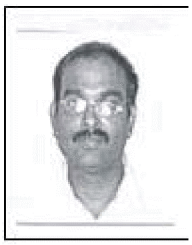

Dr. Vinay Kumar Pathak

Professor

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Academic background:

- Ph. D. Department of Computer Science & Engineering, U.P. Technical University, Lucknow under the joint guidance of IIT Kanpur, November 2004.
- M. Tech. Department of Computer Science & Engineering, IIT Kharagpur, December 1998.
- B. Tech. Department of Computer Science & Engineering, Harcourt Butler Technological Institute, Kanpur, June 1991.

Professional background:

- 2003-2004: Project Scientist, CAD Lab, IIT, Kanpur.
- 1993-1998: Lecturer, HBTI, Kanpur.
- 1998-2006: Asst. Prof., HBTI, Kanpur.
- From 18 Jan, 2006 serving as Professor at HBTI
- From August 2008 serving as Dean of Research & Development, HBTI, Kanpur

Research Interests:

- Computational Geometry and Image Processing. The topic of my M. Tech. thesis was **"Floating Point Filters for Orientation Tests of Objects undergoing Transformations"** and Ph. D thesis was "Point Cloud Processing of Freedom Sculpture Surface"

Ph. D thesis, abstract of:

Recent improvements in laser rangefinder technology, together with algorithms for combining multiple range and color images, allow us to reliably and accurately digitize the external shape and surface characteristics of many physical objects. Examples include machine parts, design models, toys, and artistic and cultural artifacts. Reverse Engineering is a rapidly evolving discipline, which covers a multiple of activities. While conventional engineering transforms engineering concepts and models into real parts, in Reverse Engineering real parts are transformed into engineering models and concepts. Even capturing shape and translating it into a CAD model is a difficult and complex

problem. In spite of several encouraging partial results in particular areas, a fully automatic solution to built a complete and consistent CAD model is still a goal. The goal of the present work in the thesis is of two fold. In the first part we present the work of data acquisition of different artifacts from different museum across the country. CAD models are prepared for the artifacts. Different applications are also shown for the handicraft industry. In the second part we present an algorithm for healing. Given a point cloud data of an artifact, estimate if there are holes (may be due to the measurement or part is missing) to evolve an algorithm to heal it. An object surface can be viewed as a family of the curves. If the surface has a hole in it, the curves forming it will also be broken in between. This presentation attempts an algorithm, which uses the intrinsic geometry and concept LINCE model of curves. Using this geometry, a relationship between the curvature (k) and arc-length (s) can be obtained from which the rate of change of curvature with respect to arc length can be obtained. This proposed algorithm first finds out the k-s information of the near by region of the broken part and then it interpolates the k-s information for the missing region. After estimating the k-s information for the missing region, intrinsic Linear Curvature Element (LINCE) Model of a curve is used to get the x-y values for the missing part.

M. Tech thesis, Abstract of:

Significant work has been done recently on the exact computation of primitive geometric predicates such as, orientation tests for points, incircle tests and insphere tests. The correct computation of such predicates is essential for correct geometric software. It is considered a dynamic environment where objects can undergo multiple translations, rotations, shear or other geometric transformations. The realization of geometric transformations such as rotations and shear, requires the computation of trigonometric functions. Normally we use trigonometric functions using build-in implementations with double precision. However, the computation of such functions involves approximating irrational and/or transcendental quantities. This presentation attempts to present several examples where the machine computation of the rotation or shear transformation is erroneous; such computations lead to wrong decisions. Thus, we consider the fundamental geometric problem of computing interactions in a set of line segments, where a subset of the segments has been transformed by rotation or shear. Finally, the problem is robustly solved by correctly determining the interaction of the convex hulls of two sets of points, where one set has been rotated or sheared. The exact coordinates of the transformed of the transformed points may not be computable (these coordinates could very well be transcendental or irrational).

Publications:

- "Heritage Prototyping using Digital Technology", 1st International Symposium on Rapid Prototyping and Tooling, RPSI, Bangalore, June 06-07, 2003.

- "Preserving Heritage in Digital way", Intersculpt-2003, International Conference, Paris, France. October 10-18, 2003.

- "Digital Technology and Heritage: An Approach of New Age Technology towards Preservation", International Conference on Engineering Education, Silesian University of Technology, Gliwice, Poland, July 25-29 2005.

