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Research Faculty

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Computer Science at the University of Calgary

About CPSC

The Department of Computer Science continues to grow and flourish at the University of Calgary. This year we were pleased to welcome Dr. Rei Safavi-Naini as Professor and iCORE Chair in Information Security. We provide a stimulating environment for our approximately 150 doctoral and masters graduate students. The faculty, staff and students all strive to make Computer Science at the University of Calgary a great place to work and study.

Research Focus

The University of Calgary is committed in advancing its role as a research university. Computer Science has earned a reputation for high quality research and as new faculty join our department, more and more international collaborations are being forged, placing us among the best worldwide. Our faculty is excited about their research projects, many of which are inter-disciplinary, bringing computer science to fields such as medicine, biology, art and kinesiology.

Noteworthy

Denilson Barbosa was successful in receiving an AIF “Ingenuity New Faculty Award”.

Saul Greenberg appointed as University Professor in recognition of his contributions to research and the University of Calgary.

Saul Greenberg and Sheelagh Carpendale awarded an iCORE/Smart Technologies Industrial Chair in Interactive Technologies.

The CHCCS (Canadian Human Computer Communications Society) announced Saul Greenberg, as the recipient of an achievement award, for being one of the world's leaders in human-computer interaction and computer-supported collaborative work.

Frank Maurer received a 2006 IBM Eclipse for Innovation Award for his work on agile acceptance testing of distributed J2EE applications

Robert Walker received a 2 year NSERC CRD Grant, his industrial partner is IBM Canada Ltd.

Carey Williamson appointed as an iCORE Chair in Performance Network.

The iGem team supervised by Christian Jacob was awarded first place in the “Conquest of Adversity” category at MIT’s iGem Competition to design and build genetically Engineered Machines. The team is comprised of students from both the Bachelor of Health Science and Computer Science programs.

Lori Shyba, Jim Parker’s PhD student, won the J.B. Hyne Research Innovation Award.

Jeff Boyd, awarded a NSERC Strategic Grant and is collaborating with J. Denzinger and A. Ramirez.

Moustafa Hammad awarded an NSERC-CRD as a CO-PI on the project “Intelligent Information Infrastructure for Wireless Multi-sensor Motes Applications” with Foothills Forest, Elk Valley Coal Corporation, and Wireless Edge Canada.

Karel Bergmann, Jeffrey Erman, Jordan Kidney, Quang Trinh, and Min Xin, were the first recipients of Computer Science’s Teaching Assistant Excellence Awards!

Gus Gutoski awarded the prestigious Chancellor’s Graduate Medal for academic standing.
Funding research remains an ongoing challenge and although funding has increased slightly from industry and the University of Calgary, government grants continue to provide the bulk of these essential funds. This year the major increase in government funding is due to the hiring of Dr. Safavi-Naini and the inclusion of her iCORE award. Cuts to government funding and increased competition for government grants will remain a challenge in future years.

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### Graduate Students Scholarships continued

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<td>James McElroy, PhD</td>
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# MSC and PhD Final Oral Examinations

