comapared to polygons. Hence, it makes it difficult to use point cloud data sets. Though it helped in avoiding noise interference.

4.1. Broad Phase

The function of these algorithms is to quickly remove most of the intersection pairs from consideration. using "Bounding volumes" such as cuboids, spheres, polyhedrals. Boxes can be used to bound the region of space occupied by an object at a specific time interval. Consider a bounding box Bi, that encloses object i over time interval [to,to+t].Let ri be the maximum distance of object from its centre of mass. Bi is found by noting position of centre of mass at time to and to+t and possibly the apex of trajectory. A recent advancement over it is ORIENTED BOUNDED BOX as it yields the better outer approximation of the objects which lead the pathway to hierarchical structures known as "Strip trees". Commonly used data structure is R Trees(Rectangle trees).They provide exceptional improvement over K-d Trees(Binary space partition) because they partition obstacles rather than space and have potential for efficiently performing collision detection queries. Objects pairs with intersecting bounding boxes are passed to narrow phase collision detection.

4.1.1 Minimum Distance Detection Algorithm:

Quillan's Greedy Combine Method(Sphere tree hierarchy construction):In this approach an initial grid of leaf spheres with fixed size is blacketed over the surface of every polygon. Nearby spheres are grouped together to form a hierarchy bottom up. The radii of larger are calculated to entirely contain smaller ones

4.1.2.1 Intersection Detection Algorithm

4.1.3 Optimised Spatial Hashing Technique(Grid based Method):

Spatial hashing is a process by which a 3D or 2D domain space is projected into 1D hash table. Imagine a grid of 100 by 100 pixels and each cell is 25 by 25. Each cell is a bucket of game objects and a unique hash id. Any object in bucket [3] cannot collide with object in bucket [9]. This reduces the time we need to cycle the nearby objects. But what if it crosses a line and exists in more than one bucket. To resolve this, imagine a box around object and calculate hash id for each corner of object. Figure 1 depicts the Simulation done using MATLAB.

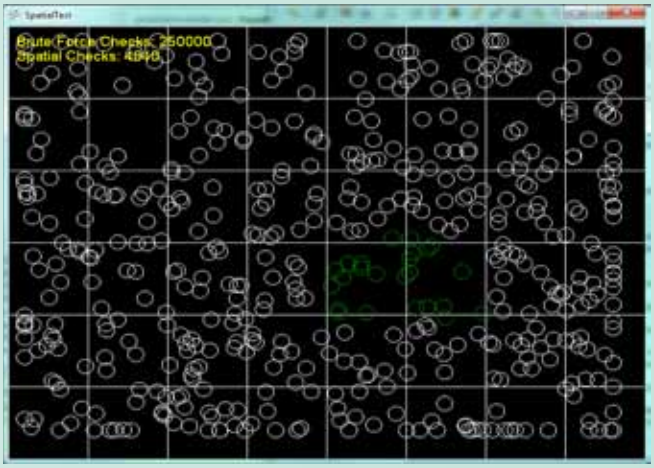

Figure 1. Spatial hashing technique

4.1.3 CoordinateSorting:
It is based on sorting the coordinates of bounding boxes along each of the three coordinate axes. The minimum and maximum of each of x-axis aligned are maintained in sorted list. Same is done for y and z coordinates. Two Boxes overlap if and only if their coordinates overlap in each of three directions.

Coherence is exploited when updating previous sorted lists. Coordinate sorting is based on dimension reduction. The coordinates may be clustered even when original boxes are not; the clustering becomes worst in higher dimesions. One way of handling clustering problems is to perform less drastic dimension reduction, projecting 3-Dimensional boxes into 2-Dimensional rectangles in plane.
Hashing does not suffer from clustering, however it does not cull as many intersection pairs as coordinate sorting. The system implemented here is the "RAPID" system implemented by Gottschalk, Lin and Manocha [3]. Vanecek used another approach i.e Modified back face culling technique. It removes all polygons whose normals face away from moving polygon.

4.2 Narrow Phase (space time bound algorithms):
Narrow phase collision detection analyze the pair of objects that are not easily culled by broad phase detector. These are based on fourth dimensional geometry. They employ more refined but slower algorithms to determine whether objects are penetrating or disjoint. When penetration is detected, a binary search method can be used to localize the time of transition from disjoint stat to the penetration state, within a desired tolerance

4.2.1 Lin Canny Closest Feature Algorithm:
It Operates on rigid convex polyhedra. It is an extremely fast method for tracking the closest features. The fundamental concept in this algorithm is of Vornoi region. The polygon has 8 features: four vertices and four edges. For each feature F, the set of points closer to F than to any other feature of polygon is called vornoi region of F, denoted by V(F). The shapes are easily deduced for polygon objects. From each vertex, extend two rays outward from the polygon, each perpendicular to one of the edges. The Vornoi region of a vertex is an infinite cone while that of an edge is an infinite rectangle. Collectively, it partitions the space outside polygon. The system used here is I-Collide. Recent improvement over it is Q-Collide system and V-Clip.

4.3 Analysis:
In case of two convex polytopes, the distance can be determined in O(log ^ 2n)time, where n is the number of vertices, which takes O(n) time and space to construct. Generalizations have been done to provide sub quadratic time in worst case for a collection of polyhedra.

5. Latest Trends and Optimisations:
5.1 Greedy Pseudo Triangulations (Mesh-based method):
Pseudotriangle is a simply connected subset of the plane that lies between any three mutually tangent convex sets. A pseudo triangulation(Delaunay) is a partition of region of plane into pseudo triangles.

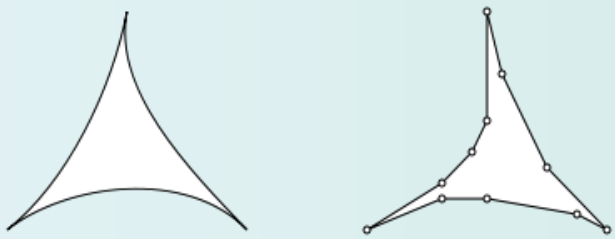

Figure 2. Pseudo triangulations

A pseudo triangulation is denoted by T(S) and each face is a pseudo triangle which lies in interior S pseudo triangles can flex as the objects move and have sufficiently simple shapes and therefore the self intersections are easy to detect. For a Low degree algeabraic motion, pseudo triangulation changes about n^2 times. Therfore, a greedy vertical pseudo triangulation is used which considers a minimum number of cells K. For any linear ordering on the free tangents, we can build a corresponding greedy triangulation, first we sort the list and then scan the set of tangents. At each step pick a tangent segment s and check if it intersects with any tangents in Sorted sequence S. Discard if it does not. The number of certificates needed to maintain correctness is propotional to minimum link subdivision. This method is particularly useful for continuously deforming objects. Therefore it is possible to obtain O(logn) query time with $O(n^4)$ space

Robots	dof	triangles
2 robots	12	8452
4 robots	24	16644
3 robots	18	14048
2 robots	12	9044
4 robots	24	14048
3 robots	18	30462
6 robots	36	41244

5.2 Dynamic Collision Detection Methods:

Pseudo dynamic collision methods suffer from temporal aliasing. However, Dynamic collision detection methods considers time and motion information in order to give conservative results without missing collisions. The dynamic collision does not suffer from temporal aliasing

The threshold where the accuracy of these algorithms depend is how far objects move per sample interval. This approach uses three stage pipeline:

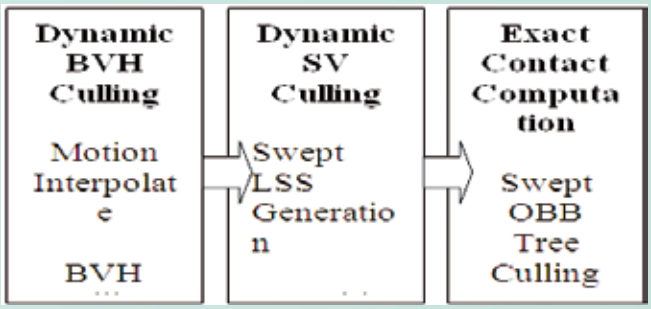

Figure 3. Pipelining

5.2.2 Graphics Hardware Method(Fast dynamic method)

Acceleration in hardware can be achieved through FPGA which acts as a co processor. It takes advantage of inherent parallism of collision detection algorithms

Due to recent advances in performance of graphic processors as well as increased support for programmability and lack of preprocessing, these methods are in great demand.

Figure 4. V-REP(Virtual Robot Experimentation Platform): Simulation using CMLABS

5.3. Haptic Interface

Haptic technology is a tactile feedback technology that takes advantage of users sense of touch by applying forces, vibrations or motions to the user. Recently, haptic devices have been used in the field of robotics. Haptic

interface is used to teleoperate a mobile robot to explore polygonal environments. It improves navigation time and operator perception. Robot motion is usually controlled by the camera mounted on robot. However, they require much of operator attention whereas haptic devices give additional sense of "feeling" the robot workspace. The human operator can simultaneously select two commands active and guarded motion type. Each receives a force feedback independently and force origin becomes clear. eM - Virtual Desktop is one of the software used for this purpose which provides powerful solutions. Prof. Gabriel Zachmann has coined a term Haptesha - a project being sponsored by grant avilus.

5.4. Evolutionary Algorithm:

It Is a multi objective optimization problem. It considers three objectives:

- Minimum Energy Consumption
- Stability
- Walking speed

Non-dominated sorted genetic algorithm is used to generate the generate the pare to set of robot gaits

5.5. Hybrid Genetic Algorithm

Implementation:

Genetic algorithm is particularly easy to implement and promises substantial gains in performance. It is used to search for optimal path from a population of feasible paths. It eliminates the problem of free space connectivity problem. The algorithm is further enhanced using traversibility vectors. The basic structure is given as:

1. Initialize population
2. Evaluate initial population
3. While not termination-condition
4. Assign fitness values to entire population
5. Select individuals for crossover
6. Crossover
7. Mutation
8. Offspring evaluation
9. Offspring reinsertion

6. Conclusion and Future Work:

Most of the prior work on collision detection assumes an exact geometric description of the objects in the scene, typically represented as a polygon mesh. However, these methods may not work well for robots operating in real-world environments, where only partial observations of the environment are possible based on robot sensors. Hence, new methods and technology was implemented which increases the efficiency and time complexity reduces to exponential time. Also, it overcomes errors such as discretisation and noise errors. All methods are efficient, however, haptics needs much more exploration in this field.

There are many avenues for future work. The above analysis can be applied to various potential applications like virtual reality based training and dynamic system simulation. In fact, optimizations are being made through the use of new programming language "Semidefinite programming" which is commonly used in Gaming. It provides a virtual framework for optimization of complex systems. Hence, it would be helpful in resolving issues of contact points and penetration which are still under the veil.

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TV Human Interface: Different Paradigm from that of PC and Mobile

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article

Abstract

Microsoft Window's Human Interface became a de-facto standard for the PC, in spite of similar and even better Human Interface of Linux and Macintosh computers. A de-facto Human Interface, like the QWERTY keypad, doesn't have to be ideal – it just needs to habituate people such that switching over to something else doesn't make much sense. Inspite of the success in the PC world, the Window's derivatives (such as Windows CE), could not become a de-facto standard for the Mobile (Smart phones). The very people who were accustomed to using the Windows on their desk-top PC, found the same unwieldy on the smaller mobile hand-set. Microsoft didn't realize that the Mobile Human Interface, represented a different "paradigm", and one could not just retrofit a success in a different paradigm. In spite of the dominance of Nokia in the mobile phone, the success, ultimately came to the Human Interface incorporated in the late-entrant Apple's iPhone and iPad. This paradigm was so successful, that clones and look-alikes followed almost immediately.

The paper discusses, how TV represents yet another paradigm, where what-ever was successful in the earlier paradigms can't be retrofitted. It's just like the requirements of the living species in water, ground and air. Requirements of the TV are more demanding than the earlier mediums, simply because it has to appeal not to logic (left brain) as in the earlier medium, but to the intuition (right brain).

The paper analyzes the needs of the Human Input Interface for the TV – the Remote, and also the Visual display and navigation interface for the TV. It

discusses the nature of TV-oriented Apps, which would be pre-dominantly content centric. It also discusses how the TV Human Interface has to facilitate creation of User Generated Content.

Keywords
Human Interface, Graphical User Interface, TV Browsing, Visual Navigation, Media Management

1. Introduction

In any product the most important standard is that of the human-interface. A good Human-interface standard becomes a part of the nervous system, allows automatic reflexes and then is difficult to be unlearnt. A product cannot thrive, unless people get so used to its human-interface, that they are unwilling to change to anything else – even if the other thing claims more efficiency.

Such has been the story of the QWERTY keyboard, invented by Sholes, which could not be displaced by even more efficient keyboards (like Dworak's) later on. Today the QWERTY layout is part of each mobile and computing device.

Such has been the case of Windows operating system, which became the de-facto standard for the Graphical User Interface in the Personal Computers. Primarily because of this, any incompatible Graphical User Interfaces, such as those provided by Linux and Macintosh, appealed only to the minority.

It is not necessary that a Human-interface which is popular in one type of product shines out in others too. Such has been the case with the Windows CE for embedded device – which did not make a splash either on TV or mobile device market, although Windows was entrenched in the PC market.

Recently, Apple's iOS caught the fancy of millions of users with its endearing User Interface for the mobiles and tablet medium. The User Interface based on multi-touch principle, allowed intuitive ease in navigation, without requiring a separate keyboard.

Clearly, different products representing different paradigms require different solutions. When the needs and habits for a product is different in another medium, a paradigm shift is needed. Such has been the case for the TV medium.

Thousands of set-top-boxes and media players have been used with the modern TV, each sporting a different user interface and a very different remote. These boxes range from simple channel-up/down boxes to sophisticated internet browser/apps boxes. In fact, recently Smart TVs have evolved, which have incorporated the functionality of these boxes internally. And yet, there seems to be wide differences between their implementations and no sign of "convergence" to what is universally acceptable.

Figure 1: TV vs. Mobile and PC

The simple Channel-up/down interface remains the only de-facto interface which everyone is used to with their TVs. Nothing else has caught the imagination of the public. Most of the exotic features provided by the set-top-boxes or Smart TVs remain ignored - just like those provided by earlier mobiles, till Apple iPhones came along.

The problem is very simple – there is a basic difference between TV media and that of PC or Mobile. You can't retrofit one on to the other.

2. The Difference between TV and PC

The closest analogy of TV is that of an outdoor experience, while that of a PC is that of reading a book, indoors.

TV is a window to the world – the bigger the better. It's an outdoor experience, to be watched from distance. An experience which become better, with more people watching and reacting to it. A PC in contrast, is a private experience, at a reading distance. People don't want to be distracted even by somebody watching over the shoulders.

TV is a lean-backward experience on a sofa, while PC is a lean-forward experience on a proper ergonomic chair. TV is for the heart while PC is for the logic. TV seems like fun, while PC seems like work.

People would rather use the TV for watching channels and videos, rather than web-browsing or emailing.

The distinction between TV and PC is not the technology – after all the same monitor can be used for both. It is the User Interface – Remote vs. Keyboard, Channel up/down, vs. complex menus.

A person feels completely at ease with the TV, when he does not have to keep figuring out how to do things with his left brain (as with a PC), but can count on the right brain to do the steering for him (as during driving a car).

3. The difference between a TV and a Mobile

A mobile, more than a PC, represent an experience similar to that of using a pocket diary. Indeed the pocket diary remains easier to use than most of the mobiles. Like a pocket diary, it has to be an "instant on, quick use, instant off" kind of experience. The PC, or even a lap-top just can't compete with that.

A mobile has to accomplish a lot in whatever screen one can squeeze in a pocket size device, and where the adult eye-sight, can still discern the tiny characters on the screen. The biggest problem has been that of the User Interface for typing. Numeric keypad, became inadequate once text input was required. Stylus based "Grafitti" interface promoted by Palm-OS mobiles, could not become user friendly. The most user friendly keyboard overlay, remains that of the QWERTY keypad provided on most of the Blackberry mobiles today. Yet, Apple's iPhone has shown, that a touch based, on-screen keyboard is also quite usable. There is no clear winner on the keyboard input front yet.

Many people are habituated to typing alphabets, through a numeric keypad of a simple mobile. Multiple key presses are

required for a typing a letter, or one can use a "T9" kind of single press scheme, where the world guessing is improved as one is typing the numeric keys. In all these cases, the operation requires a display to be located just above the numeric keypad, so that the feedback about correctness of typing is continuously available. The same operation becomes very difficult and awkward, when attempted using a TV remote with a numeric keypad. In this case one will have to constantly shift the gaze between the remote and the TV.

A TV medium, doesn't have constraints of the mobile. It is a leisurely device, which remains on for hours, even when nobody is around it. Reading text on a TV, is not as friendly an experience, as that of reading it on a mobile, primarily because of the larger distance of viewing. The de-facto human input, for majority of TVs, remains that of a simple-minded Infrared Remote – although the number of keys, functions, and layout varies quite a lot between remotes. Because of this, it is not really a simple experience for a person to go to somebody else's house and pick up the different remote. The TV users have resisted a bigger remote containing a keyboard. For their simple minded needs, an on-screen keyboard has sufficed. Many people in fact believe that a utility like a keyboard intrudes on the TV experience.

A mobile phone, even more than a PC, is a personal and private medium. The TV, however, is quite social in character and is in every way a shared experience. Unlike mobiles, the content used on the TV need to have general appeal and no-one can monopolize the TV, if it has to be shared with other members of the family.

So it doesn't make sense retrofitting User Interfaces designed for mobiles on to that for the TV.

4. Ergonomic need for a TV Interface

The needs for species which thrive on land, water and air are different. So is the need for PC, Mobile and TV. The TV User Interface has to cater to the TV's special needs – it has to be easier than the PC or the mobile.

As discussed earlier, the User Interface of the TV has to cater more to the needs of the right brain, than the left. The right brain is expert in visual oriented navigation tasks, while the left-brain is expert in language oriented, computational and logical tasks.

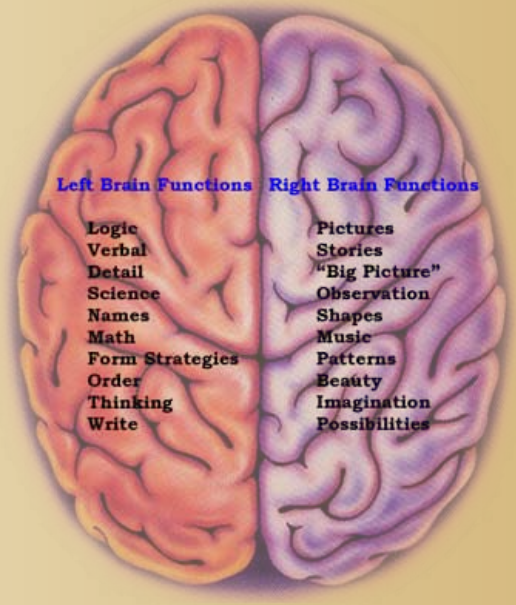

Figure 2: Left and Right Brain Functions

Left brain feels at ease, whenever the right brain can offload it from any routine yet attention demanding task. Such is the case of

driving through familiar routes in a car. You can easily carry out an intense discussion with a colleague, while your right brain will faithfully take you to your destination.

For the right brain to be in control, the items have to be visual in nature, with minimal text. The context should not be changing abruptly. Look-ahead should be available for all the options applicable at any moment. So there is no figuring out to be done by the left-brain. When right brain can off-load, the left-brain feels relaxed: an integral part of the TV experience.

4.1. Requirements from the TV Remote

The remote has to be a "look ahead" device, much like the gear-stick and the steering wheel in the car, which intuitively responds to your wishes – without your having to look down, or give a conscious thought. Most of the TV remotes, which are packed with keys, seem to be flouting all these principles. In spite of the profusion of special purpose keys, people confine themselves to the few common denominator keys: Channel up/down and Volume up/down/mute.

Figure 3: Variety of traditional Remotes

Many of the high-end STB manufactures have taken the ergonomic step of providing remotes with few keys. Alas, here also the extreme can happen by providing too few keys. This leads to loss of functionality and awkward operations on the screen. Moreover, the remote becomes custom, with the keys dedicated to the chosen applications.

Some of the remotes incorporate pointing functionality, by including a joystick, trackball, spin wheel, or a tilt sensing mechanism. Most of these not only increase the cost of the remote, but also that of the STB - for instance by requiring RF reception capability. It is though amply clear that a TV remote functionality cannot be simply handled by a pointing device, it requires more keys than PG UP/DN, VOL UP/DN and MUTE.

The TV oriented pointing device, do not provide the intuitive ease of the mouse – as they require a steady, unencumbered hand. Pointing from a distance also requires concentration for accuracy. These problems are not present in a simple remote, where an on-screen pointer is just moved by the cursor movement keys. The four cursor keys, still remain the only de-facto standard in a remote.

