Chaman Singh Verma

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Education:

PhD in Computer Science (2011-Expecting July 2016)
University of Wisconsin-Madison, Madison
Advisor: Krishnan Suresh, Vadim Shapiro

MS in Computer Sciences (2011)
University of Wisconsin-Madison, Madison

MS in Computer Sciences (2004)
College of William and Mary, Williamsburg, Virginia

Three courses in Geometric Modelling and Scientific Computing (2003)
Deparment of Computer Science,
Mississippi State University, Starkville, MS

M.Tech in Aerospace Engineering (1994)
Indian Institute of Technology, Kanpur, India

B.Tech in Aerospace Engineering (1992)
Indian Institute of Technology, Kharagpur, India

B.Sc in Mathematics (1988)
University of Rajasthan, Ajmer, India

Research Interests:

- Computational Geometry, Mesh Generation and Processing.
- Applied Differential Geometry.
- Applied Topology, Geometric and Topological Data Analysis.
- Parallel and Distributed Computing.
- Performance Analysis of Parallel Algorithms, Large Scale Graph Analytics.
- Computer Vision and Data Visualization tools.
- Machine Learning.

Work Experience (22 years)

1. University of Wisconsin (2009-2012), Department of Nuclear Physics
   Position : Research Assistant
   Project : Hexahedral mesh generation.

2. ZeusNumerics, Pune, India 2008-2009
   Position : Consultant
   Project : Development of large scale CFD and mesh generation applications.

3. CalSoft, Pune, India 2007-2008
   Position : Senior Technical Officer
   Project : Performance analysis of SSD filesystems for scientific and large scale multi media applications. In-charge of 20 members software development team.

4. Argonne National Laboratory, Argonne, IL, USA (2004, 2007)
   Position : Pre-doctoral research scientist (Advisor: Dr. Paul Fisher now at UIUC)
   Project : Development of All-Hex meshes for Vascular Geometries.

5. Engineering Research Center (ERC) Mississippi State University, MS (2000-2002)
   Advisor : Prof Bharar Soni
   Position : Reseach Associate
   Project : Developing CFD applications using Loci parallel functional programming language.

6. Center for Development of Advanced Computing, Pune (India) 1994-2000
   Position : Member of Technical Staff
   Project : Porting scientific applications on distributed memory machines, performance analysis and benchmarking of applications and parallel compilers on various shared and distributed memory architecture machines.

Publications:

1. Alpha-MST: A Robust Unified Algorithm for Quadrlateral Mesh Adaptation.
   Chaman Singh Verma, Krishnan Suresh
   Accepted in International Meshing Roundtable Conference Washington DC 2016.

2. A Robust Combinatorial Approach to Reduce Singularities in Quadrilateral Meshes.
   Chaman Singh Verma, Krishnan Suresh
   Accepted in special issue in CAD journal.

3. CQMG: An Indirect Approach to Low Singularities and Bounded Distortion Quad Meshing.
   Chaman Singh Verma, Krishnan Suresh
   Accepted in CAD Journal.

4. A Robust Combinatorial Approach to Reduce Singularities in Quadrilateral Meshes.
   Chaman Singh Verma, Krishnan Suresh,
   24th International Meshing Roundtable Conference, Austin, Texas, 2015

5. Towards FEA over Tangled Quads.
   Chaman Singh Verma, Krishnan Suresh
   23th International Meshing Roundtable Conference, London, UK, 2014

6. Jaal: Engineering a high quality all-quadrilateral mesh generation.
   Chaman Singh Verma, Tim Tautges
   20th International Meshing Roundtable Conference, Paris, France, 2011

7. An All-Hex Meshing Strategy for Bifurcation Geometries in Vascular Flow Simulation.
   Chaman Singh Berma, Paul Fischer
   14th International Meshing Roundtable Conference, San-Diego, 2005

Major Projects (Open source)

For the last 24 years, I have been passionately exploring various sequential and parallel programming languages, reusable components, robust and reliable computations. The following four very large projects are being single-handedly developed by me.