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<td>Adnan, Muhaimenul</td>
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<td>Incrementally Mining Dynamic Databases and Overcoming Main Memory Bottleneck in Mining Huge Databases</td>
<td>Reda Alhajj</td>
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<tr>
<td>Agyemang, Malik</td>
<td>PHD</td>
<td>Web Content Outlier Mining: Motivation, Framework and Algorithms</td>
<td>Ken Barker</td>
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<td>Ashraf, Fatima</td>
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<td>ClusTex: Using Clustering Techniques for Information Extraction from HTML Pages containing Semi-Structured Data</td>
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<td>Bao, Yuliang</td>
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<td>Hybrid Cache Invalidation Schemes in Mobile Computing Environments</td>
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<td>Bhawnani, Pankaj</td>
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<td>An Integrated Method for ‘When to Release’ Decisions Based on Reliability?</td>
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<td>Boyden, Sean</td>
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<td>Costa Sousa/Samavati</td>
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<td>Cai, Yong Xue</td>
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<td>Cherlin, Joseph</td>
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<td>Sketch-Based Modeling of Parametric Surfaces using Few Strokes</td>
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<td>Cieslak, Mikolaj</td>
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<td>Stochastic Simulation of Pattern Formation: An Application of L-systems</td>
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<td>Davis, Guy Dylan</td>
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<td>Elliot, Kathryn</td>
<td>MSC</td>
<td>Contextual Locations in the Home</td>
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<td>Fanea, Elena</td>
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<td>Establishing Graphical and Formal Relationships between Visualizations of Multi-Dimensional Data</td>
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<td>Gaurav, Abhishek</td>
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<td>CoAllocation of Compute and Storage Resources in Grid Environments</td>
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<td>Shared Randomness and Entanglement in Communication Complexity</td>
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<td>Optimizing Web Proxy Cache Placement</td>
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<td>Comparing Particle Swarms and Evolution Strategies: Benchmarks and Application</td>
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<td>Kian Mehr, Keivan</td>
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<td>CAR SVM: Classification by Integrating Class Association Rules and Support Vector Machine</td>
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<td>An Environment for Collaborative Agile Planning</td>
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<td>Lo, Chiu Wa Anthony</td>
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<td>VIREX: Powerful Visual Tool for Simple and User-friendly Querying of Relational Databases to Produce XML Documents</td>
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<td>Facial Model Metamorphosis Using Geometrical Methods</td>
<td>Marina Gavrilova</td>
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<td>Luo, Huiming</td>
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<td>Rob Kremer</td>
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<td>Madhukar, Alok</td>
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<td>Peer to Peer (P2P) Traffic Classification</td>
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<td>Characterising Usage of the AirUC WLAN</td>
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<td>Mahmud, Shafquat</td>
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<td>When Should Crosscutting Concerns Be of Concern in the Software Development Lifecycle?</td>
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<td>Mason, Katherine</td>
<td>PHD</td>
<td>A Framework for Element-Based Computer Graphics</td>
<td>Sheelagh Carpendale</td>
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<td>McEwan, Gregor</td>
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<td>Community Bar: Designing for Informal Awareness and Casual Interaction</td>
<td>Saul Greenberg</td>
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<td>Neustaedter, Carman</td>
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<td>Domestic Awareness and the Role of Family Calendars</td>
<td>Saul Greenberg</td>
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<td>Olsen, Luke</td>
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<td>Constraining Wavelets for Multiresolution</td>
<td>Samavati/Costa Sousa</td>
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<td>Ozyer, Tansel</td>
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<td>Alternative Approaches for Producing and Ranking Alternative Clustering.</td>
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<td>Poon, Kelly Lin</td>
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<td>Physically-Based Modelling of Flowers</td>
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<td>Prakash, Jerrall</td>
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<td>Ramachandran, Shantha</td>
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<td>Numerical Results on Class Groups of Imaginary Quadratic Fields</td>
<td>Michael Jacobson</td>
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<td>Rashid, Jibran</td>
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<td>Nonlocality and the No-Signalling Polytope</td>
<td>John Watrous</td>
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<td>Schmidt, Ryan</td>
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<td>Interactive Modeling with Implicit Surfaces</td>
<td>Brian Wyvill</td>
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<td>Faramarz Samavati</td>
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<td>Siadat, Seyed</td>
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<td>An Evaluation of Simultaneous Evolvability and Efficiency in Aspect-Oriented Software Development</td>
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<td>Smith, Colin Terence</td>
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<td>On Vertex-Vertex Systems and Their Use in Geometric and Biological Modelling</td>
<td>P. Prusinkiewicz</td>
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<td>Strömer, Julie</td>
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<td>Immersive and Interactive Visualization of Volume Interiors with a Flashlight-Based Detail-in-Context Lens Tool</td>
<td>Barker/Christoph Sensen</td>
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<td>Trinh, Quang</td>
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<td>Semantic Interoperability Between Relational Databases in Large-Scale Environments</td>
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<td>Udechukwu, Ajumobi Okwuchukwu</td>
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<td>Xiong, Wenliang</td>
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<td>Frank Maurer</td>
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# Research Personnel