Figure 4: Simple Remotes – dedicated for some applications

The TV remote user will need to handle the remote in the dark, while looking forward at the TV. Even if the room is lighted, the TV user wouldn't like to divert the attention from the TV by having to look down for locating the buttons on the remote. The TV remote user shouldn't have to figure out in which scenario which key to use. Muscle memory should be used for automatically pressing the correct key, so that the action doesn't intrude on the thinking process.

The TV remote user also should not have to shuttle between the STB remote and the TV remote, except maybe for switching the TV on/off. Even the TV on/off feature can be handled by today's STB, with the modern TVs having an HDMI interface.

4.2. Requirements from the Visual Interface

The TV viewing experience is primarily that of watching a video. The video may be coming from any source: channels, VOD, USB-stick, DVD etc. Traditional watching of the video just required few VCR controls. Today, one may like additional controls such as Slow motion, and Frame-by-Frame motion, Subtitle/Dubbing track selection etc. Today, one may also like to jump through sections of video, using preferably a pictorial index.

Instead of using many dedicated function keys on the remote, and facing the associated problems as pointed out in the previous section, it is better to use a Menu key, and allow user to select amongst the available options. The problem is that there can be diverse ways of displaying and navigating through the Menu and the user would have a tough time if he is unfamiliar. Such has been the case with all the DVD and Media players, which provided a profusion of functions at remote key or the Menu level, with almost no standardization even amongst different models from the same manufacturer.

Figure 5: Google TV GUI

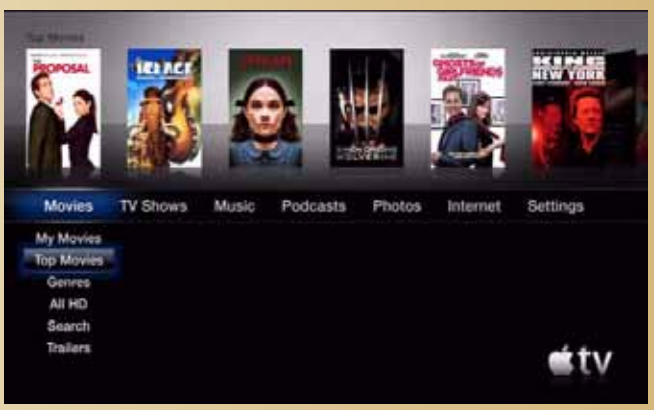

Figure 6: Apple TV GUI

Although the purpose of all the STBs, simple or advanced is ultimately to let a user watch a video, where they differ is in the navigation process which allows narrowing down to a desired video. This can be simple or tough, depending on how dedicated or versatile the STB is, and the initiation of the end-user to computer and mobile devices. But invariably, all the remote and menu interfaces are

different, and require a user to learn quite contrasting functionality.

Most of the User Interfaces start off with a "Home screen", it having multitude of icons representing the applications available at the highest level. Users have to scroll through several pages of icons to locate the one he desires. Some of the user interfaces try to fit all the icons to a single screen, in which case they run out of space and have to use tiny icons with simple logos and textual names. In fact, the Home screens on the STBs become a simplified version of that on a PC.

A STB Home Screen, can comfortably show up to a dozen icons – as the icons on the TV screen have to be larger than on the PC. So if there are hundreds of icons for Apps, then one has to scroll through several pages. This certainly makes locating an icon very messy. Even if one has located it before, it is difficult to remember its arbitrary position. Attempt to manually organize the related icons into separate pages, is a task which is rarely finished. This problem is not there only for a STB screen, but also plagues the screens of mobiles and tablets.

Instead of an abstract small icon, the TV medium should have a more visually descriptive poster or a photograph. For providing intuitive ease in recognizing items displayed on a screen one has to ensure that there is no clutter of multitude of items, as human mind can only handle few things at a time. Furthermore, there should be a visible relation amongst the items displayed on the screen for allowing mind to grasp the details as groups of items.

TV is not a medium suitable for general purpose program, such as word-processing, database and spread-sheet – these require intensive involvement of the left mind and logical thinking – which becomes "work". The TV Applications (Apps), in order to be relaxing, need to deal mostly with playing of a multimedia item (including games). The navigation and playing can be mostly handled by the right brain, allowing the left brain to relax.

Each TV App. can be having a very different way of navigating. This would depend on the type of item the App is dealing with: audio, video, photographs, channels, radio, stored contents, network contents, DVD etc. Indeed, different application dealing with the same item such as audio may have a totally different approach for navigating. Each App. boasts its own distinct screen layout, littered with clickable menu item, all of which are subject to dynamic change with versions. A user has to get used to every new application, by unlearning some of the habits from a previous similar application which he had used.

All this is in contrast to the standard way of browsing HTML pages on a web-browser. Though here too, the organization of content can vary enormously. Some STBs indeed provide a web-browser based interface, and end up facing the problem of a remote based pointing device.

Many of the STBs have assumed that the user would have access to a manageable set of "wall-garden" content, whether channels or videos. Their navigation interface is simply not geared for allowing visual search amongst thousands to millions of items.

What is needed is a simple minded navigation interface which will allow a common way of

navigation through all the applications, Menus and even the Home screen – irrespective of the type of items being handled. This is what was achieved by a "windowing "system on a PC. The TV navigation task is though tougher, because "windowing" cannot be used due to its sophistication. Moreover, even the windowing systems don't prescribe any common way of handling content items. Although the mobile has simpler screen without windowing, it too doesn't have any standard for navigating within applications.

Standardization in the TV user interface is possible, if one realizes that the end objective of all the visual navigation is just the playing of a multimedia item irrespective of how it was fetched. One can generalize this experience to playing of multimedia entities such as photographs, picture books and RSS news items. One can generalize this further to playing of interactive items, such as Flash based applications and games.

It is desirable to have a common intuitive visual navigation interface, irrespective of which type of multimedia item has to be played. It is assumed that each multimedia player will require controls separate from that of the navigation interface. It is though desired, that the input requirements be met by the same remote as used for the visual navigation.

It is further desirable to have a common layout of the visual navigation screen, irrespective of the size and the resolution of the screen. Thus the user should feel familiar with the display (the mental image remaining the same), whether it is on a small 7" PAL TV screen, mobile screen or a large XVGA screen. The experience should be similar to zooming in/out of a map, depending on the available screen resolution.

The TV medium, like the PC medium, requires its own distinct User Interface for providing a standard way for input and navigation, across the multitude of multimedia applications.

5. User Generated Content

In today's world, there is a plethora of high resolution digital picture and even videos, taken from handy camera and mobile phones. The problem isn't any more in capturing of quality photos/videos - problem is in organizing them.

It is very easy to dump photos/videos in directories and then lose track of them. Most of the Apps and software also take the easy way out by just showing hundreds of miniature photographs of what has been dumped in a directory, rather than encouraging user to sort it out or arrange it logically.

Figure 7: Mobiles/Cameras increasingly being used for UGC

There are professional tools which can allow

organizing of multimedia data, but most of the users don't have the temperament or patience to use them. Any activity, such as organizing photographs, which gets postponed for a later date, ends up getting postponed for ever.

What is needed is a simple tool which allows both navigating through a list of dumped photographs, and organizing them in a relational hierarchy, which is best suited for retrieval of the same. As an item, can be located in more than one way, it should be possible to locate the same under various paths (without multiple copies). It should be also possible for a user to easily do some value additions, such as adding captions.

If the visualizing and organizing tools are different, then the lazy habits end up postponing the task for a later date. By combining both together, the visualizing tool itself ends up organizing too. Such is the need for a visual navigation tool. Empowering end-user for organizing and authoring is important in today's time.

Conclusion

The IT industry has today, shifted its focus to the TV. TV brands are bringing out what they claim as "Smart TVs" - these essentially draw their content directly from the internet. There is plethora of DTH, Cable, IPTV, OTT (Over-The-Top) boxes, which give a rich High Definition experience on the TV. Yet, the user remains confused amongst the myriads of remotes and Human Interfaces. This is similar to what happened in the pre IBM-PC era.

A user would like to have one remote, which can do it all. He would like to have one Human Interface, which will allow him to browse through and play all types of content. He would like to have one-box, which will be network agnostic. This de-facto box, would represent the "TV paradigm", and would get ultimately absorbed in the TV itself.

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Mohan Tambe obtained his B.Tech.(1980) and M.Tech. (1982) in the field of Electronics and Computer Science respectively from IIT, Kanpur. He is the recipient of the Distinguished Alumni Award, by IIT Kanpur in 2002.

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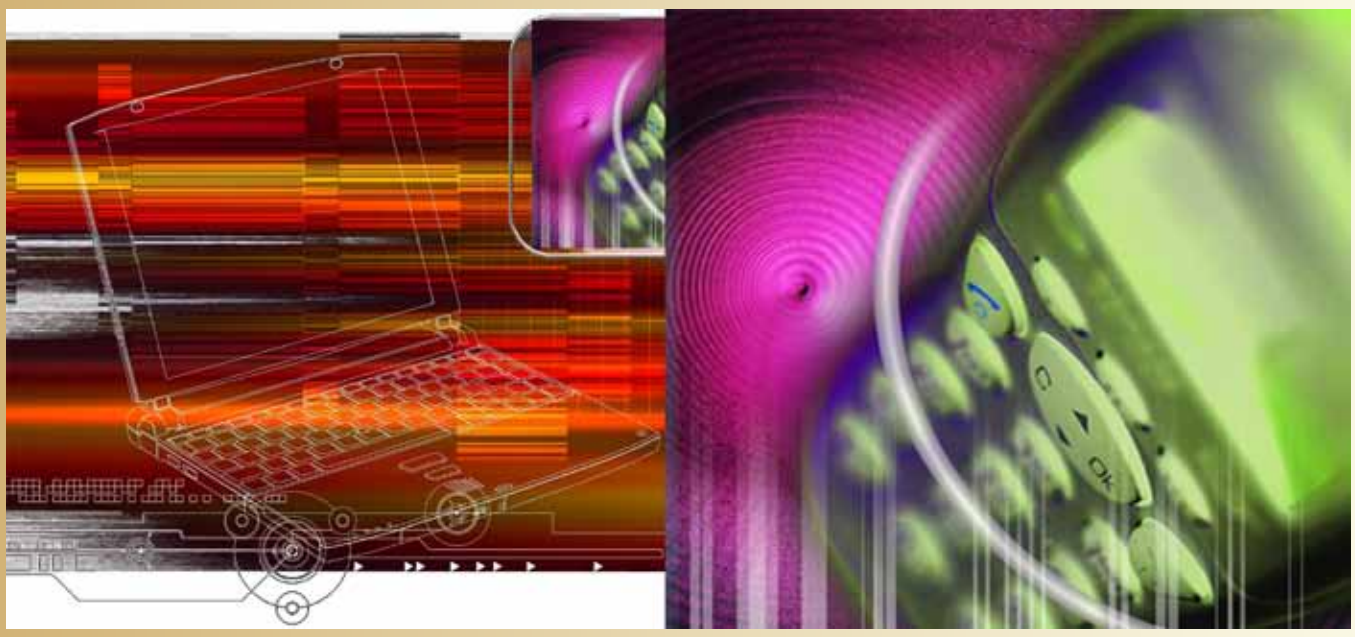

IOS 5, Android 4.0 and Windows 8 – A Review

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article

Abstract

This paper presents a brief review of three top mobile operating systems viz. IOS 5 from Apple, Android 4.0 from Google and Windows 8 from Microsoft. The salient key new features introduced in IOS 5 are also described in some detail.

Key words

Mobile Operating System, IOS, Android, Windows. Tablet OS, Mobile OS

1.0. Introduction

With introduction of iOS 5 from Apple, Android 4.0 also referred to as Ice Cream Sandwich from Googleand Windows 8 from Microsoft in the offing there are going to be three key playersin the mobile technology market capable of supporting tablet as well as phones. As per the September 2011

data from Net Applications, there is surge in demand for Android but Apple's iOS holds the lead among mobile platforms.iOSincluding all mobile devices, i.e., iPhone, iPod and iPad reached 54.6%market share of the market as compared to 42% a year ago. The percentage market share of Java ME [which is typically used in feature phones], Android, Symbian, Blackberry, Windows [including Windows Phone OS 7.0, Windows CE and Windows Mobile] and others was at 18.12%, 16.26%, 6.12%, 3.29%, 0.51%, 0.28% respectively as shown in figure 1.The results will, however, vary depending on which devices you decide to include in the comparison. For example, if we look at smartphones only then Android will be in the lead. But by including tablets in the mix, iOS may come on the top.

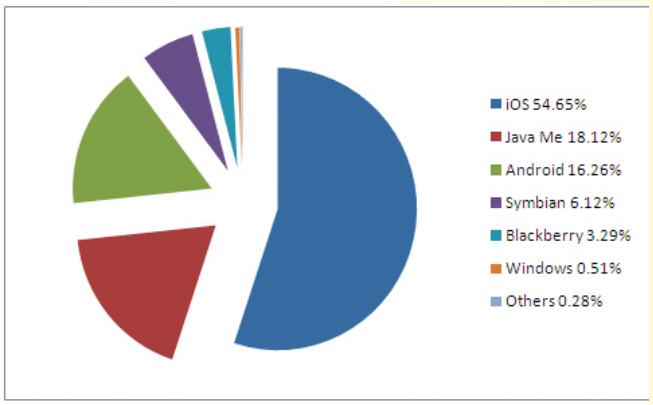


Figure 1: Market share of Operating System for mobile devices

Apple's iOS 5 claims several features which rivals do not have such as Newspaper/ Magazine Subscriptions and an Advanced Reminder System. In areas such as PC-Free Setup and Updates Apple has tried to match the competition. Apple's approach is to entice users through useful and creative services which many users don't even knowthat they want them but once they have they find it difficult to manage without them. A few services offered by Apple are listed below:

- With iOS 5, an iPhone can remind you to pick up the milk as you drive near the grocery store and also that May 20 is your fathers birth day..
- Newsstand app can deliver newspapers and magazines automatically.
- iMessages can send quick messages to other iOS users.
- Reader can render Web pages in an easy-to-read format with no clutter,
- Siri – the virtual assistant – enables telling phone what to do and get feedback, e.g. the user can tell Siri they want to go on a date consisting of an Italian dinner for two ....

In other words, Apple handles things so you don't have to worry about them. iCloudenables all these services together and keeps all your iOS devices in Synch.

Google's Android 4.0 has improved multitasking, resizable widgets, rich notifications and customizable home screens, and increased interactivity to a much deeper level. Google's Android features and concepts are useful in ways that iOS is not e.g.

- turn-by-turn directions,
- resizable widgets,
- extensive voice commands,
- provision to attach files to an e-mail,
- creation of shortcuts to contacts, and
- Navigation instructions and bookmarks on the Homescreen.

Android 4.0 also was announced on October 19, 2011. It includes Honeycomb features to smartphones and added new features including facial recognition unlock, network data usage monitoring and control, unified social networking contacts, photography

enhancements, offline email searching, and information sharing using NFC. Android's integration with social applications is miles ahead as compared to Apple's Twitter integration within iOS 5. Tap the "share" button in an Android Web browser and you'll see options for Twitter, Facebook, Google+ or any other app on your phone that accepts shared URLs.

The most probable feature of Windows 8 is its short boot time of about 6 seconds. As per Microsoft, Windows 8 will reduce the boot time of Windows 7 by at least 50%. This will be most welcome feature particularly for the mobile devices.
In this paper, we review the new operating systems and compare them on certain criteria, from user interface to ease-of-use, to find the positives and negatives of their designs followed by a brief review of iOS 5 and a comparison of the three OS.

2.0 A unified OS for Tablets and Phones

IOS 5, Android 4.0 and Windows 8are unified OS as they support both phone and tablets.
MicrosoftWindows 8 will be a one-stop solution for smartphones, personal computers and of course, tablets.

So far Android 2.3 Gingerbread is for phones and Android 3.0 Honeycomb for tablets. Android 4.0 will be a single OS for both kinds of devices except personal computers, with the user interface adjusting to form factor of the device.

With unified codebase, Google developers will be able to develop apps that will be compatible across all Android-based devices - smartphones or tablets.This may lead to increase in the availability of applications on Android Market Place thus narrowing the gap with Apple App Store.

It's a known fact that an open-source operating system is a great advantage. Like iOS, Windows Phone 7 [Windows 8 too in all probability] lacks this feature that gives the user "admin" capabilities, such as wallpapers to custom notification vibrations; open-source gives the "super-user" total control.

3.0 User Interface [UI]

Apple is back with the 4x4 icon display, but with customizable backgrounds and folders, and the look is really what the user makes of it.

Google offers colors against black which brings vividness and contrast to the notification bar, menus, and other parts of the UI. Android 4.0 is likely to have a special holographic UI to provide rich experience and a better application framework. In Android 4.0, area at the bottom of display is referred to as the System Bar and the buttons are called virtual buttons. These buttons are present "across all apps".

Windows 8 UI appears to have been redesigned mainly to make it more tablet- and touch-oriented. It has a live-tile-based home screen comprising of beautiful and colourful boxes and rectangles similar to that of Windows Phone 7 and these tiles will display information from news sites, social networks, and other services in real-time directly on the home screen.Windows 8 will not be offering widgets in their "metro-style" UI.

Smoother UI is a must for every OS to be user friendly and on this score Android will have an edge over others.

4.0 Architecture

Apple's next-generation mobile devices powered by iOS 5, including the iPhone 4S, iPad 2, and iPod Touch, will be run on a SoC processor called the Apple A5 and a graphics processor up to nine times as powerful as its predecessor.

Google's Android OS is referred by Google as a software stack. Its kernel is based on Linux version 2.6 OS. Android's libraries include the media framework library which supports playback and recording of audio, video and picture formats, a three-dimensional acceleration library and a Web browser library. The runtime layer includes a set of core Java libraries. The application framework includes programs that manage the basic functions like resource allocation, telephone applications, switching between processes or programs and keeping track of the phone's physical location.

Google's mobile devices will be powered by Android 4.0 system and use Google Nexus 3, Google's reference handset, with 1.2 or 1.5GHz processor (or a quad-core Kal-El processor), 1GB of RAM, a big display, 1080p video capture and an ultra-thin body.

Microsoft traditionally uses Intel for its chips, but Windows 8 promises to run on new "system-on-a-chip" SoCprocessors made from ARM Holdings - the world's leading semiconductor intellectual property. Chips designed using ARM technology are optimized for tablets and mobile devices, and are highly energy efficient.

While the processors that run these platforms are comparable in speed, ARM-based Windows 8 tablets won't be able to run apps built for Windows 7 jettisoning any chance for cross-platform compatibility.

5.0 Default Browsers

Safari gets an upgrade on iOS 5 with a new way to browse pages and save articles. The Mobile Safari also enables users to email story content together with link and if the user so desires. The Safari Reader will get rid of reviews, ads and other unnecessary content on the page to enable user to dive right into essential stuff.

The new version of the browser with Android 4.0 will continue to be cloud-connected and can synch Google Chrome bookmarks from your account connected on your desktop. You can set Website preferences for each browser tab, and you can save entire pages for offline reading. A visual list is available to see saved pages, browser bookmarks, and history.

Windows 8 tablets will enjoy the fastest experience on Internet Explorer to-date. To keep things looking pretty and consistent, Microsoft is developing a new Metro-style version of Internet Explorer that will likely further leverage the use of Microsoft's search engine, Bing.

6.0 Typing

For iPod, iOS 5 offers a split keyboard functionality enabling typingas ease. However, when keyboard is split the keys become iPhone-sized and tapping on them becomes harder.

There's a new soft keyboard in Android

4.0 too looking similar to the Gingerbread keyboard, the improvements mostly sitting on the inside.

Windows 8is likely to offer a myriad of typing solutions, including a full-sized touch keyboard that can be split in half, making it possible for users to type with their thumbs a feature already introduced in iOS 5.

Windows ability to plug in a keyboard and mouse should make an easy transition for PC users.

7.0 Social Applications

For social media fans one of the best reasons to upgrade to iOS 5 is its tight integration with Twitter and support for Twitter from the Photos app, Maps, YouTube and Safari. The App Store now has new apps such as The New York Times app and the new iTunes Movie Trailers with native support for Twitter.

A new People app in Android 4 allows user to link together social groups, profiles, and contacts in one place. This integrated app enables use of Google+ outside the Google+ app itself. You can create your own "Me" profile comprising of contacts, each profile photo tapped displays Quick Contacts, shortcuts to phone numbers and text messaging, and elements inside social networks.

Windows 8 will not only show Facebook and LinkedIn contacts in its People contact book but also let you anchor people on your Start screen, see status updates and share across multiple social networks from all over the OS. Microsoft has integrated Facebook and Flickr at the core for photos, letting you see images stored on your accounts, other peoples' accounts, and up on your own SkyDrive cloud storage account, including your local photos.

8.0 iOS 5 - A Brief Review

We briefly describe the top 12 features of iOS 5.

(i) **Notifications:** Apple now gives you Android-style notifications which come up at the top of the screen and don't block you. They show up on lock screen; if you swipe any it'll take you directly to the app.
   a. You can configure Notification Center easily by little tweaking in the Settings.
   b. You can also change the way apps notify you, e.g. Notifications appear as a banner at the top of the screen rather than interrupting you with popping alert window.