- "Healing of Surfaces Using Intrinsic Property of a Curve", Proceedings of the fifth IASTED International Conference Visualization, Imaging and Image Processing, Benidorm, Spain, September 7-9, 2005.

- "Preservation of Heritage – Melting Pot of Culture and Technology", Indo-US S&T Forum Workshop on Digital Archaeology: A New Paradigm for Visualizing Past through Computing and Information Technology, Mussoorie, India, November 11-13, 2005.

- "Sculptures' Identification Through Feature Extraction: An Approach", Indo-US S&T Forum Workshop on Digital Archaeology: A New Paradigm for Visualizing Past through Computing and Information Technology, Mussoorie, India, November 11-13, 2005.

- International workshop of Computer Technology "Simulation of Turing Machines using Universal Turing Machine" Nov 25-26-2005 Bareilly (U.P.)

- "Feature Extraction from 3D Data for the Modeling of Any Input Artifact/ Sculpture to Support Its Identification", Computer Applications and Quantitative Methods in Archaeology, CAA2006, Fargo, ND, USA, April 18-23, 2006.

- "Geometric Modeling of Indian Archaeological Potteries", Computer Applications and Quantitative Methods in Archaeology, CAA2006, Fargo, ND, USA, April 18-23, 2006.

- "Generic Algorithm to Detect the Boundaries of the Irregular Missing Surfaces", 22nd International Conference on CAD/CAM, Robotics and Factories of the Future, Vellore, Tamil Nadu, India, July 19-22, 2006.

- "Application of CAD, Rapid Prototyping and Reverse Engineering in Handicrafts Sector – A success Story", 9th International Conference on Engineering Education, San Jaun, PR, USA, July 23-28, 2006.

- "Generic Algorithm to detect the boundaries of the irregular missing surfaces" 22nd International Conference on CAD/CAM, Robotics and Factories of the Future (CAR&FoF) July 19 – 22, 2006 Vellore India.

- "Cleavage Site Detection from Broken 3D Objects", 15th International Conference on ADCOM 2007, IIT Gwahati, India, December, 2007.

- "OFFSETTING THE OBJECTS USING SEGMENTATION" International Conference on Engineering Education (ICEE-2007) 3 to 7 September 2007, UNIVERSITY OF COIMBRA PORTUGAL

- "AN INVESTIGATION OF STRAIN IN DOUBLY CURVE SURFACE" International Conference on Flexible Automation and Intelligent Manufacturing (FAIM2007) ID P022, June 18-20, 2007 – Philadelphia, USA.

- "Watermark Embedding and Detection Algorithm for Audio Signals" –International conference: Recent applications of Computers in Electrical Engineering , Bikaner – March 2007. pp-546-550.

- "International Journal for Engineering Modeling" "Strain Field in Doubly Curved Surface, ISSN 1330-1365 Vol. 20, No.1-4, 2007.

- International Journal of Applied Engineering Research (IJAER) "An Approach for Surface Reconstruction" ISSN 0973-4562 Vol.2 no.1 (2007). pp. 65-80

- "Methods of Obtaining Smooth Surface in 3D Surface Reconstruction", International Conferences on Engineering Education ICEE,27-31 JULY 2008 PÉCS-BUDAPEST, HUNGARY

- "Automatic Feature Extraction from 3D Face", 2nd International Conference on NTMS 2008, Tangier, Morroco, November 5-7, 2008.

- "Journal of Design and Research" (JDR) " Healing of Missing Surface: Pivotal Approach towards Reconstruction of Doubly Curved Surface ISSN (print): 1748-3050 -2008

- International Journal of Applied Engineering Research (IJAER) "An approach towards Offsetting of Object in Non-manifold 3-D Geometric Modeling" ISSN 0973-4562 Volume3 no.1 (2008). pp. 1-14.

- The Arabian Journal for Science and Engineering"(AJSE) Healing of Surfaces Using Complex Topology (Ri 3) and Geometry ISSN 1319-8025

- "Methods used to generate composite gait sequence features" IEEE International conference on soft computing, Alwar, 18-19 Nov'08.

- "Designing Handicrafts using Information Communication Technology", International Conferences on Engineering Education ICEE-2009 , 17th Fl. Korea Technology Center Teheran Str.305 Kangnam-Gu, Seoul.