## Post Doctoral Fellows

<table>
<thead>
<tr>
<th>Name</th>
<th>Research Area</th>
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<tbody>
<tr>
<td>Isenber, Tobias</td>
<td>Applying non-photorealistic rendering to information visualization (Carpendale)</td>
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<td>Hofstra, Peter</td>
<td>Theoretical Computer Science (Cockett)</td>
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<tr>
<td>Barbier de Reuille, Pierre</td>
<td>Biological Modelling &amp; Visualization (Prusinkiewicz)</td>
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## Researcher

<table>
<thead>
<tr>
<th>Name</th>
<th>Area of research/lab</th>
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<tbody>
<tr>
<td>Arlitt, Martin</td>
<td>Wireless Networks/Williamson/Unger</td>
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<td>Bauld, Eric</td>
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<td>Bowes, Jeff</td>
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<td>Cossette, Brad</td>
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<td>Curry, Roger</td>
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<td>Kiddle, Cameron</td>
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<td>Kivi, Derek</td>
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<td>Lane, Brendan</td>
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<td>Wong, Nelson</td>
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<td>Wu, Yujing</td>
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</tbody>
</table>
Research Personnel continued

Graduate students

Degraaf, R
Leighton, Gregory
Agyemang, Malik
Duta, Angela
Rahman, Rasheed
Williams, Pele
Joevenazzo, Jill
Sadikali, Akil
Hindrichs, Uta
Keijser, Jeroen
Tat, Annie
Tobiasz, Matthew
Guo, X
Nichols, Sean
Tang, Ning
Anastacio, Fabricio
Kidney, Jordan
Zheng, Wei Wei
Apu, Russel
Bhattacharya, Priyadarshi
Hasan, Mahmudul
Monwar, Maruf
Luo, Yuan
Larkin, Wecker
Diaz-Marino, Rob
Elliot, Kathryn
McEwan, Gregor
Smale, Stephanie
Neustaedter, carman
Hegazy, Islam
Mohammed-Farrag, Fatima
Omotayo, Adesola
Kamaluddeen, Nuha
Dohotaru, Catalin
Zhang, Hongchao
Bhalla, Navneet
Pilat, Marcin
von Mammen, Sebastian
Bergman, Karel
Hirt, Andreas
Krivoruchko, Taisya
Lorimer, William
Ramchandran, Shantha
Velichka, Mark
Becerra, Gabriel
Heard, Jason
Gopinathan, Ajay
Basher, Naimul
Erman, Jeffrey
Sessini, Phillipa
Deng, Chengyao
Melnik, Grigori
Morgan, Robert
Park, Shelly
Cieslak, M
Smith, Richard
Sekhon, Ravdeep
Wang, Chengfeng
Wang, Y
Bhawnani, Pankaj
Du, Gengshen (Kelly)
Li, Jingzhou
McElroy, James
Saliu, Omolade Moshood
Ullah, Irfan
Al-Emran, Ahmed
Mohamed, Abdallah
Brosz, J
Chen, Hung-LI
Severn, A
Sadeghi, Javad
Shirmohammadi, Mitra
Eshraghi, Mahsa
Aikema, David
Akshay, Abhinav
Elahi, Tanvire
Markatchev, Nayden
Tan, Tingxi
Rzik, Philip
Cottrell, Rylan
Holmes, Reid
Mahmud, Shafquat
McIntyre, Mark
Rawal, Bhavya
Siadat, Jamal
Gavinsky, Dmitry
Gerhardt, Heath
Rashid, Jibran
Boyden, Sean
Cao, Jean
Gong, Minwei
Parvez, KN
Obied, Ahmed
DeGroot, Erwin
Jepp, Pauline
## Undergraduate students and their supervisors

<table>
<thead>
<tr>
<th>Name</th>
<th>Supervisor</th>
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<tbody>
<tr>
<td>Park, Justin</td>
<td>Barbosa</td>
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<td>Zholudz, Yanina</td>
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## Visitors

<table>
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<tr>
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<tbody>
<tr>
<td>Johnen, Collette</td>
<td>LRI, Universite de Paris, Sud, France</td>
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<tr>
<td>Kawash, Jalal</td>
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<td>Flores Mendez, Roberto</td>
<td>Christopher Newport University, Virginia, USA</td>
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<td>Tessem, Bjornar</td>
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<td>Oliver, Michel</td>
<td>Universite d’Evry Val d’Essonne , France</td>
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Seminars

Computer Science throughout the year encourages and supports information sharing by hosting seminars presented by individuals within the department and by invited speakers.