(ii) **iMessage:** It is a new messaging [chat] service to easily send unlimited text messages, photos, videos, locations and contact information via Wi-Fi or 3G between iOS users and supports iPhone, iPad, and iPod touch. All iMessages are automatically pushed and synced to all your iOS 5 devices.
   a. If you're sending a message to someone who's registered their phone as an iOS device, the green bubbles go blue and your message is sent for free via the internet rather than the networks' SMS/MMS gateways.
   b. You get delivery receipts and optional read receipts. Messages are securely encrypted end-to-end. Of course, it won't work if you don't have a data signal.

(iii) **Reminders:**Reminders enable you to organize your life in to-do lists. This is tasks management app that lets user create and group tasks together. This feature enables you to set location-basedreminders; however, there areonly two ways to enter locations: by using your current location, or by choosing an address from Contacts.Reminders set up a geo-fence for when you arrive at or leave places. The reminders will be alerted based on due dates and also locations and come as notifications. All reminders sync with iCal, Exchangeand iCloud for Mac, PC and iOS5 users respectively.

(iv) Twitter integration: iOS 5 makes it even easier to tweet from your iPhone, iPad, or iPod touch. Sign in once in Settings and with this Single sign-on you can begin tweeting directly from Twitter-enabled apps, including Photos, Camera, Safari, YouTube and Maps. Contacts have also been integrated with Twitter. You can even add a location to any tweet, no matter which app you're tweeting from. Unfortunately, there is no Facebook integration.

(v) **Newsstand:** This app organizes your subscription to magazines and Newspapers directly from here.There's also a new place on the App Store just for newspaper and magazine subscriptions. It is a single location on your Home screen. New issues are downloaded in the background — complete with the latest covers. It emulates as if the paper is delivered to your front door.

(vi) Camera: Now you cancapture precious moments instantly by launchingCamera app from lock screen by double pressing the Home button, and a tap on Camera icon beside the unlock bar. iOS 5 introduces the long overdue feature which uses the volume-up button to quickly snap a photo instead of tapping on snap button on screen.

a. You can add optional grid lines to help line up objects pinch to zoom, put your finger down and hold it on a given location and it'll set auto-exposure/auto-focus lock.
b. New Camera app also enables you to Features such as auto enhance (using iPhoto) function, crop, rotate, remove red-eye help you make your photoslook better and you also can arrange them into albums right on the device to share them on the go.

(vii) **Game Center:** It has about 67 million signed in users. With iOS 5, you can get your game face on with even more Game Center features. You now can add profile photo, see your friends, size up an opponent on the spot by knowing his achievements points, meet your match with new friend recommendationsbased on the games you play, and game recommendations. You can also buy games from within the Game Center.

(viii) **Safari:** With iOS 5 you get more browsing features to iPhone, iPad, and iPod touch. Now on iPad you get full-tabbed browsing enabling you to easily switch between sites. The new Reader in Safari makes everything nice and easy for you to read. It strips out ads and unnecessary page matter to deliver a clean, clear reading environment. There is the Reading List, which enables you to save pages to read later and through iCloud keeps all your devices in synch and

you can read stories at time of your choice. You can now browse without the device saving any histories, cookies or logs. The private browsing enables protecting private information and blocking some websites from tracking your behavior. You can turn on Private Browsing by getting intoSettings and selecting Safari.

(ix) **Mail:** iOS now supports HTMLrich-text formattingand a new formatting bar with bold, italics, underline and indention, drag address field to rearrange name, full-text search, flag messages, add and delete mailbox folders on the fly and for iPad you can swipe to get to inbox in portrait orientation.New mail enables you to search in the body of messages. If you get a free email account on iCloud then your mail stays up to date on all your devices.

(x) **AirPlay Mirroring:** Wirelessly display iPad 2 screen to HDTV screen through Apple TV.

(xi) **PC Free:** One thing that prevented the iPad from being a genuine computer alternative was the need to connect it to a computer. That's gone: you can set up your iOS 5 device without going near a PC or Mac, and you can download software updates over the air. If you do have a computer, though, you can finally sync without cables: whenever your device is charging, it'll look for your computer and sync wirelessly with iTunes.

(xii) **iCloud:** a free facility - for the first 5GB at least - stores all your content through wireless backups and does automatic synchronization between your various devices. For example, you take a picture on your iPhone, it is saved to your cloud andiCloud pushes it to all your devices without any intervention from you.

9.0 Comparison of iOS 5, Android 4.0 and Windows 8

Table 1 below shows a comparison between iOS, Android and windows.

Table 1 Comparison between iOS 5, Android 4.0 and Windows 8

Features	iOS 5	Android 4.0	Windows 8
Roaming user profiles/accounts	no	no	Yes/Uses Windows Live Id
Home Screen	shows row upon row of icons	Holds apps, widgets (which are now resizable as they have been in Honeycomb), and app folders.	Easily customizable tiles actively stream data and updates in a widget-like fashion.
Widgets	Does not support Widgets. See *1	Let users populate the home panels with dynamic content that changes and/or updates automatically.	Does not support Widgets.
Browsing	HTML 5		HTML5
Settings	Allow many app-specific changes can be made	New data Usage function See *3	"Control Panel" follows a similar trend focusing mainly on system configuration
Lock Screen		Enables both unlocking and accessing of the camera app. Notifications window is also accessible from the lock screen. When you get a phone call you can now respond by text message without unlocking. To unlock there is face recognition and back up is pin as usual.	It has a huge advantage, because of ability to run both desktop OS and Metro-style-Tablet
Adobe's Flash	No	no	Yes
Local File support	Users can sync files from the device to a computer, but the process is awkward. iCloud helps to ease this except at locations with no connectivity. See *2		Microsoft's main goals in redesigning the Windows 8 file management features is to make them clear and concise for the touch enabled platforms.
Voice Actions Google supports voice search in the official Google Search app for iOS.	Siri brings much talked about voice functionality with feedback.	Every text field is voice-enabled, user can dictate the text into any place it is possible to type without the need for a third-party app. See *4	WP7.5 packs has voice control functionalities see *5
Communications	Wi Fi but No Near Field Communications [NFC]	Android beam See *6 Wi Fi Direct and Bluetooth HDP	NFC is supported See *7

Notes in Table

*1 The notification system comes close to widget zone with its live stocks and weather updates, but user can't be place them where he wants and are only live in the notification shade.
*2 Apple's view: it has spent 10 years attempting to kill off the need for file management tools.
*3 Settings now has a Data Usage function enabling user to show total data use on each kind of network, mobile or Wi-Fi, plus the amount of data being used by each running application. You can set warning levels on data usage, disable mobile data altogether, and control apps individually for data.
*4 The new voice input engine in Android 4 lets user dictate the text they want, for as long as they want. They can speak continuously for a prolonged time, even pausing for intervals as needed.
*5 Windows 8 will enable you to call contacts, open your calendar, search Bing, start apps, control settings and text friends, all with the power of speech. We will know more only when it is launched.
*6 You can connect two NFC-enabled devices to "beam" apps, such as contacts, music, and videos by simply tapping the two devices together. Android Beam opens a new pathway for developing Innovative Apps say, to trade game scores or transferring in-game data or to include many other functionalities limited only by imagination.
*7 NFC in Windows 8 will include: device pairing, Data sharing (e.g. digital business cards), Device control transfer (e.g. transfer a video call from a tablet to another NFC-enabled device),Tag reading

10.0 Application Store

Today Appstore of a company - including variety of apps it contains – has become a deciding factor in making its products popular. While Android and iOS boast close to 500,000 apps each, the Windows Marketplace has not crossed the 10,000 mark

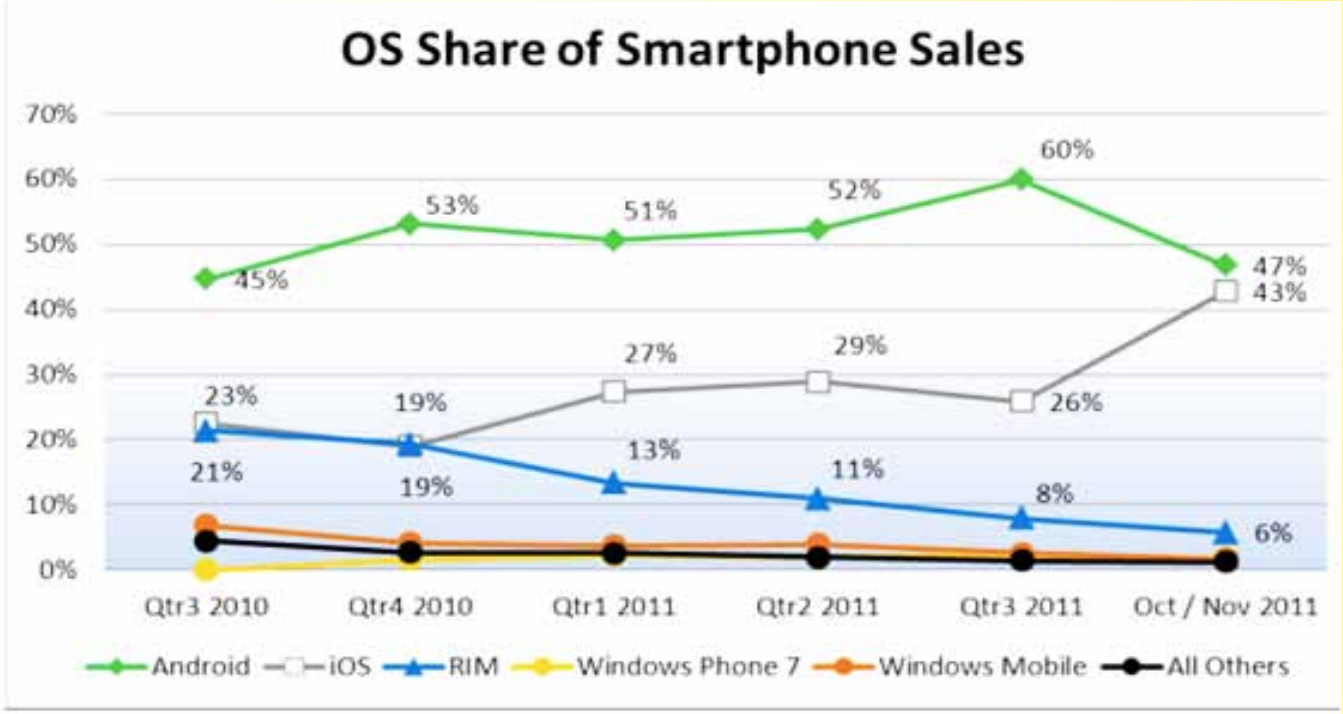
11.0 Conclusion

iOS 5 has umpteen numbers of new features to make your iPod, iPhone, iPad feel shiny and new all over again. iOS 5 is solid upgrade to an excellent OS although many features are effort by Apple to catch up with the competition.

It is an established fact that Google Android OS is the next best mobile/smartphone OS in the world today after Apple iOS. Hence, Ice Cream Sandwich already enjoys a fair bit of credibility. On the other side, it is not the case with Windows 8. It is expected to be released sometimes in 2012 and still has to prove its mettle in tablet/smartphone segment.Figure 2 shows OS share in mobile market till Oct./ Nov. 2011.

Microsoft business appears to be based on yesterday's platforms as there is a positive drift from PCs and notebooks towards mobile platforms. "Their products are fine on notebooks. But on phones and tablets, they're in bad shape," says Michael Silver, an analyst at Gartner, a technology research firm.

From the users' perspective besides the features in the OS, the weight of the mobile device and battery life - on which OS runs - is of utmost importance. If every Windows 8 tablet will continue to weigh two pounds and last less than five hours on battery life, all the goodness of the OS will be lost on the consumer.



Source: The NPD Group, Consumer Tracking Service, Mobile Phone Track

Figure 2.

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YOUNG ENGINEER AWARD 2012

IEEE DELHI SECTION had introduced YOUNG ENGINEER AWARD couple of years ago. Accordingly, nominations for YOUNG ENGINEER AWARD 2012 are invited as per the notification given in hereby.

Last date of receipt of nominations for this award is June 30,2012. Please get in touch with Dr. V.R. Singh, Chairman, Awards and Fellow Nomination Standing Committee for further details.

Auto Pilot for Car using Fuzzy Logic and Laser Scanning Radar Sensor

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article

Abstract

This paper describes a fuzzy logic based approach to create an auto pilot software for the car. The car gathers knowledge of its surrounding via the use of LIDAR sensors (Light Detection and Ranging). The data is then fed to a decision making unit based on fuzzy logic. For all the development and test purposes, Virtual Reality is used as the simulation platform.

Key words

Auto Pilot, Autonomous Navigation, LIDAR, Virtual reality, Fuzzy Logic, Simulation

1.0. Introduction

With advancements in the field of computational intelligence, computers are gradually replacing the work that previously required human expertise. This has resulted in the activities becoming more time efficient and better managed; at the same time freeing up the human operator to invest his resources in other meaningful pursuits. The paper is aimed at using computational intelligence to build an auto pilot system[1] that will be able to maneuver the vehicle on road, in real time. The system is based on services of existing hardware that is available to the industry and is being currently used by auto majors. The software has been built upon the hardware layer [2-7], such that the services of underlying hardware are being assumed by the software in decision making. The software uses fuzzy logic as the main decision making unit.

2. Problem Formulation

To control the trajectory of the car, two variables throttle are used to accelerate or decelerate, and steer, to turn the car. Four LIDAR [8] sensors are assumed to be positioned respectively in the front, left, back and right.

The four sensors sense the surrounding vehicles and objects, and then generate signals according to proximity, in range 0 and 1, which are used by the decision making fuzzy logic. The auto pilot software sits in the vehicle as follows:- LIDAR sensors enable visual scanning of the surrounding and thus, help determine the position and proximity of any obstacle.

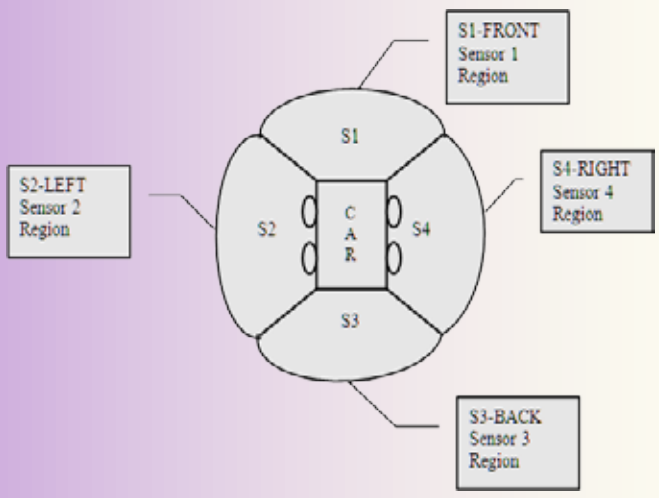

Figure 1: Placement of sensors

3. Fuzzy Logic Motion Control

Fuzzy Inference System has been used for driving the car as it has the inherent ability to evaluate conditions and arrive on results, on basis of inputs that are partially true and partially false, for a particular criteria or rule.

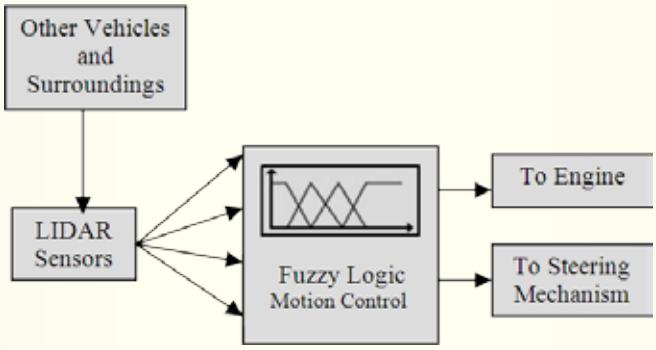

Figure 2: Conceptual Schematics

Coupled with the parallel evaluation of rules that allow to maneuver the vehicle with regards to all the inputs simultaneously, this paradigm of programming enables to lay the program in form of simple rules that could be linguistically described with ease, as against other computational intelligence techniques such as artificial neural networks, which need to have pre-collected data that has to have all the features one needs the system to exhibit, or others where the program has to be hard-coded to encompass all possible cases.

Fuzzy logic enables human like control of the vehicle that seems more 'natural'. And so on similar lines, the rules of the system are formulated based on simple observations of avoiding collision with obstacle by applying brakes, moving away from it, or accelerating. For example, if there is a vehicle that is speeding up from behind, then the fuzzy system will evaluate whether there is any other car in front, if yes then is it near or far, is there any vehicle near to the right or not, is there any vehicle near to the left or not. Now all the above conditions are evaluated simultaneously to obtain a feasible throttle value, i.e. whether to accelerate or decelerate, and a steer value, i.e. to steer left or right or maintain current direction.

4. Simulation

Virtual reality is used as the simulation platform to carry out the development and testing of the program. A virtual world was created, with roads and other cars besides the one being controlled by fuzzy logic.

The sensors are simulated by calculating the difference between coordinates of the car and other vehicles which would be in the detection range of sensors in the real world. The demarcation of road boundaries in the real world could be painted with a specific color that can then be recognized with the help of LIDAR visual scanning.

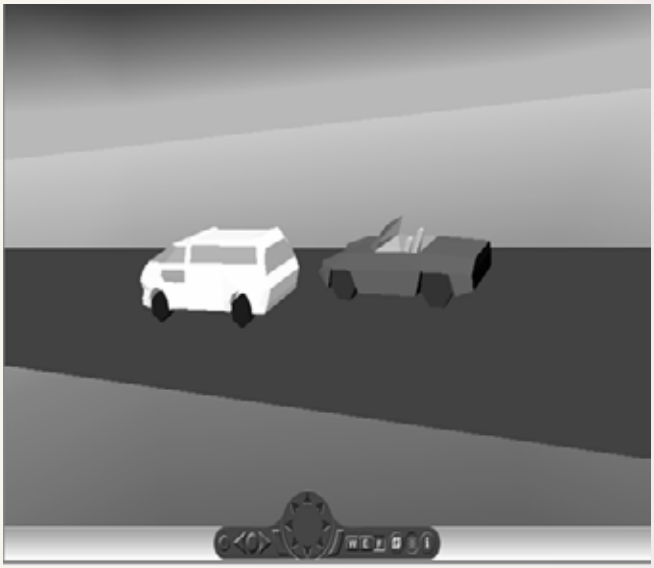

Figure 3: Virtual world for simulation

5. Results

Simulated study is conducted to affect basic overtaking and collision avoidance in presence of one other car and are shown in Figure 4 (a & b).

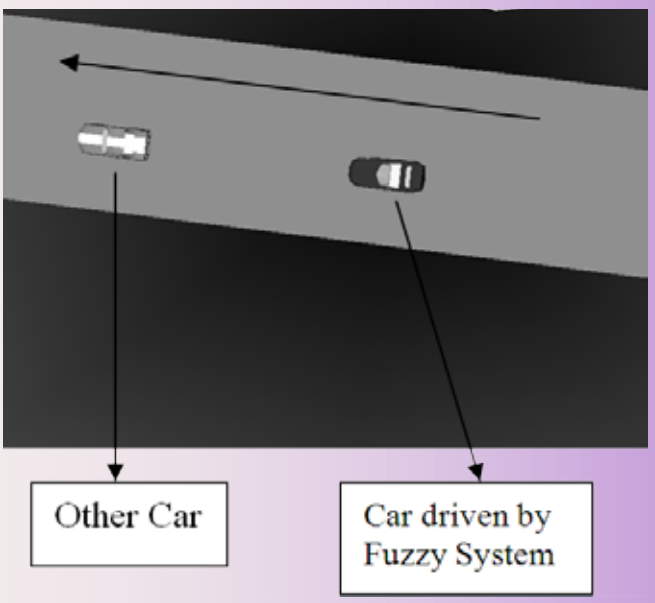

Figure 4 (a): Avoiding collision with car in front

The axis alignment is such that the cars are moving in positive z direction, and the direction perpendicular to it, on the plane of the road is positive x to the left of cars. The scope in figure 5 (a & b) show the difference in X and Z.