1. ***Jaal: An Integrated Geometry Processing Toolkit:*** This software integrates various geometric processing and meshing algorithms. It is written in C++ with an objectivity of multi-core parallelization with TBB, CilkPlus, OpenMP and MPI libraries. More than 50 open-source softwares (CGAL, libIGL, diffusion geometry etc) have been integrated and interfaces simplified.

2. **RelNet:** The objectives of the ***Rel****ationNet****work*** are creation, manipulation, and study of the structure , dynamics of complex social networks. It integrates various functionalities of Boost Graph library, NetworKit, GraphChi, SNAP, and GraphViz softwares. This software uses in-memory **BerkeleyDB** as backend storage and extremely large graphs (order of Terabytes on a home desktop). Many hash-functions such has Cookoo hashing and Locally Sensitive hashing have been implemented to map graph entities to the database. Many expander graph generation, spectral clustering and graph analysis algorithms have been parallelized using TBB, CilkPlus, and Intel Performance library.

3. **ATopNet:** This **A**pplied **Top**ology **N**etwork toolkit integrates algorithms in Dionysus, Gudhi, CTL, Chomp etc software. The algorithms have been rewritten to take advantages in the latest C++14 and the Boost library. Similar to RelNet software this software supports out-of-core computations using BerkeleyDB as storage engine.

4. **JaalVis:** Debugging computational geometry algorithms can be very painful. This software is aimed to visualize geometric structures in all the three software listed above in addition to allow debuging geometric algorithms in 2D and 3D by various slicing, cutting, coloring, and animation tools.

Awards:

- Best Member of Technical Staff, Center for Development of Advanced Computing, Pune, 1998.
- Rajasthan Education Board, on securing 7^{th} position in 10^{th} class, 1984,
- Rajasthan Education Board, on securing 8^{th} position in 12^{th} class, 1986

Internships:

1. Aeronautical Development Agency, Bangalore (India) : April 1991-Sep 1991
   Project-1: Development of visualization software for vortex shedding behind blunt objects.
   Project-2: Development of visualization software for temperature distribution over space vehicles.

2. Vikram Sarabhai Space Center, Trivendrum (India) : August 1998-Dec 1998
   Porting of Octree based CFD codes on distributed memory machines.

3. Russian Academy of Sciences, Moscow, (Oct 1999-Dec 1999)
   Porting scientific codes on PARAM Supercomputers.

4. Bhabha Atomic Research Center, Bombay (India) June 1994- Dec 1994
   Development of Finite-Element-Analysis codes for turbine blades.

5. Bhabha Atomic Research Center, Bombay (India) March 1994-June 1994
   Experiment studies on flow through porus media.

Teaching Experience:

1. Teaching Assistant : Spring and Fall 2014
   Engineering Graphics: Department of Mechanical Engineering
   University of Wisconsin, Madison

2. Teaching Assistant : Spring and Fall 2013
   Engineering Graphics: Department of Mechanical Engineering
   University of Wisconsin, Madison

3. Teaching Assistant : Spring and Fall 2013:
   Discrete Mathematics: Department of Mathematics
   University of Wisconsin, Madison

4. Instructor : (1995-2000)

High performance computing, Parallel and Distributed Computing
Department of Computer Science, University of Pune, India
Department of Computer Science: College of Engineering, Pune, India
Department of Computer Science: Army Institute of Technlogy, Pune, India

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References:

1. Prof. Krishnan Suresh
   2059 Department of Mechanical Engineering, University of Wisconsin, Madison
   Ph: 608-262-3594, E-mail: ksuresh@wisc.edu

2. Prof. Vadim Shapiro
   Department of Computer Science, University of Wisconsin, Madison
   Ph: 608-262-3591, E-mail: vshapiro@engr.wisc.edu

3. Prof. Kim Manner
   Department of Mechanical Engineering, University of Wisconsin, Madison.
   Ph: 608-262-4825, E-mail: kmanner@engr.wisc.edu