- "Human Gait Analysis on the Basis of Average Appearance Features" IEEE International conference (ICIT-09), Bahadurgarh, 18-19 June'09

- "Biometric Based Watermarking in Audio Signals", Proc. of International Conference on Multimedia Information Networking and Security, (MINES) IEEE Computer Society, Wuhan, China, November 2009.

- "Biometric Based Unique Key Generation for Authentic Audio Watermarking", Proc. of International Conference on Pattern Recognition & Machine Intelligence, (PReMI), Springer-Verlag LNCS series. IIT - Delhi, India, December 2009.

- "Perceptible Audio Watermarking for Digital Right Management Control", Proc. of 7th International Conference on Information, Communications and Signal Processing, (ICICS) IEEE Explore, Macau, December 2009.

- "Blind Watermarking in Audio Signals using Biometric Features in Wavelet Domain", Proc. of TENCON 2009, IEEE Explore, Singapore, December 2009.

- "An Efficient Algorithm for Underdetermined Blind Source Separation of Audio Mixtures", Proc. of International Conference on Advances in Recent Technologies in Communication and Computing (ARTCom) IEEE Explore, Kottayam, India, October 2009.

- *"Audio Watermarking Using Pseudorandom Sequences Based on Biometric Templates"*, Journal of computers(JCP), Academy Publishers, Finland. Scheduled to be published in Volume: 5, Issue: 6 of Year 2010.
- "Human Recognition in passive environment using Bidirectional associative memory"- ACM international conference on Futuristic Computer Applications (ACM-ICFCA 2010), IISc., Bangalore, India, March 20-21, 2010.

Professional Memberships:-

- Member of Research degree committee in U.P. Technical University.
- Member of Board of U P secondary education
- Member of Board of studies of U P Technical University
- Expert member of NBA of AICTE.

Courses Taught:

- Design and Analysis of algorithm.
- Theory of computation (to B.Tech students).
- Data structure & C.
- Information systems.
- Software Engineering.
- Theory of computation (will teach to M.tech students).

Projects Guided:

- Guided 40 B. Tech projects.
- Guided 1 M tech student.
- Guiding currently 5 students for Ph. D degree.

Brief Abstract of the Ph. D's being supervised :

- ***"Design & Development of Generic Algorithm of Reconstruction of 3D CAD Models":***The Aim of the research work is the reconstruction and an approximation of 3D CAD model from an unorganized collection of points. Applications include Rapid prototyping, Reverse engineering of existing object for use in a virtual prototyping environment including CAD and manufacturing. A reconstructionapproach needs to be developed which is flexible enough to permit interpolation of both smooth surfaces & sharp feature keeping few restrictions on geometry/topology of object.

- ***"Fusion of Anatomical Medical Image Data with Functional Image Data":***The Aim of the proposed research work is to create a single image from Anatomical Image and Functional images. The resultant image will contain both the Anatomical and Functional information.

- ***"A Biometric System for the Identification of Sculptures":***This research work attempts to develop an intelligent Biometric System which can uniquely identify any sculpture's period based on its characteristic and iconographic features along with some additional information based on certain measurements. As it is already revealed that different sculptures belonging to different dynasties have very unique characteristic & iconographic features. Based on this information this research aims at developing a system to identify various sculpture's age or era.

- ***"Biometric system using human gait "****:* The goal is to describe the motion of a moving human figure in order to recognize individuals by variation in the characteristics of the motion description. We develop a method that reduces the influence of backpacks, bags and shoes on the feature extraction and fuses with multiple biometric modalities and finally, group the resulting features and find a standard value for a group of people depending on their age and sex. At last consider the above mentioned standard values as an threshold we

approximately find that how far a patient is from his actual gait patterns by comparing the patient's gait features with the threshold.

Colloquia or Seminars Organized:

- Symposium on "Biometrics & Network Security" at HBTI, Kanpur on 15-17, Feburary-2005
- International Symposium on "Recent Trends in Biometric Identifications" at IIT, Kanpur on 15-16, April-2005
- Workshop on "Java, J2EE, WebSphere, Linux Technologies" conducted by IBM professionals at HBTI, Kanpur on 11-13, June-2005.

Personal Information:

- *Father's Name* : Mr. Ram Anuj Pathak
- *Date of Birth* : June 2, 1969
- *Nationality* : Indian