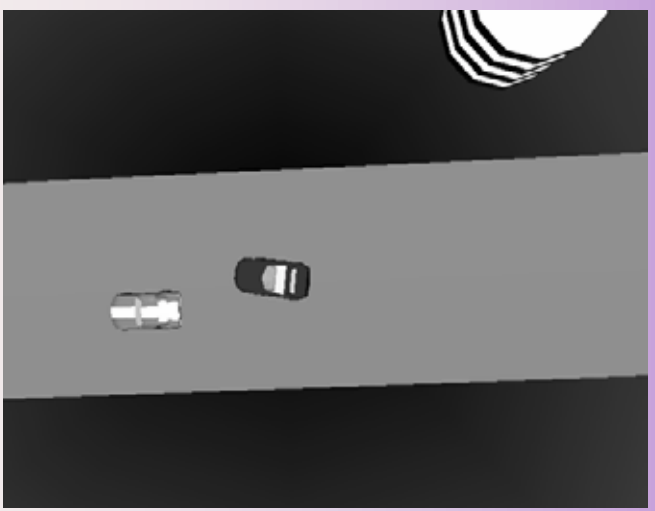

Figure 4 (b): Avoiding collision with car in front

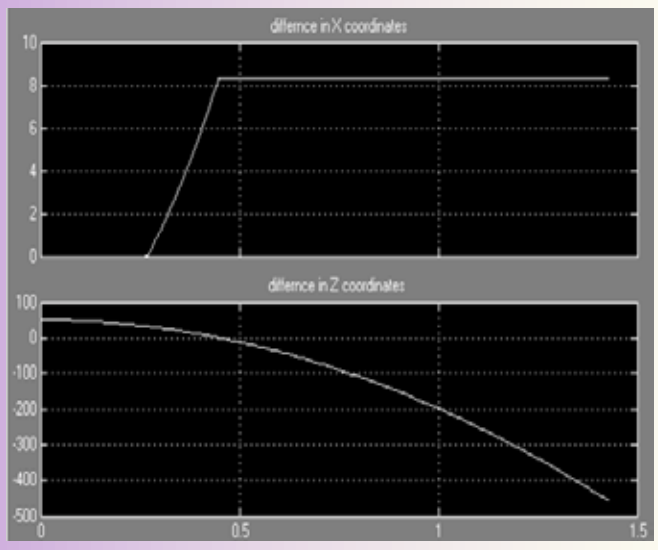

Figure 5 (a): Scope Values

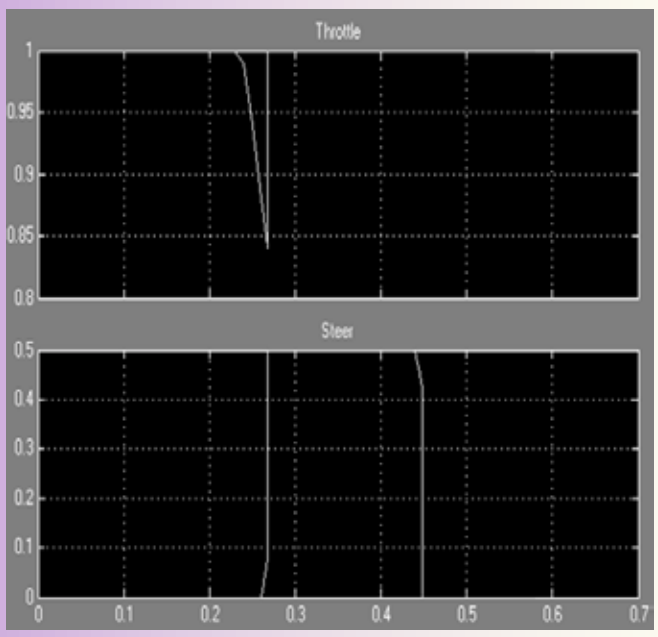

Figure 5 (b) : Outputs from Fuzzy Logic Motion Control

coordinates varies with time. The difference in coordinates is calculated by: (coordinate of the other car – coordinate of fuzzy car in both X and Z direction). Initially when other car is in front of fuzzy car the difference in Z is positive and when fuzzy overtakes other car the difference becomes negative.

For difference in X, initially fuzzy car moves straight for some time then after it senses other car in front it moves to right direction increasing the difference in X and when it completes the overtaking it maintains its position in X.

Scope in this case shows the throttle and steer output variables. Initially when fuzzy car senses no other car in front then throttle is maximum i.e. 1 and steer is 0. After some time when front sensor senses other car the throttle output reduces and in order to overtake the other car steer increases to turn the fuzzy car in right direction. Once overtaking is done the fuzzy car returns to its original orientation and speed as shown.

The turning in simulation is implemented by mapping the steer output between -90 to 90 degrees and then taking the sine of the current velocity to get the velocity in direction of turning.

Another test cases [see figure 6 & 7] are where the car avoids collision with two other moving cars on road. This result is also a generalized case for several cars on a real world road.

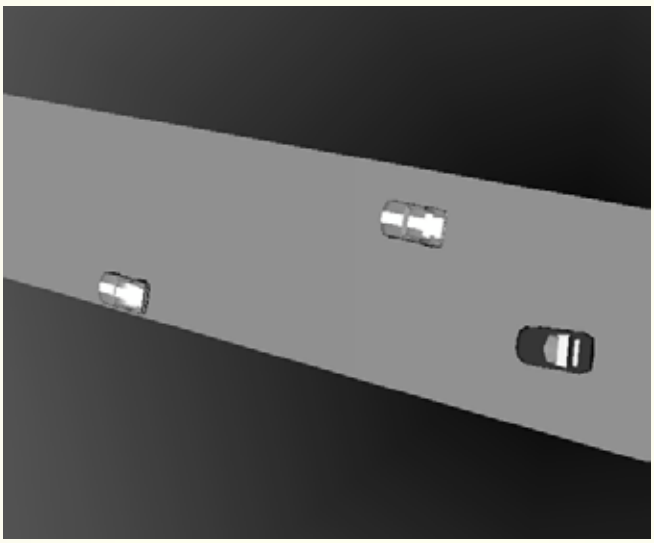

Figure 6: Car beginning to avoid collision

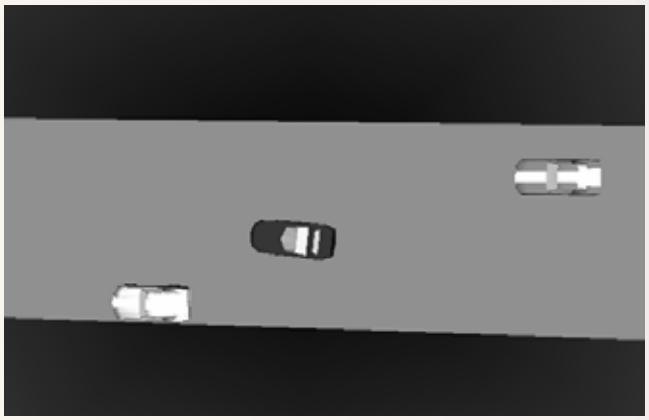

Figure 7: Car maneuvering among two other cars

Conclusion

This paper presented a new approach to making auto pilot for cars that mimics human driving using fuzzy logic. It also used virtual reality platform to simulate and test the program successfully. The hardware services that are assumed by the program as sensors in simulation are to be employed by the use of LIDAR sensors in real world, thus resulting in a practical implementation.

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A Computational Study to Detect Pulmonary Edema Using Electrical Impedance and Anthropometric Parameters

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article

Abstract

Variations of electrical impedance of various parts of human body are well known. Fluctuations in the electrical impedance of human thorax are synchronous with both respiratory activity and also with the cardiac cycle. One of the major life threatening diseases is "Pulmonary Edema" which need special attention in the area of clinical diagnosis is focused in this paper. A computation based diagnosis of this complication is being reported. This study is based on the electrical impedance and anthropometric parameters. A user friendly software based approach is reported here for quantifying the intrathorasic fluid accumulation (IFA). A curve reported by Khan et al relating percent control (PC) and intrathorasic fluid volume (IFV) is used to derive a simple equation, which is helpful in detection of IFA. The PC is equal to the ratio of measured transthorasic electrical impedance (TEI) to the predicted TEI multiplied by 100. The entire computation based technique is able to detect the quantity of fluid which is responsible for the disease. The results obtained by the computer based system verify and validate the research and development work done by other scientists during 1977 till now.

Key words

Pulmonary Edema, Anthropometric Dimensions, Transthoracic Electrical Impedance, LabVIEW.

1. Introduction

Bioimpedance monitoring is an emerging tool for biomedical research and for medical practice. Electrical bioimpedance is defined as the measurement of the electrical impedance of a

biological sample. Different bioimpedance monitoring is being recommended for a variety of clinical applications, such as aerospace medicine and diagnosis, body composition analysis, respiratory disorders/ cardiac contractility and sports medicine etc. Impedance plethysmography is one sub division of bioimpedance analysis. Impedance plethysmography technique has been extensively used for monitoring intrathoracic fluids other than blood. In the present work the TEI has been utilized to predict the intrathoracic fluid volume. The electrical impedance of a living tissue can be continuously measured in order to determine its patho-physiological evolution. Tissue impedance can be measured with tetra polar electrodes in which the current is injected with a couple of electrodes and the resulting voltage drop is measured with another couple of electrodes. This method has been used for more than a century (Geddes 1996) as it overcomes the drawback of large parasitic impedances of twin lead system. Rigid band electrode system has been reported for tetra polar electrical impedance plethysmography (EIP) of a finger (Leslie D 1976). Fluctuations in the electrical impedance of human thorax are synchronous with both respiratory activity and also with the cardiac cycle. EIP is used to estimate the volume changes in different parts of body due to pulsation of blood. A quantitative measure study of pulse volume is demonstrated with the help of EIP by J Nyboer [1950]. Changes in impedance of the thorax with cardiac activity, are produced not only by single source, but also influenced by changes in the geometry of the thorax.

1.1 The Disease

Pulmonary Edema, a condition in which fluid accumulates in the lungs. This is due to build-up of fluid in the spaces outside the blood vessels of the lungs. The life threatening type of pulmonary edema occurs when a large amount of fluid suddenly shifts from pulmonary blood vessels to lung. It can also be the first sign of coronary heart disease and may lead to heart attack. Successful attempts have been made to investigate the chest by measuring TEI. Leupker et al and Roy et al demonstrated a change in TEI with the variations of IFA.We made use of TEI, as this method proven to be accepted for monitoring and detection of Pulmonary edema. Earlier, scientists derived and developed the relations to predict quantitative values of fluid volume in the lungs by using long and cumbersome computer programs. In the present work these relations and data are used for simple, better and faster results. The results are obtained within fraction of seconds by using new software Lab VIEW.

1.2 Software Description

In this paper advanced and fast software of National Instruments (www.ni.com/labview) is used. The hardware used is a laptop/ personal computer which should be able to configure the latest software Lab VIEW. This integrated software and hardware offered by National Instruments provide excellent applications in various areas. In this work the application run on P4, 512 MB, and 80 GB hard disk with a dual core processor. The used version is

LabVIEW 8.5. Using LabVIEW's graphical programming it's easy to approach for a variety of engineering and science disciplines including control and embedded design, signal and image processing, instrumentation, biomedical, communications, circuit design

and many more. The NI Lab VIEW can be considered as the best computing platform for research, logics and industrial consultancy. In the field of Bio Medical Engineering.

2. Materials and Method

Extending and modifying the study of Khan et al and by reapproximating/ redrawing the curve reported by them the volume of fluid is obtained. In the study of Khan et al, the TEI of subject is measured by placing the electrodes at anatomical landmarks. Using the modified semiemperical relationship to determine disease free TEI, Zp (predicted impedance) is computed. The equation of the curve given by Khan et al, has been derived by software computing and the same equation along with human thorax dimensions are responsible to give the quantity of intrathorasic fluid (IF). Since the object of the study is to predict pulmonary edema with the existing relations of human thorax and a well established and tested curve shown in Figure 1 given by Khan et al, it is also necessary to test the developed software with some real data. For authenticity of the system the developed computer program/software has been checked on the data reported by Khan et al. In broad the required materials are the curve between TEI control percentages and volume which is in ml/liter (IFV vs. PC), the equation of the curve, the relationship between predicted and measured impedances and human thorax dimensions.

The hardware used is a laptop/personal computer which should be able to configure the latest software Lab VIEW. This integrated software and hardware offered by National Instruments provides excellent applications in various areas. Using NI Lab VIEW graphical programming its easy to approach for a variety of engineering and science disciplines including control and embedded design, signal and image processing, instrumentation, biomedical, communications, circuit design and many more. The NI Lab VIEW can be considered as the best computing platform for research, logics and industrial consultancy. In the field of Bio Medical Engineering Lab VIEW already proven a number of tasks like; fetal acquisition and analysis system, simulation of biological neuron models, ECG signal processing and analysis, brain cell function analysis, development of real-time functional stimulation system etc.

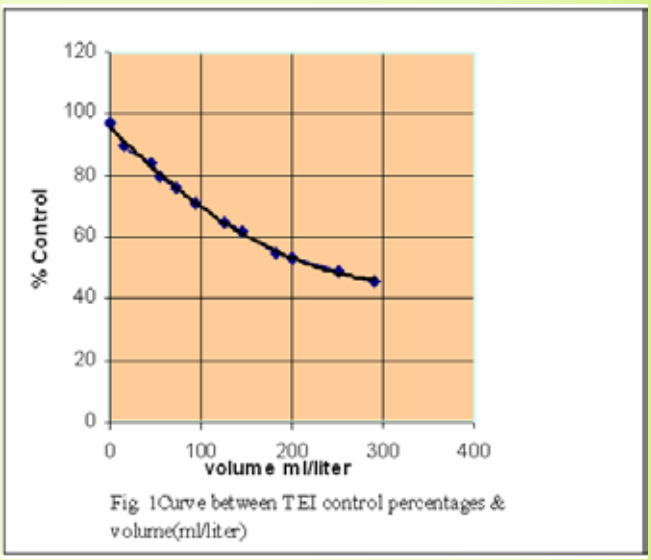

Figure 1. Curve between TEI and pulmonary edema fluid volume

In the very first step, the curve between TEI control percentage vs. volume given by Khan et. al has been looked up to get numeric values of both the parameters manually. From the curve twelve such values are considered and for accuracy of diagnosis of the disease the curve is redrawn for fair study. In the next step the equation of the drawn curve is obtained, which is a second order equation,

given by
vol = 0.0005PC2 - 0.3066PC + 95.982 (1)

where, vol is the volume of the fluid present in the lung in ml/liter, PC is the control percentage of measured impedance (Zm) and predicted impedance (Zp), which is determined by the given relation,
PC = (Zp-Zm/Zm) *100 % (2)

And for determining Zp the relationship of human thorax dimension and Zp reported by Khan et al (1995) is used in modified form,
Zp=5.8+66 L (1+r2)/ r (P1+P2)2 (3)

Where, L is the difference between inner electrodes in meter, r is the radius of thorax in meter, P1 is axillary chest girth in meter and P2 is xiphisternal chest girth in meter.

Finally for finding out the fluid volume two VI's have been made one is Percent Control Calculator which needs the values of parameters r, L, P1, P2 and Zm and the other is PC to volume converter.

To authenticate the used software previously reported data [Khan et al] is utilized. The TEI was measured with the help of tetra polar electrodes in that technique. The predicted impedances were found by anthropometric measurements and their relations manually. But in this reported method the measured values of impedances are used and the new values of predicted impedances are calculated with the help of computer. To prove the accuracy of the developed computer program the same set of data is being utilized.

Results and Conclusion

The dimension of thorax and measured impedance data values are shown in Table 1 and the volume of edema fluid have been calculated for ten subjects.

Subjects	Thorax Dimensions			
age/ gender	radius [r]	length [L]	girth [P1]	girth [P2]
28/M	1.32	0.21	0.78	0.74
7/M	0.175	0.17	0.56	0.54
38/M	0.285	0.285	0.87	0.83
21/M	0.23	0.23	0.875	0.75
70/M	0.26	0.26	0.85	0.76
24/F	0.27	0.27	0.87	0.745
20/F	0.22	0.22	0.8	0.71
6/M	0.17	0.17	0.55	0.535
17/M	0.26	0.26	0.81	0.69
25/F	0.215	0.215	0.745	0.635

Table 1. Dimensions of thorax with respect to age/gender

Measured Vs. Predicted impedance			
age/sex	Z_m	Z_p [present]	Z_p [previous]
28/M	30	30.26	26.7
7/M	43.5	43.22	40.8
38/M	32.5	32.54	29.2
21/M	30	30.44	26.9
70/M	32.2	32.54	29.2
24/F	33.4	33.27	30
20/F	31.6	32.229	28.5
6/M	45.1	44.027	42.2
17/M	37	36.866	33.9
25/F	30.6	36.53	33.2

Table 2. Difference between existing and present value of Zp Vs. Zm

The transthorasic electrical impedance of 10 normal subjects (7 males and 3 females) of different ages span (6 years to 70 years) are calculated and compared with the previous results given by Khan et. al with the new results. It is observed that the predicted values of the TEI are much closer than the measured values TEI in the present work shown in Table 2. This indicates the validity of the prediction relation equation (3); hence we can conclude that the reported approach is more accurate than the existing one. As the measured and predicted impedances are very close to each other and calculations are fast, the technique can be used as a routine clinical tool furthermore the amount of IFA i. e fluid volume can also be closely approximated.

AUTHORS

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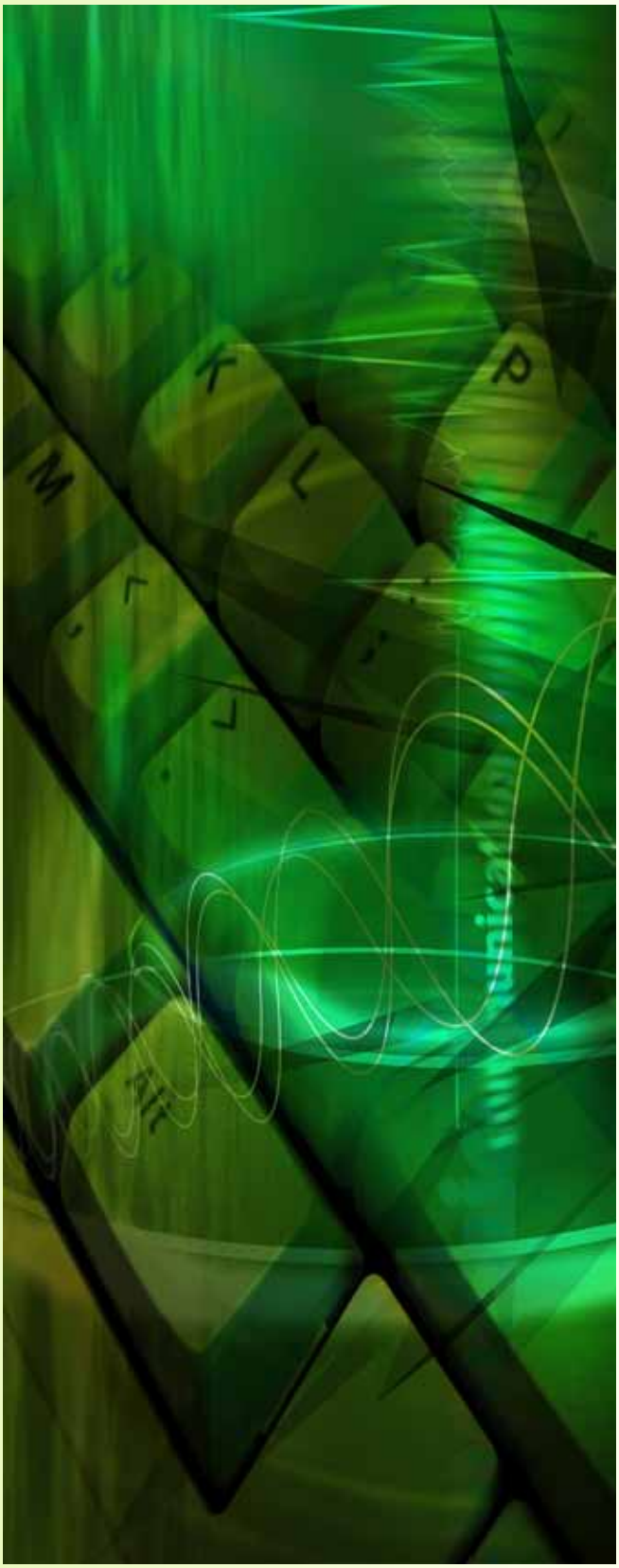

Sustainability in IT

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article

Abstract

There are number of definitions for Sustainability or Sustainable Development – the author defines this simply as "Live and Let Live!". He attempts to put light on how IT puts a lot of load on Mother Nature and defines that as 'pollution'. The article goes deep into a comparison of Sustainability efforts of some major corporates in India based on a list of 18 parameters identified by him. He believes that the corporates need to do a lot more on a continued basis to make this world Sustainable.

Key words

Sustainability, e-waste, WEEE, LCA

Definitions

There are number of definitions for Sustainability –

Sustainability is the capacity to endure. For humans, sustainability is the long-term maintenance of well being, which has environmental, economic, and social dimensions, and encompasses the concept of stewardship, the responsible management of resource use. (Wikipedia).

The term was used by the Brundtland Commission which coined what has become the most often-quoted definition of sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."

My simple way of saying 'Live and Let Live!'

Youtube has many videos on Sustainability, one of them being available at **http://www.youtube.com/watch?feature=player_detailpage&v=B5NiTN0chj0**

Scope

The scope of this article is IT companies in India. I would like to extend this to IT in India e.g. all industries make extensive use of IT these days so we should look at the role of IT in Sustainability or Sustainable Development.

Traditionally, IT was thought to be non-polluting – perhaps because there were no chimneys and no smokes were seen coming out of the datacenters. But, that view was not necessarily correct. My definition of pollution is not smoke or dust, rather the 'load an activity puts on mother nature'. And, IT puts a lot of load on Mother Nature than was thought in the past.

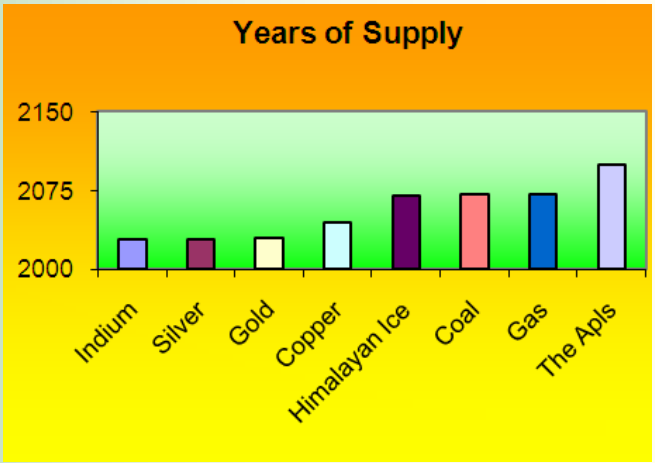

Figure 1

Some of the natural substances used in/ for IT are not forever, as shown in Figure 1 above. This is load on Mother Nature.

Concept of Energy

Embodied Energy is a concept showing energy spent on a product before its usage i.e. admitting that the energy is spent in designing, mining, manufacturing, packaging and distribution. There are two more stages of energy consumption by a product – during usage (and this is all that is known to the user, if it's known at all) and for disposal/ recycling etc. As shown in Table 1 below, the embodied energy of some materials used in IT is very high. This is load on Mother Nature. Then, of all the energy used, most (currently up to 90% in India) is from the fossil fuels. This is load on Mother Nature.

Table 1

Material	Embodied Energy (MJ/Kg)
Brick	2.5
Cement	7.8
Glass	14.9-26.2
Steel	32
Lead	35.1
Paper	36.4
PVC	70
Copper	70.6
Plastics (HDPE)	103
Aluminum	191

One should not forget the amount of 'e-waste' generated at the end of the IT equipment.

That is a huge load on Mother Nature, especially in India where either there is no recycling, or most of the recycling is done in the unorganised sector which is not only illegal but perhaps also unethical as it may employ child labour.

For such reasons, now the focus is turning on to IT, in a way that 'IT can be greened and IT can be used to green the rest of the organisation'. This is known as Green IT or Sustainable IT. The focus is not just the usage phase but from 'cradle to grave' or 'design to disposal' or 'womb to tomb'. This approach is also known as LCA (Life Cycle Analysis). Good corporate are now becoming bold to publish their LCAs. Figure 2 shows one such example from Apple.

Figure 2

Comparing Sustainability Effort

When it comes to comparing organisations on their Sustainability efforts, Table 2 below can be used to a greater extent.

Table 2

S. No.	Tool/ Assessment/ Achievement
1.	Green IT Maturity Assessment (based on Green IT Maturity Model copyrighted by Continuity and Resilience)
2.	ISO 14001 certification
3.	SA8000 certification
4.	CDP (Carbon Disclosure Project) participation and score
5.	GRI (Global Reporting Initiative) Reporting
6.	Commitment to UNGC (United Nations Global Compact)
7.	Compliance to RoHS, WEEE directives
8.	Usage of Energy Star, EPEAT etc. directives
9.	Compliance to PAS 2050
10.	BS EN 16001 certification
11.	Usage of BEE star rated equipment
12.	BEE star rated buildings
13.	LEED certified buildings
14.	Compliance to PAS 141
15.	Compliance to PAS 2060
16.	LCA disclosure
17.	Education/ certification in Sustainability (e.g. those offered by BCS (www.bcs.org) in India
18.	GRIHA rated buildings

One of the best achievements in India in the recent times has been by the ITC – about 7 of its hotels across India have been LEED Platinum certified – perhaps the only hotel chain in the world to have this feature. I have not yet gone deep into ITC's this achievement, but if I were the auditor, I would have definitely looked at the hotels' Green or Sustainable IT practices while awarding such certification. (This doesn't take the credit away from ITC).

Table 3 below shows some of the work done by 9 majors (mainly in the IT/ ITeS sector) in India in the field of Sustainability or Sustainable Development:

Table 3 (there is no order of selection of these organisations)

#	Organisation	Achievements
1.	ITC	Sustainability Report (http://www.unglobalcompact.org/system/attachments/12038/original/ITC_Sustainability_Report.pdf?1316592204), Carbon-water-solid waste positive , SA8000 certified (number of group organisations individually), GRI G3 Level A+, Triple Bottom-line Reporting, ISO 14001,
2.	TCS	Sustainability Report (http://www.tcs.com/about/corp_responsibility/Documents/TCS_Corporate_Sustainability_Report_2009-10.pdf) , world's 7th greenest company (http://www.tcs.com/news_events/press_releases/Pages/TCS_Worlds_7th_Greenest_Company_Newsweek_Green_Rankings_2011.aspx), Carbon Disclosure Project
3.	Infosys	Sustainability Report (http://www.infosys.com/sustainability/Pages/sustainability-report.aspx), GRI G3 Level A+,
4.	IBM India	Sustainability Report (http://www.ibm.com/ibm/responsibility/IBM_CorpResp_2009.pdf) – but for the corporate worldwide, not for India
5.	Wipro	Sustainability Report (http://www.wipro.com/Documents/Wipro%20Sustainability%20Report%202009-10%20online.pdf), Carbon Disclosure Project (top in India)
6.	Cognizant Technologies	Sustainability Report
7.	Mahindra Satyam	Sustainability Report
8.	Google India	Not available
9.	Microsoft India	Citizenship Report (http://www.google.co.in/url?sa=t&rct=j&q=microsoft%20india%20sustainability%20eport&source=web&cd=2&sqi=2&ved=0CC0QFjAB&url=http%3A%2F%2Fdownload.microsoft.com%2Fdownload%2F4%2FD%2FB%2F4DB34782-BEAE-4A56-93F6-36DC8D251054%2FMicrosoft_2010_Citizenship_Report.pdf&ei=cT-kTob7K5GHrAfW7ICHAw&usg=AFQjCNHKDzDEaog1M6Ju5cP1Uo38kVvqtA) – but for the corporate worldwide, not for India

While concluding, I would like to say that a lot has been done (a detailed study of all above reports will help to dig out more), but much more needs to be done due to some of the following reasons:

a. Even if all our IT equipment is stamped with WEEE symbol, none of us in India can claim to be using WEEE compliant equipment as:
   1. There are no (or not enough) collection centers for the dead equipment
   2. There are no (or not appropriate) recycling facilities

b. RoHS in the EU stands for Restriction of Hazardous Substances while the same term in Govt of India's e-waste management and handling rules (applicable from 1st Jan 2012) stands for Reduction of Hazardous Substances. 'Restriction' and 'Reduction' to me are poles apart; hence implementation will pose a big challenge.

c. It seems that even the largest organisations haven't yet understood my definition of Sustainability or pollution (total load on Mother Nature concept) as the Sustainability Reports title pages still link this to kind of 'rural' life which traditionally used to be the Philanthropic work.

AUTHORS

Daman Dev Sood, with over 26 years in the industry is a global speaker, traveller and worker. He holds an excellent mix of skills in being a practitioner, trainer and consultant. A Fellow of BCS, Member of BCI, Senior Member of IEEE, Member of AIMA, and Life Member of CSI – Daman is very well poised and connected professionally too. He was BCI's BC Manager of the Year Award India winner in 2009 and a finalist in BCI's Industry Personality of the Year Award India in 2011. His two passions are 'giving back to society' and 'giving back to students'.

Medical Tourism – The India Advantage

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Abstract

Medical tourism is a fast growing industry in many developing nations. Today India can boast of many internationally accredited super-speciality hospitals having some of the world's best practicing doctors, as well as advanced infrastructure and facilities. This article takes a look at the potential advantage India has to be able to emerge as a leader in providing healthcare services, the role of the government as well as intermediaries like healthcare facilitators and where this market is headed.

Key words

Medical tourism, healthcare facilitator, hospital accreditation, Market Development Assistance scheme, medical treatment cost comparisons, da Vinci robotic surgery, Cyberknife, BrainSuite.

I. Medical Tourism and India

Medical tourism is a term used to describe the rapidly growing practice of travelling internationally to seek healthcare services. Health tourism is a sector where developing countries, such as India, have great potential due to their advantage based on providing world-class treatment at competitive prices combined with an attractive tourism heritage. Availing medical services in India costs about a tenth of what it is in the United States and in UK. The hospitals in major cities offer the highest standards of quality and ensure a completely sanitized environment and personalized care. India now offers the latest equipment and techniques such as

those used in robotic surgery and cutting-edge radiosurgery cancer treatment for non-stationary tumours. The success rates achieved are comparable and in some cases even surpass those of the western world. The major hospitals are especially geared to cater to a discerning international clientele.

A wide range of specialised procedures are offered by the major super-speciality hospitals. The Ministry of Tourism advertises cardiac surgery, minimally invasive surgery, oncology services, orthopaedics and joint replacement and holistic health care as the major areas of specialised treatment.

Given these advancements in technology and infrastructure coupled with the economy of scale, medical tourism is foreseen to be a booming industry in the coming years. Figure 1 displays the major destinations for medical tourists across the globe.

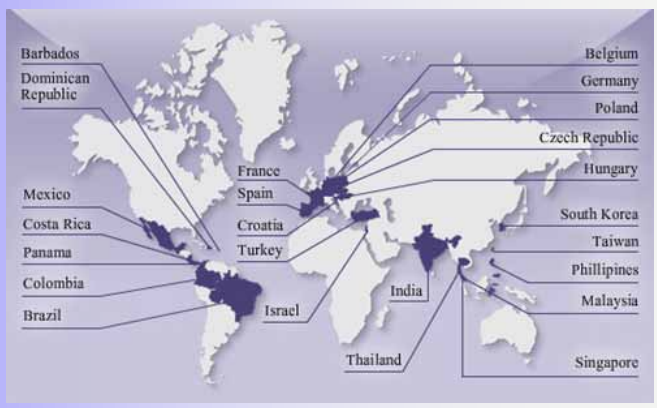


Figure 1. Medical tourism destinations[1]

II. Market Size and Trends

The medical tourism market in India is fast growing with an estimated target of reaching over US$ 1 billion by 2012. As per a study conducted by India's chamber of commerce, the medical tourism industry in India is competitive in nature and has been able to attract a large number of foreign visitors surpassing the figures for other South East Asian countries, thereby contributing significantly to the country's economy.

In a report titled, 'Emerging Trends in Domestic Medical Tourism Sector' by a leading industry body, it was stated that an estimated 3.2 million medical tourists would arrive in India by 2015. The report stated that the states of Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, West Bengal and New Delhi have been identified as the major destinations for medical tourists in the country. These states have adequate medical infrastructure for complex medical operations. A leading industry body estimates that the medical tourism sector could rise to US$ 2.4 billion by 2015.

As can be seen from the patient inflow distribution data in figure 2, a large percentage of patients come from the Middle East countries. Apart from local citizens there is also a large NRI population working there. This is a good target segment as it is a natural preference for NRIs to come to India for treatment.

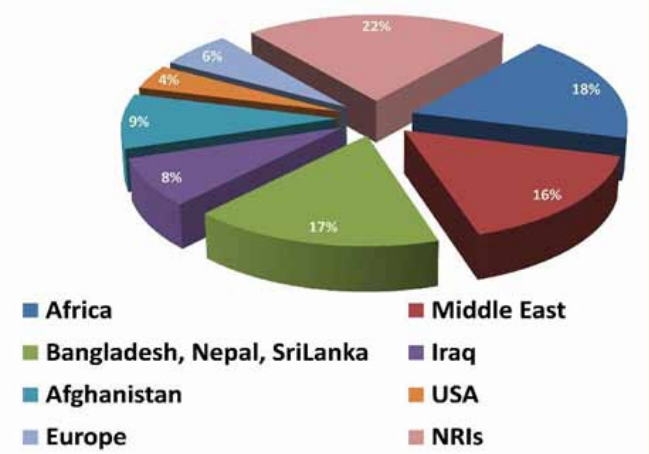


Figure 2. Patient inflow distribution

III. Government Focus

India's efforts to promote medical tourism took off in the early 2000s, when the Confederation of Indian Industry (CII) identified immense potential for the sector. The Indian government has played a concerted role in providing support to help grow this industry in the country over the past decade. India is being promoted as a healthcare destination in the on-going "Incredible India" campaign being run by the Ministry of Tourism. The government has provided support on a number of fronts, although we still have "miles to go before we sleep".

The "M" or medical visa: Indian consulates and missions abroad face a growing number of inquiries about "M" or medical visas. With millions of tourists travelling to India for healthcare the Indian government issues special M visas to the medical patients as well as MX visas to the accompanying spouse with a validity of one year.

Travel Information: The Indian Ministry of Tourism's overseas offices supply information for those intending to travel to India for medical treatment. Special publicity material has been produced to promote health tourism and is widely circulated for publicity in potential markets.

International Exhibitions and RoadShows: In order to promote and position India as a medical destination, road shows and exhibitions focusing on medical tourism are organized in conjunction with the stakeholders from time to time. Road shows and conferences have been organised recently in the middle-east region from which there is a major inflow of tourists.

Infrastructure Growth: Domestically, many on-going development initiatives have benefitted the industry. These improvements primarily include upgrade of airport infrastructure, development of hotels as well as initiatives to provide a facelift to major cities.

Focus on Quality of Hospitals: Providing quality standards acceptable to the western world is an on-going challenge for our country. To provide a guarantee of service quality for medical tourists, the Ministry of Tourism's Market Development Assistance scheme provides financial incentives for medical tourism service providers associated with hospitals which are certified by Joint Commission International (JCI)and National Accreditation Board of Hospitals (NABH). Most of the major multi-speciality hospitals today have achieved accreditation and many are in the process.

Fiscal Incentives Provided by Ministry of Tourism: The Ministry of Tourism provides Market Development Assistance for participation in approved Medical and other Tourism Fairs, Medical Conferences, Wellness Fairs and allied Road Shows. This scheme was extended to the Medical Tourism Service Providers and Wellness Tourism Service Providers during the year 2009.

IV. Role of the Healthcare Facilitator

Amongst all the participants in the Medical Tourism industry, the role of the Healthcare Facilitator (HCF) as an authorized intermediary has become significant. An HCF is the bridge between the international patients and the hospitals in India providing

specialised treatments. Broadly speaking the function of an HCF is to reach out to potential clients across the globe and facilitate the entire process starting right from collecting the medical history and records of the patients to taking care of all the logistics.

The HCFs help organize the patient's treatment package by recommending the hospitals and doctors best suited to their needs and establish a dialogue with them even before the finalisation of the trip. They also provide visa assistance, airport pick-ups, hotel reservations and help plan any sightseeing trips the patient and their companions may want to undertake after recovery.

Some HCFs have long standing working relationships with the senior doctors as well as the management of these prestigious hospitals allowing them to ensure that the patients get the best possible attention and treatment.

The medical healthcare facilitation service provided by the HCFs is free of charge. Patients are billed directly by the hospitals for their medical treatment. The marketing efforts of the HCF are in turn incentivised by the hospitals.

In order to facilitate easy access to a global clientele, a typical HCF will maintain an internet based website with a mechanism to establish a dialogue with patients as well as provide a host of information relating to the hospitals, doctors and medical procedures provided. See figure 3 below.

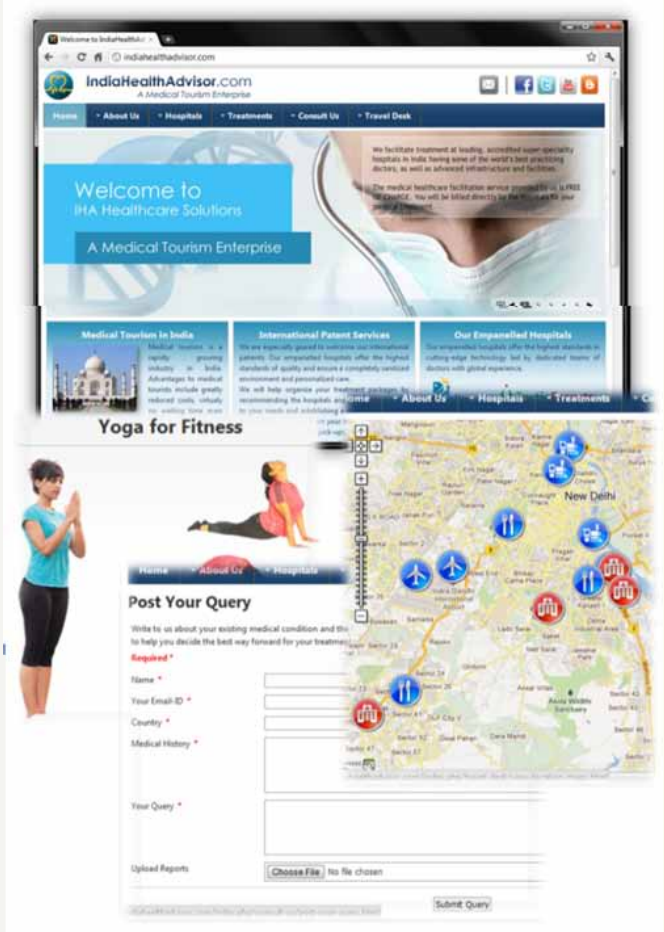


Figure 3. A typical HCF website[2]

V. Advantage India

India hosts medical tourists not only from neighbouring countries like Bangladesh, Nepal and Afghanistan but also from developed nations like the United States and the United Kingdom. Medical tourism is a rapidly growing industry in India. Some of the major advantages to medical tourists include:

- Greatly reduced cost of treatment
- Virtually no waiting time even for advanced treatment
- Availability of latest medical technology
- Highly qualified surgeons of international

repute
- Accredited hospitals complying with international quality standards
- No language barrier in most cases

Comparative cost of treatment: The cost of healthcare in the western world is very high as compared to India and other countries catering to medical tourism. The treatment costs in the USA can be as high as 10 times those in India. This is a major reason for travel, especially when the patients are not covered by insurance. Table 1 gives a comparison of costs for major surgeries in the US and other countries. These costs are indicative and actual expenses would vary based on the specific treatment package of the patient.

	USA	India	Thailand	Mexico
Heart Bypass	130,000	7,000	11,000	20,000
Angioplasty with 1Stent	57,000	7,000	13,000	15,000
Knee Replacement	48,000	8,000	14,000	11,000
Hip Replacement	43,000	8,000	12,000	14,000
Bariatric Surgery	65,000	9,000	14,000	9,000

Table 1. Indicative cost of treatment (in US$)

No waiting time: Over the last decade India has seen substantial growth of private super-specialty hospitals. These hospitals have excellent facilities and have attracted some of the best medical talent in the country. The capacity in this segment of Indian hospitals has expanded very fast and there is still scope for greater utilization. The volume of patients handled is much higher than in western countries. Unlike the US or the UK, there is virtually no waitperiod for scheduling major surgeries or treatment. Waiting times in the US or UK could well be over a year in some cases. This is one of the major factors in drawing in patients from developed countries.

Availability of latest technology: The leading super-speciality hospitals employ high-end technology and equipment. Some of the innovative technologies adopted by them are in the area of robotic surgery, neurosurgery and radiosurgery for treatment of cancer.

The da Vinci Robotic Surgery System senses the surgeon's hand movements and translates them electronically into scaled-down micro-movements to manipulate the tiny instruments. It also detects and filters out any tremors in the surgeon's hand movements. The camera used in the system provides a true stereoscopic picture transmitted to a surgeon's console.

The CyberKnife® Radiosurgery System is designed to treat tumours anywhere in the body non-invasively. Using continual image guidance technology and computer controlled robotic mobility, the CyberKnife System automatically tracks, detects and corrects for tumour and patient movement in real-time. This enables the system to deliver high-dose radiation with pinpoint precision, which minimizes damage to surrounding healthy tissue. See figure 4.

BrainSuite®is a MRI guided neurosurgical suite, where neurosurgery is performed directly under the guidance of MRI in the operation theatre. This system provides comprehensive treatments for Brain and

Spinal Tumours.

Figure 4: CyberKnife Radiosurgery System

Accredited hospitals comply with international quality standards: Most hospitals now carry Joint Commission International accreditation which puts them at par with the world's best. The leading hospitals in India comply with one or more of the following certifications:

Joint Commission International[3] (JCI) is a recognized world leader in health care quality and patient safety providing international accreditation and certification.

International Organi-zation for Standardization[4] (ISO) 9001:2000 certification ensures compliance across multiple criteria including improved patient satisfaction, effective Quality Management System and continuous improvement.

National Accreditation Board for Hospitals & Healthcare Providers[5] (NABH) is a constituent board of Quality Council of India, set up to establish and operate accreditation programme for healthcare organizations.

National Accreditation Board for Testing and Calibration Laboratories (NABL) provides laboratory accreditation services in accordance with ISO/ IEC 17025:2005 and ISO 15189:2007.

These certifications will help alleviate the concerns patients from US and UK have about quality of facilities and healthcare in India.

VI. Conclusion

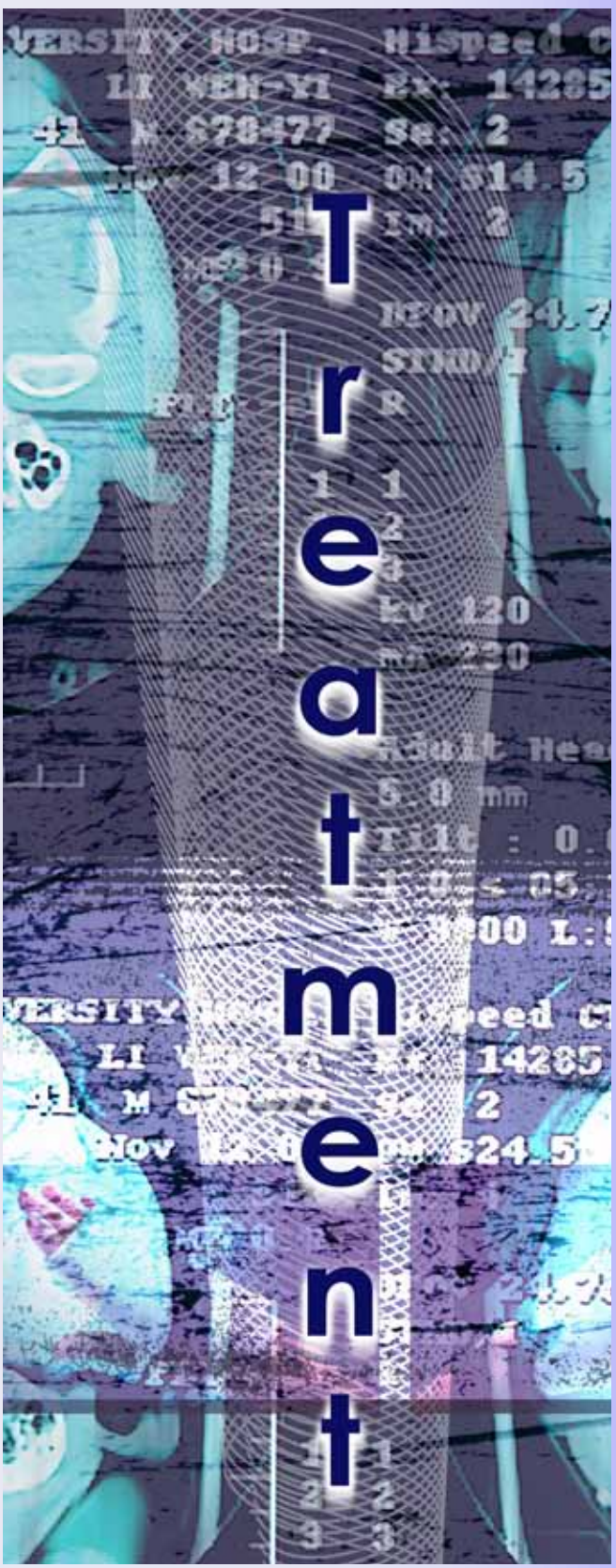
Medical tourism is turning out to be a booming industry across the globe in large developing nations. India is emerging to be a leader on this front primarily due to the growth of private super-speciality hospitals over the past decade and being a host to some of the best medical talent in the world. The IT revolution has also had its part to play in paving this path.

Whereas, patients from the developed western nations are attracted to India due to lower costs and waiting times, there is also a large presence of patients from middle-east and neighbouring countries like Afghanistan and Bangladesh because of availability high quality of treatment.

There is a growing support from the government as medical tourism is viewed as a potential benefactor to the nation's economy. However, there is still some way to go in improving the country's image in the eye of the western world.

Medical Tourism Service providers and Healthcare Facilitators have had a significant role to play in attracting international patients. In the future this model may change as hospitals are gearing up their marketing functions. As infrastructure improves further, international insurance providers may directly tie up with Indian hospitals to extend their coverage as well as become more cost effective in their operations.

It is clear from market analysis that medical tourism as an international industry is set to see great advancements in the years to come.



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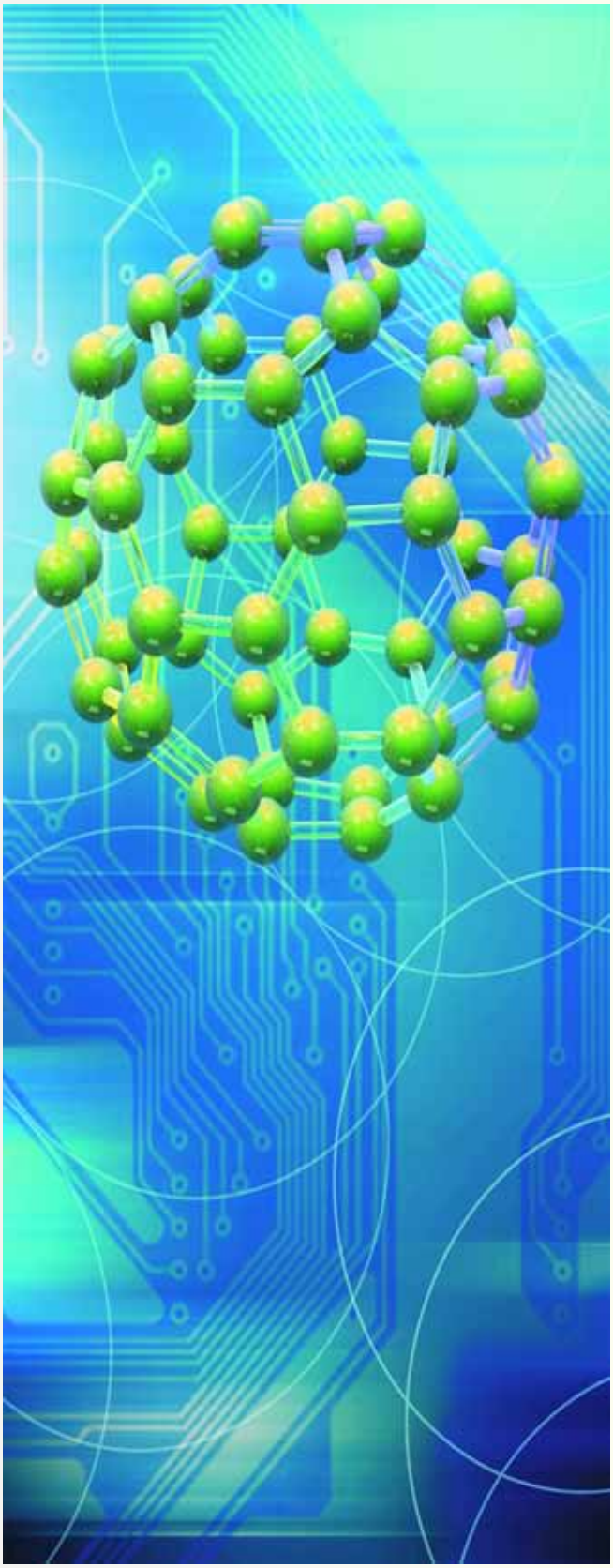

A Journey from Computer Networks to Networks-on-Chip

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Abstract

The growing demand of applications in consumer electronics has increased the number of computing resources in single chip. The applications need many computing resources such as CPU, DSP, and specific IPs to build a system in System-on-Chip (SoC). Therefore, interconnection between each other becomes another challenging issue. In this paper, we have presented the emerging paradigm of networks that is applied to SoC design. This paper presents history, evolution and state-of-art of Network-on-Chip (NoC). The paper also presents discussion on routing and architecture of NoC.

Key words

Keywords - NoC; SoC; OSI;

Evolution of Network-on-Chip

The computer network may be referred as a collection of electronic hardware components and processing elements interconnected by communication channels. The networks can be classified by the characteristics such as the medium, communication protocol, and topology. The communication protocol provides set of rule and data formation for exchange of information across the network. The medium refers to the physical media used for data transmission such as wire media, aerial media and optical media. The topology guides the physical layout and connectivity of nodes in the network. In the earlier days, telecommunication

was used to exchange the information. In September 1940, first time, George R. Stibitz has remotely used a Teletype machine to send instructions to his Complex Number Calculator that was placed in New York. The calculator was able to perform complex addition, subtraction, multiplication and division. He also received computed results back through remotely placed machine [11]. The early computer network project includes the military radar system Semi-Automatic Ground Environment (SAGE) that was started in the late 1950s. After that, early work on the ARPANET began in the 1960s, and in 1969 a four-node network using primitive packet switching was created [12]. The modern computer networks can be used for a variety of purposes:

a) Facilitating communications between users
b) Sharing of hardware resources
c) Sharing of files, data, and information
d) Sharing of software

The primary purpose of computer network is efficient communications and resource sharing among users. The standard of computer network is guided by OSI reference model.

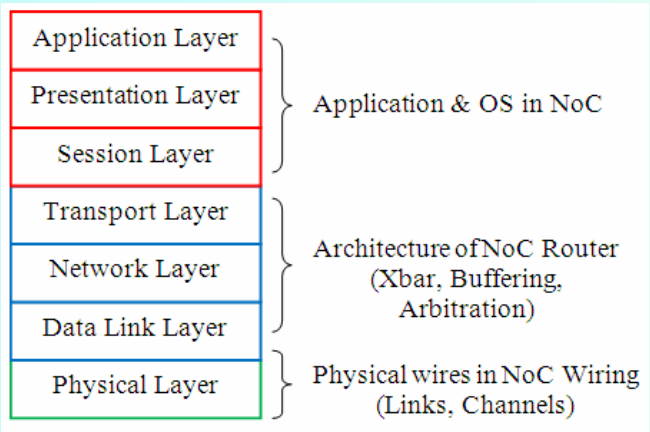

Figure 1. OSI Model and Mapping to NoC

The growing demand of applications in consumer electronics has increased the number of computing resources in single chip. The applications need many computing resources such as CPU, DSP, and specific IPs to build a system in System-on-Chip (SoC). Therefore, interconnection between each other becomes another challenging issue. A conventional approach to SoC applications is to use a shared bus interconnection which needs arbitration logic to serialize several bus access requests. The bus is a low-cost solution and simple control characteristics as shown in table 1. In bus, only one master at a time can utilize the bus. In such scenario where the number of bus request is large and their required bandwidth for interconnection is more than the available bandwidth, the interconnection other than bus should be considered. This has attracted the attention of researchers towards computer network. The people started borrowing the principle and practices of computer network in SoC design. In earlier days, people used to integrate the components based on circuit switching concepts. In 2001, William J Dally's paper has changed the thinking of VLSI designers [6]. Prof. William J Dally state to route the packets, not wires [6].

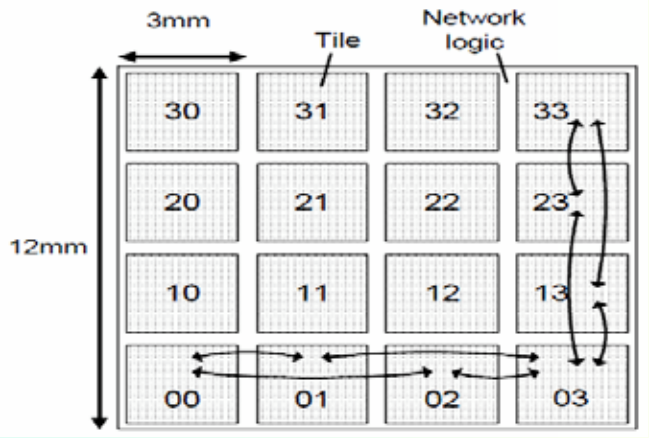

Figure 2. Die of Typical NoC [6]

The die in the NoC is partitioned into module tiles and network logic as shown in figure 2. Author sketches the design of a simple network showing a 2mm x 12mm chip in 0.1m CMOS technology with a 0.5m minimum wire pitch [6]. In the figure 2, we can see that network logic occupies a small amount of area between the tiles. The tile interfaces with the network over an input port that is used to insert packets into the network and an output port over which the network delivers packets to the tile [6].

II. Bus and Network-on-Chip

The following table shows the comparison between bus and NoC. The bus is simple protocol; however, scalability of bus is poor.

Table 1. Bus and Network-on-Chip [1, 2, 3, 4, 8]

Bus	Network-on-chip
Bus uses simple protocol and is well understood.	Lightweight computer network protocols are applied to between the IP for communication.
The limited bandwidth is shared by all units attached to bus.	Total available bandwidth scales up with the network size.
The delay in bus arbiter grows with the number of masters.	The decision of routing and arbitration is distributed across the routers. Hence, delay remains constant.
The bus is almost directly compatible with most available IPs.	NoC oriented IPs needs some wrappers or network interface to communicate.
The cost of silicon for a bus is almost zero.	The network has a significant silicon area.
The bus has only arbitration latency, other is almost zero.	Internal network contention has significant amount of latency.

In table 1 we have presented comparative analysis of bus and NoC. The main disadvantage of bus is limited bandwidth, slow and complex testing, and delay of arbiter when there are large numbers of processing elements (PE).In NoC each PE has a router attached. The router is connected to the neighbors using wires. This router performs multiplexing for multiple communication flows over these interconnects to provide scalability and high bandwidth.

III. PROTOCOLS

The NoC protocol is organized in layers akin to OSI model. The physical layer is underlying layer behind the communications. This layer is responsible for physical level of transmission on a medium (wires). The physical layer in NoC defines as signal voltages, timing, bus widths, and pulse shape of the signal. The wire length and routing of wires is important in this layer. The floor plan of the chip can have a dramatic effect on wire length, power consumption and latency. The synchronization of signals at different level of voltage level and frequency (different clocking domains) is a challenge at this layer. The Data Link Layer (DLL) includes flow control, error detection and correction routine for reliable data transmission. This layer is also responsible for arbitration of access to a shared physical medium. The Network Layer establishes connection in the network that could be static, such as offered by the reconfigurable interconnect of FPGAs, or dynamic. Similarly, data routes can be persistent over multiple transactions, or each transaction can be dynamically routed [12]. The transport layer is responsible for establishment and maintenance of end-to-end connections. The session layer is an optional layer in NoC. This layer provides

infrastructure for synchronization of messages in the network. These messages may be generated from any router in the NoC. The presentation layer is not directly related to the NoC. However, this layer may be found in the application that is running on the top of processing elements. The protocols at this level are responsible for converting the data into the acceptable format. The application running is not aware of the underlying strategy for flow control, routing or physical signaling.

IV. ROUTING AND ARCHITECTURE

A. Routing

The topology in NoC determines the physical layout and connections between nodes and channels in the network. A topology determines the number of hops (or routers) a message must traverse. Topologies for NoCs can be classified into three broad categories [8].

- Direct networks
- Indirect networks
- Irregular networks

The routing algorithms are responsible for correctly and efficiently routing packets or circuits from the source to the destination. Routing schemes can broadly be classified into following categories.

- Static routing
- Dynamic routing
- Distributed routing
- Source routing
- Minimal routing
- Non-minimal routing

B. Static and dynamic routing

In static routing, fixed paths are used to transfer data between a particular source and destination. This routing scheme does not take into account the current state of the network, and is unaware of the load on the routers and links when making routing decisions. In dynamic routing, routing decisions are made according to the current state of the network, considering factors such as availability and load on links. As such it is possible that the path between the source and destination changes over time, as traffic conditions and requirements of the application change. This adaptive behavior, however, comes at the cost of additional resources that continuously monitor the state of the network and dynamically change routing paths. Examples of static routing algorithms includes dimension order routing (DOR), XY, pseudo adaptive XY, surrounding XY, Valiant's random, topology adaptive, directed flood, and random walk routing. Examples of dynamic routing algorithms include minimal adaptive, fully adaptive, congestion look-ahead, 2-TURN, odd–even, slack time aware, and hot potato routing.

C. Distributed and Source Routing

Both static and dynamic routing schemes can be further classified depending on where the routing information is stored, and where routing decisions are made. In distributed routing, each packet carries the destination address and routing decisions are made in each router by looking up the destination addresses in a routing table or by executing a hardware function. When a packet arrives at the input port of a router, the routing table is consulted (or routing logic is executed) to determine the packet's output port based on its destination address. In source routing, pre-computed routing tables are stored at a node's (or PE's) NI. When a source node transmits a data packet, the routing information is looked up at the source router

(or NI) based on the destination address, and this information is added to the header of the packet. Unlike distributed routing, source routing does not require a destination address in a packet, any intermediate routing tables, or functions needed to calculate the route. However, source routing requires additional routing information in a packet header, and the number of bits increases for longer paths.

D. Minimal and Non-Minimal routing

A routing is minimal if the length of the routing path from the source to the destination is the shortest possible length between the two nodes. In minimal routing, the source does not start sending a packet if a minimal path is not available. In contrast, a non-minimal routing scheme does not have such constraints, and can use longer paths if a minimal path is not available. By allowing non-minimal paths, the number of alternative paths is increased, which can be useful for avoiding congestion.

E. Architecture

A router consists of components like input buffers, router state, routing logic, allocators, and a crossbar (or switch). The functionality of router is route the packet from source to destination with minimum latency. In order to reduce the latency routers often use pipelined approach to improve throughput. "Delay through each router in the on-chip network is the primary contributor to communication latency. As a result, significant research effort has been spent reducing router pipeline stages and improving throughput [10]". The router can have following architecture.

- 2-D Routers
- 3-D Router

The choice of particular architecture is govern by the requirement of particular application domain.

V. CONCLUSIONS

We have presented a journey from computer network to NoC paradigm. We have presented the OSI model and discussed the importance in SoC design. The paper has also presented various strategies for routing packets from one processing element to another. We have also discussed essential elements and types of a router.

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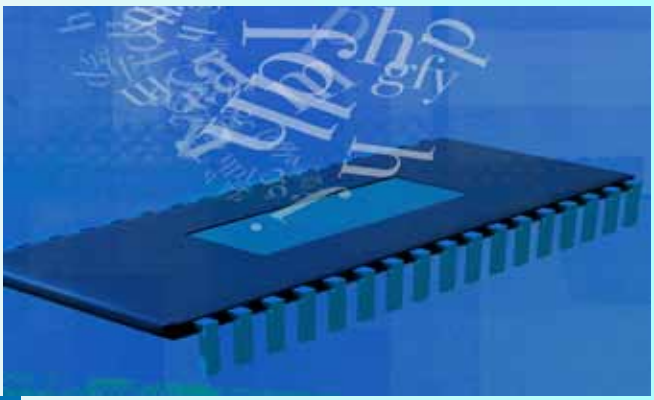

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- US$ 5 for each Professional member recruited to e-Membership (offered in developing nations only);
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Additive Watermarking in Optimized Digital Image

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Senior Member IEEE

Abstract

Watermarking is a method which is used to identify and authenticate the originality of an image. It is used in security and forensic too. In an image there can be a hidden or non-hidden text, image, information or a piece of program embedded, which restricts its unwanted usage. Watermarking are in pictures, images, logo, signature etc. In this paper, we describe a watermarking process by adding an image or text or piece of program to an optimized base image i.e. logo or signature. The procedure can be used for both visible and hidden watermark.

Key words

Additive Watermarking, optimized image, covert image.

I. INTRODUCTION

Watermark is used for authentication, identification and preservation of originality of an image. There are two concepts watermarking and fingerprinting. Watermarking is for adding or embedding some context to the base image which is used for its identification and authentication. While fingerprinting traces the source of copying the image. Fingerprinting, thus, provides necessary information to enable taking action against piracy of the image or context. On the other hand, watermarking is used for restricting the piracy.

Digital watermarking is done in the image, audio, video or other multimedia files. It is also used in

forensic department in various ways. In other words, we can also say that fingerprints are embedded in an image by using watermark algorithm. Once the authorized copy of digitized context is available, to identify the series guilty, who created those unauthorized copy can be identified. This is also called forensic watermarking.

Another concept is Visual Cryptography Scheme (VCS). In this process encoded secret image are distributed into n number of shared participants [6]. This is used for watermarking purpose. Reversible Watermarking is also called lossless or distortion free watermarking. It completely removes the watermarking and exactly recovers the original signal image [8].

In forensic analysis sometimes patterns of skin color are matched to analyze the culprit. Here, various watermarking algorithms with knowledgebase are used to identify the skin color pigmentation of criminals [7].

In this paper, we have used the concept of visual cryptography, reversible watermarking in small picture like logo or file containing signature of a person. If we can find robust methods for watermarking then in digital media we can authenticate signatures, logo and many important documents.

II TYPES OF WATERMARKING

There are various types of watermarking. In a broader way, we divide it into two categories, viz.
A. Visible
B. Covert

Visible Watermark
These are watermarking used for identification of an image or text embedded in some context.

There are various kinds of Visible Watermarking
1. Scheme based Watermarking
2. Stochastic Watermarking
3. Scaling based Watermarking
4. Feature Extraction Watermarking

1) Scheme Based Watermarking
These are based on some kind of scheme like diagonally visible watermarking throughout the image on a line segment or on the top or bottom of an image [11].

2) Stochastic Watermarking
Here, watermarking is added to an image using some algorithm and stochastic function like addition, multiplication, mean median mode etc.

Additive watermarking - Cox et al. [4] have proposed an additive watermarking technique which is based on spread spectrum concept which is resistant to noise and cropping attacks [4] and
Multiplicative Watermarking [10] are based on using local optimum decoders in Multi resolution transform domains.

3) Scaling Based Watermarking
Watermarking are used in image using scaling algorithm i.e. on the basis of size and resolution of an image [11].

4) Feature Extraction Watermarking
Here, certain features or patterns are defined and are used for watermarking [12].

B. Covert Watermarking
The covert watermarking are those where watermarking is hidden in context. There

can be various kinds of covert watermarking.
1. Cryptographic Watermarking
2. Non- Cryptographic Watermarking

1) Cryptographic Watermarking
The watermarking done in this category is in the form of cyphertext. It can be algorithm based like RSA, AES, DES or secret key based like public key or private key. Thus, the cyphertext is added in the context which needs to be deciphered after retrieval. These kind of watermarking are used in forensic analysis and referred to as forensic watermarking.

2) Non-Cryptographic Watermarking
This watermarking method is hidden in the context. The hidden text, image, program or context is not a cipher text. It is in the readable form but is not visible or easily identified. One needs appropriate program or algorithm or key to extract it from the base image and read it.

There is also another kind of categorization of watermark i.e. Robust, Semi Fragile and Fragile. Robust method is for identification where semi fragile and fragile is for authentication [5]. In other words, we can say that robust watermarking is also visible. It is used for identification. Semi fragile and fragile is for covert watermarking. Generally, covert watermarking is used for authentication and forensic watermarking. Using covert watermarking unauthorized copying can be traced out from some hidden program embedded in the base image.

III. PROPOSED METHOD OF WATERMARKING

The proposed method can be used for embedding watermark in logo of company or digitized signature of any person. This method can be used for authorization and identification of digital media logo of company or sign of individual person. Logo can be used any where and everyone by downloading it from site. Sometimes, these logos are used in pirated copies and unauthorized work. There are various ways of stopping or restricting someone from this kind unauthorized usage, like legal action or heavy fine. But, all steps are taken against the person or company who has done the unauthorized work atleast once and being caught. We can restrict the use of logo by adding proper watermarking in such a way that it cannot be viewed or used after copying or downloading from the internet. Files can be password protected. There are various ways to do this. In order, to stop unauthorized use of image files fingerprinting and watermarking are used in security and forensic applications. Here, the proposed method is about using non-cryptographic covert context for forensic watermarking. It is also reversible watermarking i.e. if we extract the watermark the image remains unchanged without any distortion. This can be used in all images (of any format or file type).

Image file irrespective of their format have some minimum of number of bytes which are required to view the image. Say, a file is of 6.71 MB but it requires 1719 bytes to display the image with optimized resolution. This part of optimized image can be separated by extracting via reading the bytes and writing into new files.

Further, increasing color depth, padding and other beautification of the image can be enhanced by putting the rest of bytes in another file. The optimized part of image 'I' is taken as say X and rest part is in Y.

Let A is watermark which is broken into n parts.
A= A1 +A2+A3+…_An.
B=An +An-1+…+A1
Watermark ordering can be of any type so that it is indistinguishable. There can any type of permutation and combination of A1,A2,…An in watermark B.

Let 'I' is a base image
I= X+Y
Covert Image C
C=X+ B+Y

The algorithm is as follows-

Step I Take the Image I.
Step II Seek the optimize size of the image X.
Step III Rearrange watermark image parts B.
Step IV Embed the watermark C=X+B.
Step IV Add extra padding or color depth in the file C=X+B+Y.
This method is a type additive watermarking, as watermarking is added in the image file.

Procedure to Retrieve the watermark from the covert image:

Step I Take the covert image C.
Step II Use the key to extract the hidden context of the image X, Y and B.
Step III Rearrange B and retrieve original A.
Step IV Join X+Y of image and display.

Here, after removal of the watermark completely the same image is retrieved i.e. reversible watermarking.

The example [see Figure 1] shows the image without watermark. Figure 2 shows the watermark to be added in the base image shown in the Figure1. Figure 3 shows image watermark using the above proposed method. The proposed method can be used on images in png, jpeg, tiff, bmp, gif or any file format. We can add the watermark within the image which can be visible too. This can be done by adding the watermark within the optimized image part. Figure 4 shows an image where watermark is visible.

Figure 1: The base image sign.tif(ie.I)

Figure 2: Watermark. tif (Part A of the image)

Figure 3: Sign and hidden Watermark image (i.e. C=X+B+Y)

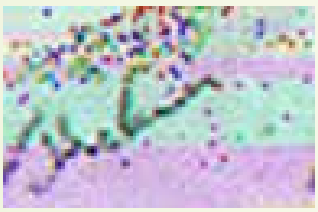

Figure 4: Sign with visible watermark .

Here, in Figure 4 Watermark is added within the optimized part of Image i.e.

X=X1+X2+…+Xn
C=X1+A1+X2+A2+…Xn+An +Y

IV. BENEFIT & DRAWBACK

The benefit of the method is that any type of

file can be stored and retrieved. It is reversible and used for forensic analysis. Batch files, java files can be stored and run. It is useful for image authentication. Moreover, the watermark can be broken into n number of pieces and can be stored in the different parts of image which can be retrieved accordingly.

Drawback of the method is it can be hampered by brute-force-attack. If watermark is deleted authenticity and forensic analysis cannot be done. Thus, using visual cryptography scheme is more preferred i.e. n parts of watermark are added at different locations of the optimized image. Thus, it cannot be completely deleted at any cost, which solves the purpose of tracing.

V. CONCLUSION

Image authentication, identification are used extensively in the industry. Moreover, logo and signature files are extensively used in various digital media for variety of work. If we provide proper and robust method of authentication the user will be able to use digitized media in a secure manner. This will increase its usage. Online application form and Income Tax Return files are typical examples where authentication is critical. If watermarking is promoted more areas of application will emerge. Authentication method should, however, be robust, reversible as well as error free. We need to take care of its authentication methodology and traceability.

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AUTHORS

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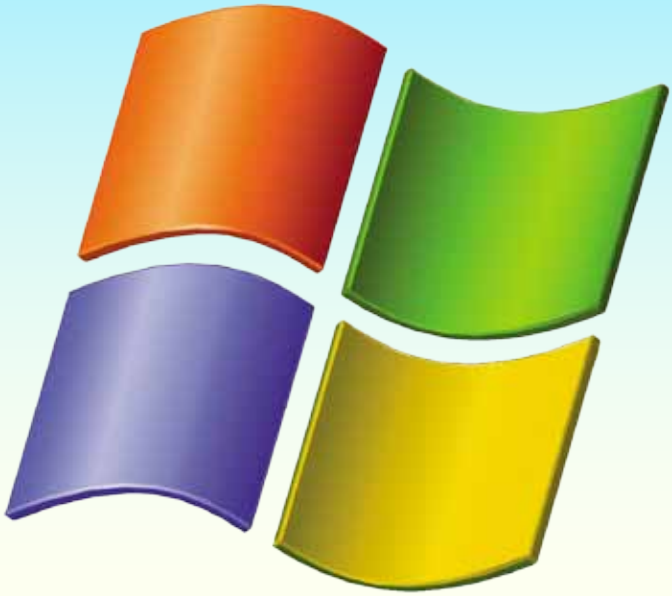
She is Senior Member of IEEE, CSI, ACM, SEI Carnegie Mellon, Secretary of IEEE Computational Intelligence Society, Treasurer IEEE Computer Society and Member Education Society of IEEE Delhi Section. Website-- www.sharbani.org



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Adaptive Relaying: A New direction in Power System Protection

Rachna Dhir,
M.Tech Ist Semester, DTU

Abstract

To adapt to the requirements of frequent changes in system parameters and the operating mode of power system, the integrating advantages of adaptive protection is designed. The key technology and the basic concepts are presented. The effect of necessary parameters like earth fault resistance, load angle and the prefault conditions on the adaptive relay distribution is indicated in this paper. Adaptive relaying is shown to be capable of improving the qualitative degree of network stability along with dependability and security. The use of adaptive relaying system provides faster protection of the distribution system as compared to the old conventional relays, shorter tripping times and improvement in selectivity. Over and above the cost/performance is increased.

Key words

Power system, distribution network and adaptive relaying distribution.

I. INTRODUCTION
Adaptive relays

Modern electric power systems can deliver energy to users very reliably. Protective relays in the power system play an important role in assuring this continuous service. Relays monitor the status of the system continuously and detect failures or abnormalities within their assigned zone of protection. The control action takes place by opening a minimum number of circuit breakers to isolate the defective element an element that would have otherwise caused excessive damage or possibly collapse of the power system.

article

Although protective relays should detect all system abnormalities quickly, other considerations might detract from this primary objective. In general, a relay system is designed to achieve the highest levels of speed, reliability, selectivity, simplicity, and economics. Since it is impractical to satisfy all requirements simultaneously, compromises must be made. A typical conflictory objective is embedded in the reliability of a relay system. The dependability and security of a relay system establish its reliability. Dependability is a measure of the relay system to perform properly in removing system faults. Security is a measure of the relay tendency in not initiating an incorrect trip action. There is always a compromise between security and dependability. The dependability or security can be enhanced significantly by utilizing redundant relays. If the contact of the redundant relay is connected in parallel with the original relay, then the dependability isincreased. On the other hand, if the contactsare connected in series, the security is enhanced. With conventional relays, the protective system design is either biased toward the dependability or the security. Therefore, the highest levels of dependability and security can't be achieved at the same time.

Why do we need Adaptive Distribution system??

With the conventional relays, the power system is either designed to provide dependability or the security. Similarly speed and accuracy cannot be achieved at the same time.

Various improvements are needed in existing network as it lack the capability to detect high impedance faults, lack automatic changes in relay settings with the change in network parameters. To adapt to the requirements of frequent changes in system parameters and the operating modes of a power system, the integrating advantages of adaptive protection come into play. Adaptive relaying is shown to be capable of improving the qualitative degree of network stability along with dependability and security. Adaptive protection is a protection philosophy which permits and seeks to make adjustments in various protection functions automatically in order to make them more attuned to prevailing power system conditions.

Or we can say that it is an on-line activity that modifies the preferred protective response to a change in system conditions or requirements. It is usually automatic, but can include timely human intervention.

The adaptive relaying system summarizes the following application areas:

- Proactive load shedding.
- Multi-terminal distances relay coverage.
- Fault type changing speed of operation.
- Load flow compensation.
- Variable breaker failure problems.
- Adaptive reclosing.
- Permissive reclosing.
- Operating time depending on distance to fault.

In ADPS(adaptive distribution protection system), the line voltages and currents are monitored regularly. Computer simulation is performed to determine ideal trip boundaries and these boundaries do change with the system conditions settings. The adaptive relay requires a DSP controller for this purpose.

Application Area

In adaptive relaying, the system can be regu-

larly monitored and analyzed so that when fault occurs, the system can be isolated while in conventional relays we need to add a voltage restraint or to compromise the setting.

When a network is out of the service for a long time, the inrush current is very high while restoration. Due to high inrush current the relays will be blocked and the circuit is reclosed. Since cold load pick up is a sequence of events followed by outages plus the restoration time, so the computer derived calculation is amenable.

In case of transformer protection, an idea of computer algorithm has been proposed in a recent work that is adaptive and utilized Kalman filtering. This algorithm relies on monitor transformer currents to determine the state of transformer. By changing the monitoring states the algorithm can adapt to different operation conditions.

Automatic Reclosing: Despite huge attempts to maintain reliability and simplicity in a transmission system faults do occur. To minimize the effect the system must be brought back on-line as quickly as possible. In this the automatic reclosing of circuit breakers is employed. The old traditional methods lack the ability to adjust their actions with the change in system itself. The adaptive reclosing provides a more reliable, efficient and safer method of closing the faulty parts of system.

Computational Issues: The three important factors to be kept in mind while relaying the power system are selectivity, speed and sensitivity. Also the three relevant parameters that an engineer must consider are the pick-up setting, instantaneous setting and time dial setting. At present, the relaying concept must consist of proper setting of relays under worst conditions provided the conditions must be properly analyzed. As all the calculation are done offline, so this process is time consuming.

Adaptive relaying situation can be beneficial in many ways especially when relays can respond to certain changes in existing network conditions. The relay setting will change online thus becoming more sensitive to various types of faults and contingencies.

Is Adaptive relaying safe??

If relays are made to operate and change their settings automatically, who will be responsible in assuring that these settings are need to be done? If many such relays change their settings, will they be able to coordinate with each other? Will such relays trip when they should or refrain when they should not? These are the questions that need to be answered. Dependability and security are the two very important factors in a distribution system.

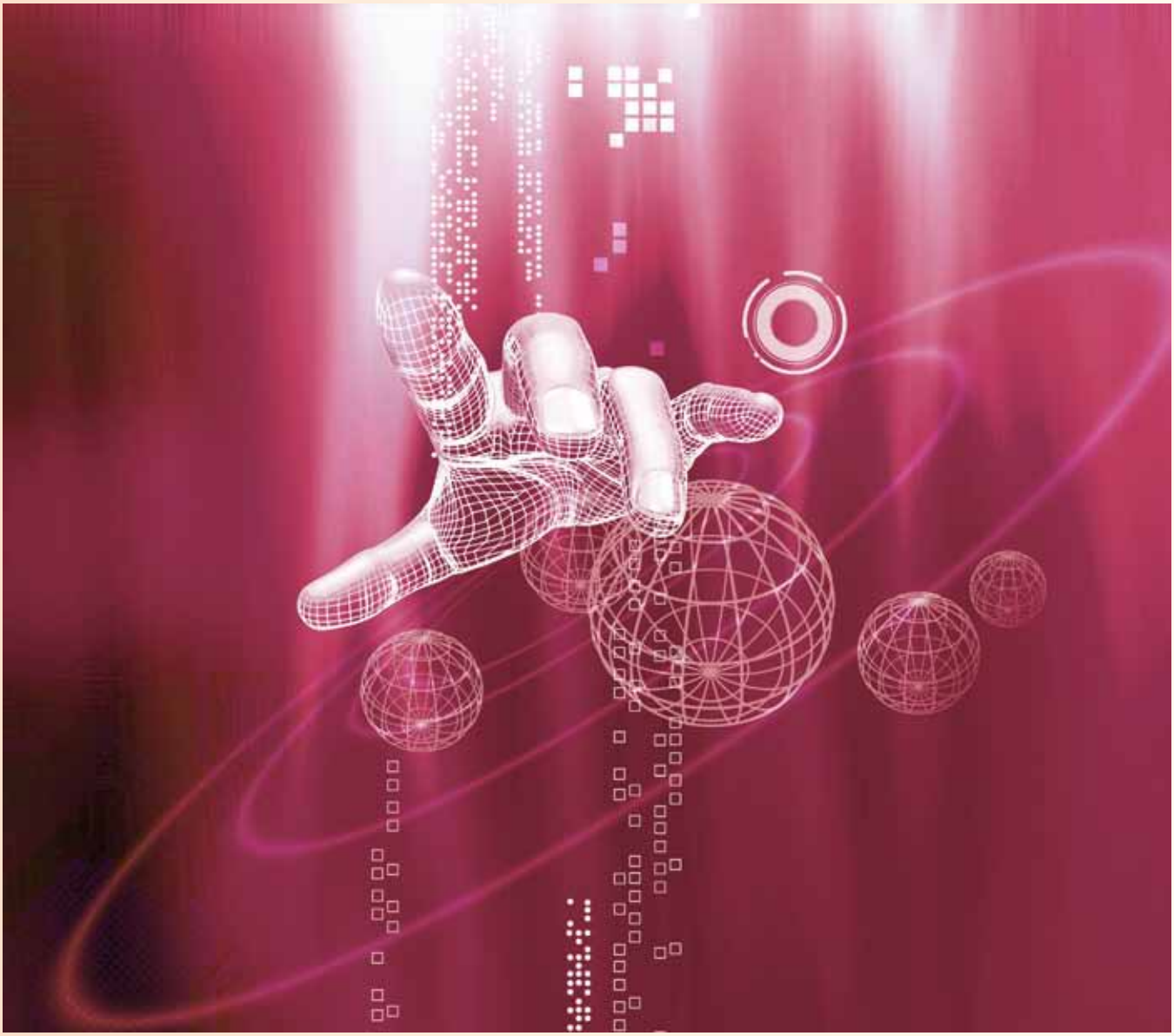
Dependability refers to the degree that the operation will be accurate and security is that facet of reliability that the relay will not work incorrectly. However, adaptive concept always includes the possibility in the failure of communication channel, hardware modem or software. Therefore, checkbacks, safety checks and other reliability designs must be an integral part of any adaptive relaying scheme. With proper design the adaptive relays can be as safe as conventional relays and provide a better match between the current state of power system and its protection system.

Conclusion:

Technology to design the adaptive distribution protection system, utilize computer over current relaying concept, is more expensive than the electromagnetic relays. Adaptive

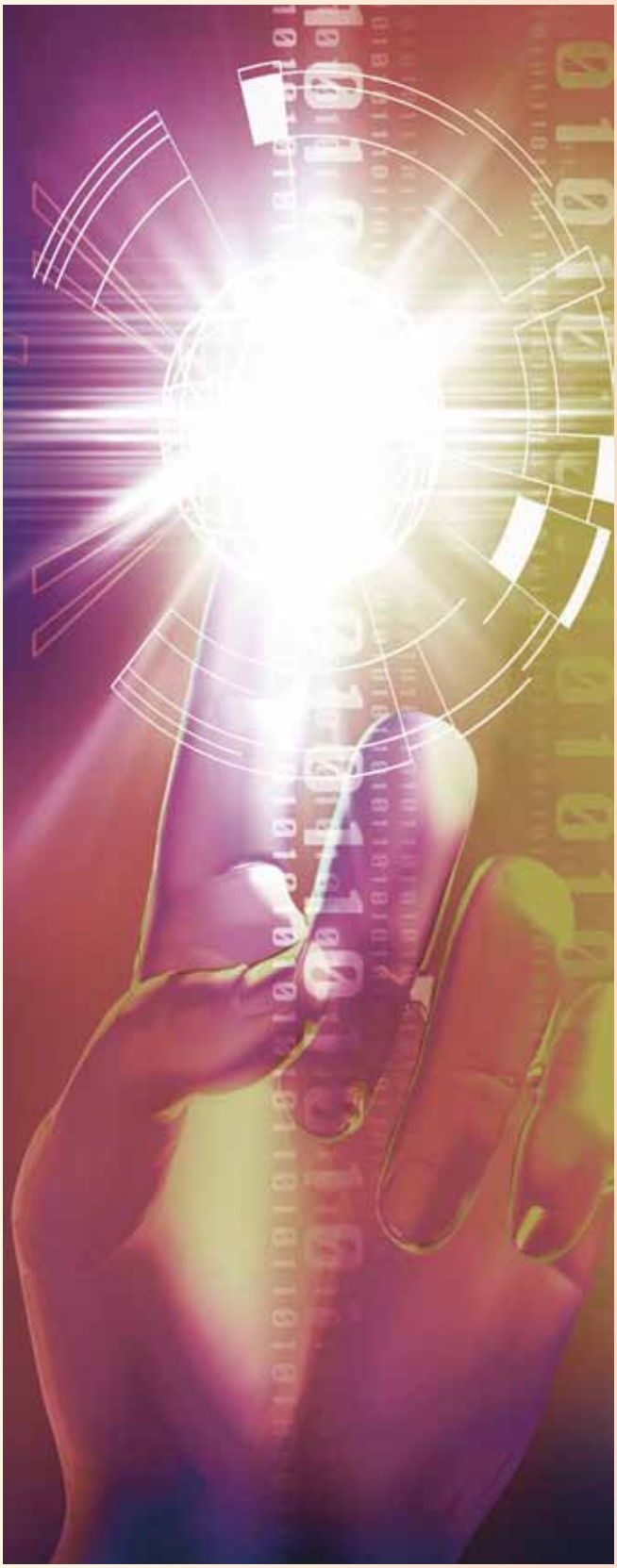
relaying protection being a new protection scheme is a recurring topic on every agenda. The ADPS utilize the changes in actual system conditions as a basis for online adjustment of power system relay setting. It provides the required flexibility and stability of power system distribution system without affecting the speed and selectivity of the system. Digital relays with adequate software and communication system make these devices ideal for adaptive relaying. The use of adaptive relaying system provides faster protection of distribution system as compared to old conventional relays, shorter tripping times and improvement in selectivity.

In this article a new protection philosophy suited to the new and demanding environment of the modern power system have been presented. The relaying community will accept the challenges it presents and will use it for designing & developing the new protection schemes.



AUTHORS

Ms. Rachna was born on Nov 10, 1991 in Haryana. She did schooling from 35-model school in Chandigarh and later she chose to become an electrical engineer. Currently, she is pursuing M.Tech from Delhi College of Engineering, DTU. Her specialization is power system and research area is Power system protection.



Students Activity Report

Figure 1: The 14th IEEE Quarterly Meet, Delhi Section,Ambedkar Institute of Technology (Govt. of Delhi) on Sep. 3, 2011

More than ten student branches, New MTT-S Student Chapters and WIE Affinity groups were opened in student branches of IEEE Delhi Section.

All India Students Congressand four Quarterly meets were organized in IEEE Delhi Section in 2011.

The 14th IEEE Quarterly Meet, Delhi Section was held at the Ambedkar Institute of Technology (Govt. of Delhi) on the Sep. 3, 2011.

Dr. VR Singh, Past Chair, IEEE-Delhi and IEEE fellow enumerated the benefits of IEEE, for instance, the Distance Learning Programmes, scholarships and various other benefit schemes offered to members.

Prof. S.K. Koul, Chairman, IEEE Delhi Section spoke about the activities being conducted by the IEEE-Delhi Section and also brought to notice a very rampant problem prevalent all over the student community-that of plagiarism.

He also spoke about the starting of a IEEE-MTT(Microwave Theory and Techniques Society) chapter in the college which are to be mentored by IIT-D and NSIT. Ms.Ranjana Mittal (National winner of Trainers award) also gave a short motivational speech. Finally, Dr. S.C. Dutta Roy, Senior Emeritus professor IIT Delhi spoke about a range of topics plaguing the education system in India, from lack of hands on experience to absence of proper guidance and study material.

The 15th quarterly meet, organized by the IEEE was held on **8th October 2011** at **THAPAR UNIVERSITY, Patiala.** IEEE branches of all colleges, notably from the **Delhi, Punjab, Rajasthancame** together for this meet. The aim of this meet was to encourage interaction between student branches and provide an opportunity to the upcoming ones to learn from the more experienced ones in order to improve the functioning of their respective IEEE student branches.

Figure 2: Vikram Sarabhai Rotating Shield Quiz Competition at BhartiVidyaPeeth College of Engineering

The BVPIEEE WIE Meet-2011 was organized on 14th October 2011 and saw a huge participation from colleges across Delhi like IGIT, NSIT, DCE, JamiaMilia University, ASET, HMR etc. With the cumulative efforts of BhartiVidyaPeeth College of Engineering, IEEE WIE Chairperson RichaDaga, BVPIEEE WIE Vice-Chairperson Swathi S. Iyer and the whole of the WIE team the event was a resounding success.

The 2011 Edition of the Vikram Sarabhai Rotating Shield Quiz Competition took place yesterday at BVCOE. The event saw participation of 126 teams and was a big success.

WIE IEEE NSIT organised a science workshop for underprivileged students on 10thOctober'11 for students of classes IV to VIII. A group of 40 students were divided into 2 parts and were taught by 4 IEEE members of 2nd and 3rd years.The main motive of the workshop was to increase awareness and impart knowledge to the students of different science experiments like working of torch and principle of inertia.

Figure 3 & 4: WIE IEEE NSIT organised a science workshop for underprivileged students on Oct. 10, 2011 for students of classes IV to VIII.

Figure 5: WIE Affinity group inauguration -ManavRachna College of Engineering IEEE Student Branch.

Figure 6: IEEE Delhi Section delegates attended the R-10 Student Congress at Auckland, New Zealand in July'2011.

IEEE Delhi Section delegates attended the R-10 Student Congress at Auckland, New Zealand in July'2011.

WIE Affinity group inauguration -ManavRachna College of Engineering IEEE Student Branch.

Four members were partially sponsored by IEEE Delhi Section to attend R-10 SC held at Auckland in July'2011 .

The growth in membership as compared to previous year as below:

Student Members count on 31st December 2011 is 3245

(Student Members count on 31st December 2010 was 2567)

"Global Warming Awareness cum Innovative Idea Generation Program"

By Ravindra Joshi,
Chair, IEEE Delhi Section-
Human Technology Challenge (HTC)

Environment Event Report

HTC organized an event on 17th and 18th Sept., 2011 in Select City Walk, Saket in collaboration with UNIC. This IEEE and UN event was aimed at providing general awareness to public on the causes of global warming and their adverse effects. The event started at around 11 am and closed at 8 pm on both days. The outline of the event was as follows:

1. An objective quiz based on global warming followed by "3 ideas to prevent global warming" to be submitted by the event participants;
2. attractive prizes were given to the top three scorers of the quiz contests followed by 3 consolation prizes;
3. the event was repeated three times over the day and
4. Takeaways like car hangings asking to car pool, switch off idle light, use less water stickers, magazines conveying global warming awareness messages were distributed to the public.

We are pleased to inform you that the event was a big success with more than 2500 people participating. The enthusiasm of people to participate in such an event was a rare thing to see. We received many innovative ideas to combat the crisis of global warming.

We would like to thank our sponsors- Select City Walk Mall for providing us the venue and the space, Hidesign for gift vouchers, Homeshop for prizes, Cinnabon as Hospitality partners and Delhi Govt. for overall support.

Our collaborator UNIC also actively participated in organizing the event. Some of the partners were present to give away prizes like Mr. Rajeev Chandran from UNIC, Mr. Suneil Singh Umapathy and Ms. ShefaliArora from HomeStop, Dr. Sabat and Dr Anil from Delhi Government and Mr. Bisht from Select City Walk.

The event was blessed by the presence of SusriArchanaDidi who also gave prizes in one session. We are thankful to Registrar, IP University Mr. B. P. Joshi to come and grace the occasion and give away prizes. IEEE HTC committee members Dr. SukumarMisra-IIT Delhi and Mr. PiyushGoyal - CDOT also came for some time to enthuse the event. In the end closing prizes were given by IEEE Delhi Section Chair, Dr. ShibanKoul of IIT, Delhi.

The event was overall conceptualized, designed, organized under the guidance of Mr. Ravindra Joshi, Chair, IEEE Delhi Section HTC, who was present all through the event to engage the audience and energies the volunteers who at this event came mostly from IIT Delhi. Mr. Joshi comes from the Tata Group of Companies. He is an IITian and a management graduate from the Lancaster University, UK and is currently working with Tata Power-NDPL.

Some of the highlights of the event were:

- About 75% of overall visitors came voluntarily on seeing an environment cause
- A good percentage of them were keener on the idea generation part of the Quiz.
- All participants took the quiz quite seriously which displayed growing awareness and concerns about the environment.
- Participants ranged from all ages of 10 to 80 years.
- Many left congratulatory and appreciative messages for organizing such event
- Tree shape book marks were very popular take away by the kids

The feat achieved through the event is such that many other organizations have approached IEEE, HTC to organize such events at their locations. It is also decided to conduct series of such events in other parts of NCR to spread environment awareness to more and more people and to obtain innovative ideas from public for this noble cause.

Figure 1: The enthusiasm of participants was magnificent

Figure 2: Mr. Bisht GM Select City Walk welcomes SusriArchnaDidi

Figure 3: Dr. Sukumar Mishra, Secretary, IEEE Delhi Section

Figure 4: Dr. ShibanKoul, Chair, IEEE Delhi giving away the First prize Giving away prizes to the winners

Figure 5: The Organizing Partners: ShefaliArora- HomeStop, Ravindra Joshi- IEEE-HTC, Dr. Sabat- Delhi Government

Recognition of Innovative Ideas by "Environment Ambassadors"

IEEE-HTC organized innovative idea generation programs in collaboration with UNIC and Ministry of Environment - GoNCT across various society segments, namely school students, University students including IITs, NSIT, DCE and general public. Toappreciate volunteer's interest in preserving environment as seen from their innovative ideas, some of the good ideas have been selected for further deliberation and possible implementation.

An event was organised on International Volunteers Day - 6th Dec 2011 from 5.30 p.m. to 7.00 p.m. at UN Conference Hall, Lodi Estate, New Delhi. The highlights of event are as follows:

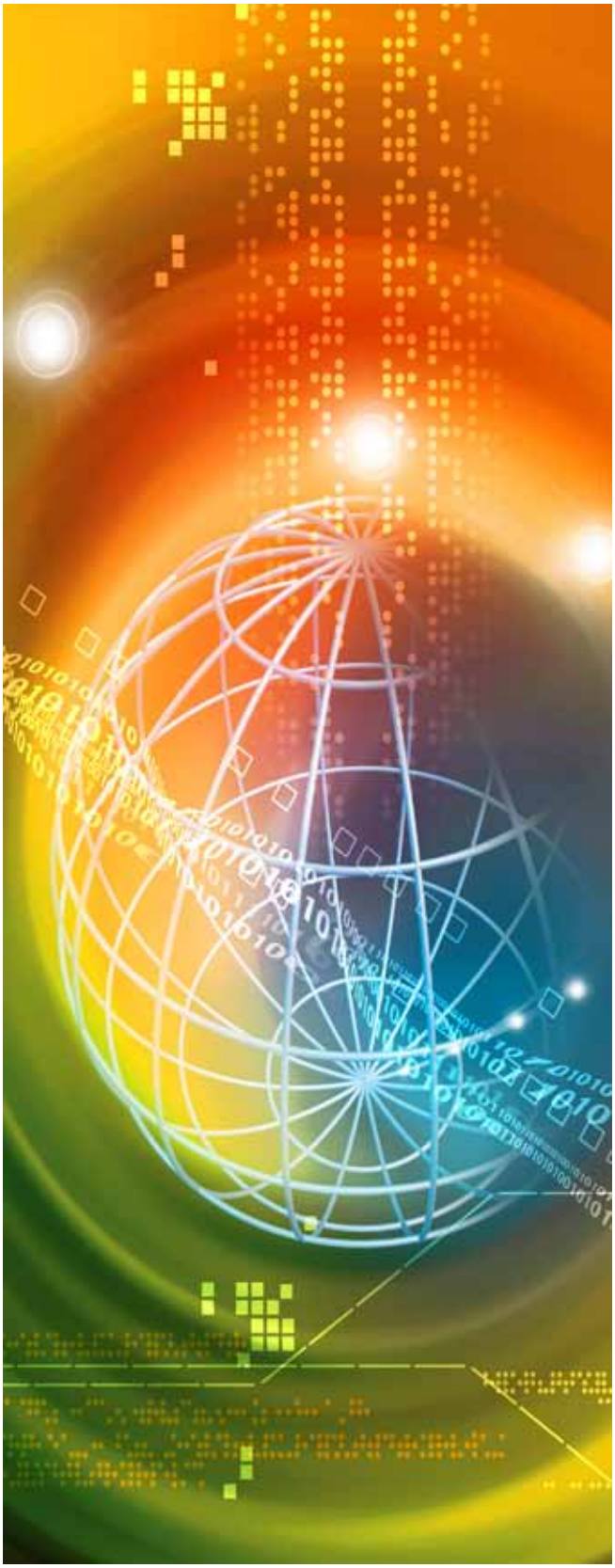
1. The theme of the event was "Innovative Ideas sharing to Combat Global Warming"
2. Ideas given by School Students were presented
3. Ideas given by University Students of IITs, DU, IPUniv etc.were presented
4. Ideas given by People of all ages (From event done at Select City Walk) were presented
5. Panel discussion was one and each suggestion was sensitised

UNIC Director, Ms.KiranMehra-Kerpelman said "Your contributions show that people, especially young people, believe in change, and are willing to take great strides towards it". The ideas covered areas such as saving energy and preserving environment. Volunteers pledged to persist with efforts to raise awareness on these and other issues.

Figure 6: Environment Ambassadors

Figure 7: DeepankarGautam Volunteer IIT-D, being facilitated byKiranMehra-Director-UNIC and Ravindra Joshi, Chair, IEEE Delhi_HTC

Figure 8: Dr Subrata of IEEE guiding environment ambassadors



Jamia Professor nominated to IEEE Boards 2012

Prof. Mini Shaji Thomas,
Professor of Electrical Engineering,
Jamia Millia Islamia

Prof. Mini Shaji Thomas, Professor of Electrical Engineering, Jamia Millia Islamia has been nominated to serve on two boards of the Institute of Electrical and Electronics Engineering (IEEE) for 2012. Prof. Thomas will serve as the Chair of IEEE-Educational Activities Board (EAB) Section Outreach Committee and a board member of the EAB. Prof. Thomas will also serve as a board member of the Publication Services and Products Board (PSPB) in 2012 as the Member and Geographic Activities Board (MGAB) liaison. She is also a member of the Power and Energy Society Long Range Planning Committee 2012.

Prof. Thomas has served as the Vice-Chair of the MGAB of IEEE for 2010 & 2011 and also as the IEEE R10 SAC Chair for 2007-09. Prof. Thomas has won IEEE MGA Innovation Award 2008, IEEE Power & Energy Delhi Chapter Outstanding Power Engineer Award 2008, IEEE R10 Outstanding Volunteer Award 2005 and IEEE Outstanding Branch Counsellor award 2002 to name a few of the recognitions from IEEE.

Mr. Daman Dev Sood Becomes IEEE Ambassador

IEEE started concerted efforts towards its visibility program and Mr. Daman Dev Sood from Delhi Section was interviewed 4 times in each of the last two years – that gave visibility to IEEE in general and to the Delhi Section specifically. Mr. Daman Dev Sood is now an IEEE Ambassador - one of 40 across globe, and only one from India.

Prospective authors are invited to submit article not exceeding 2500 words for publication in the next issue of Beacon – a magazine published by IEEE Delhi Section.

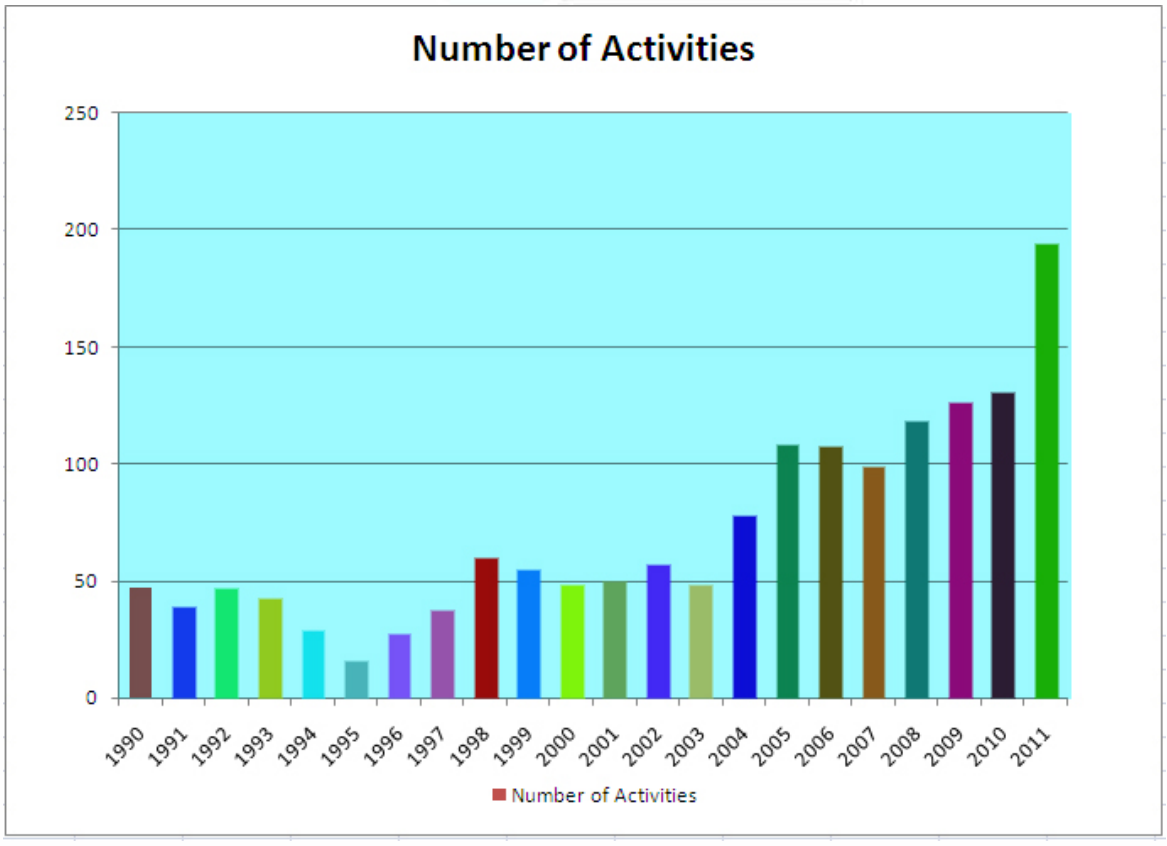
The last date of receiving articles is Sep. 15, 2012. All articles should be submitted to r.asthana@computer.org.

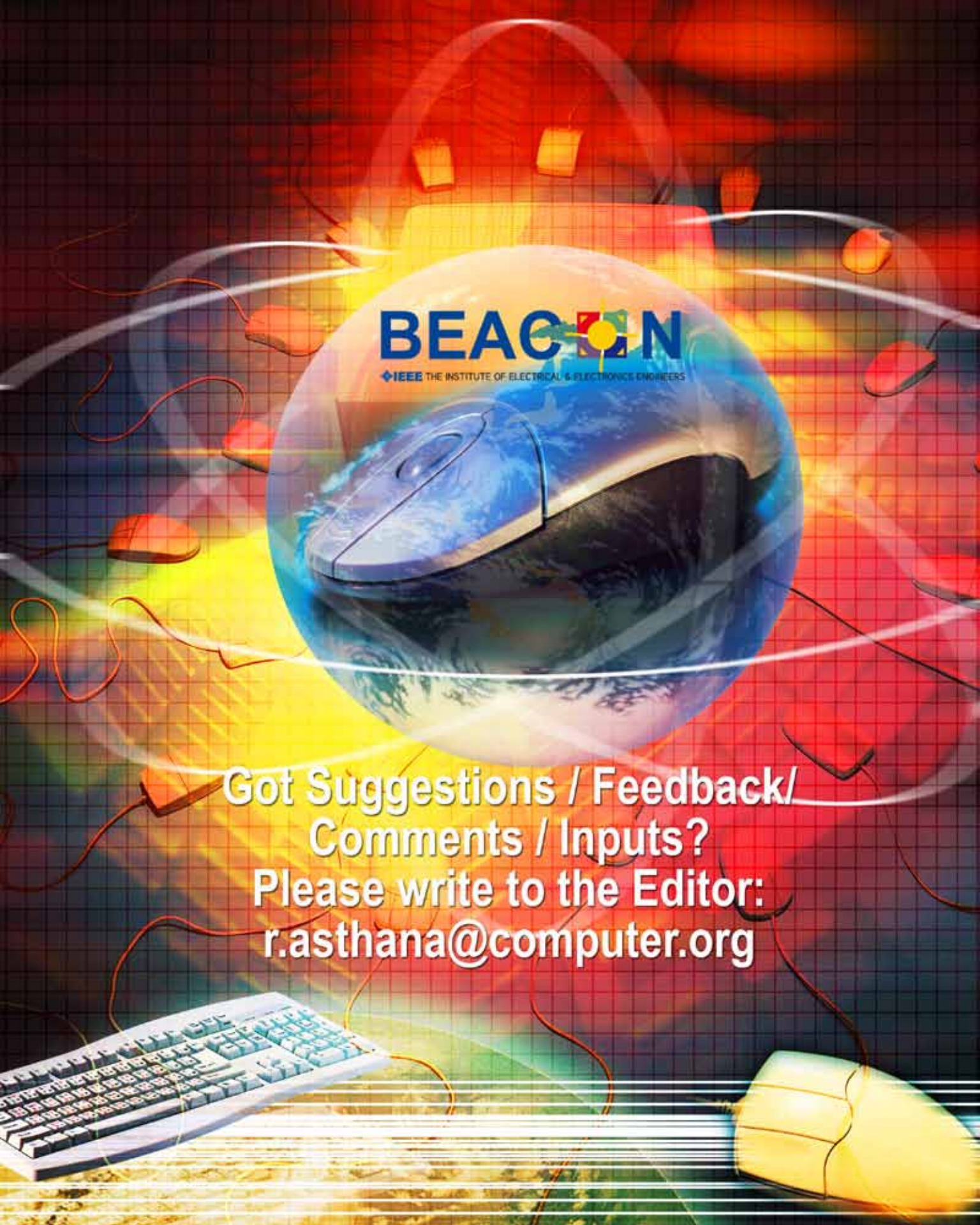
General

Papers are invited under the General category and only soft copy of articles will be accepted. Submission of paper for Consideration is not a guarantee of acceptance. Selection of papers by the publication committee will be partially determined by its requirement to:

- Achieve balance in the number of papers accepted under each theme or topic
- Limit multiple papers from the same author/institution
- Ensure the range and diversity of the readers' interests is addressed.

Section Activities from 1990 to 2011

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