Department Presentations
Carey Williamson  An Inside Look at WWW2007

Invited Speakers

Andy Cockburn  Faster (and faster) scrolling with automatic zooming and space-filling thumbnails
Antoine Spicher  Paths and Patches: Declarative Handling of Multi-Dimensional Data-Structures
Helen Sharp  Empirical Studies of Software Development
Takeo Igarashi  Interactive “smart” Computers (Sketching Interfaces for 2D/3D Graphical Applications
Colette Johnen  Implementing Read/Write State Models with Link-Registers
Marco Dorigo  Self-assembling in Swarm Robotics: The Swarm-bot Project
John Wilkes  Tuscany – economy-based service-oriented computing
Bill Bone  Sizing up the Next Big Thing in Information Technology
Philippe Kruchten  Software Architecture Decisions – A Missing Element in Architectural Knowledge
Stephen Viller  Lo-fi matchmaking: A Study of Social Pairing for Backpackers
Tim Bell  Computer Science Unplugged
Steven Tanimoto  Transparent Interfaces to Software Systems: Helping Users Understand Their Tools
Hiroaki Ogata  Computer Supported Ubiquitous Learning in the Context of Language Learning
Gail Murphy  Reducing Information Overload for Software Developers
Gregor McEwan  Supporting teams collaborating remotely
Rob Deline  “HIP” Tools for Software Development
(with Gina Venolia and Andrew Begel)
Volker Wulf  A Practise-based Approach to Human Centred Computing
Ihab Ilyas  The RankDB Project: Supporting Ranking in Database Systems
Catherine Plaisant  Network Visualization: Seeking Alternatives to the Traditional Node Link Diagram
Andrea Bunt  Supporting Interface Customization Using a Mixed-Initiative Approach
Pau Atela  New Geometric Concepts for Phyllotaxis
Andrea Bunt  Supporting Interface Customization Using a Mixed-Initiative Approach
Sergei Bereg  Open Problems in Computational Geometry
Lionel C. Briand  Ensuring the Dependability of Software-Intensive Systems
Michael M. Richter  Similarity and Utility
Paolo Cappellari  Model Independent Schema and Data Translation
Ton Kalker  The State of Digital Watermarking
Mary Cummings  Decision and Collaboration Support for Time-Critical Unmanned Vehicle Operations
(with Stacey Scott)
Geoff Moon  Intellectual Property and Commercialization
Graduate Seminars

Stephanie Smale
Broadcasting Information via Display Names in Instant Messaging

Anguo Dong
ByCT: Bluejay Comparison Tool

Ye Wang
Simulating Chinese calligraphy and ink painting in real time

Jibran Rashid
Introduction To Nonlocality

Mikolaj Cieslak
Stochastic Simulation of Pattern Formation: An Application of L-systems

Pankaj Bhawnani
An Integrated Method for ‘When to Release’ Decisions Based on Reliability

Yuan Luo
NPAR by Example: Line drawing facial animation from photographs

Shafquat Mahmud
When Should Crosscutting concerns Be of Concern in the Software

Keivan Kian Mehr
Effective Classification by Integrating Support

Muhaimenul Adnan
Incremental Mining of Association Rules in Dynamic Databases

Luke Olsen
Constraining Wavelets for Multiresolution

Gabriel Becerra
A Social Commitment-Based Agent-Controlled Constraint Environment: An Implementation and Investigation

Wenliang Xiong
In-Container Testing for Web Portal Applications

Aniket Mahanti
Characterising Usage of the AirUC WLAN

Shantha Ramachandran
Numerical Results on Class Groups of Imaginary Quadratic Fields

Torin Taerum
Real-Time Super Resolution Contextual Close-up of Clinical Volumetric Data

Phil Rizk
A GridFTP Overlay Network Service

Aaron Severn
A sketch-based approach to assembling subdivision surfaces with Boolean operations

Carman Neustaedter
The Calendar is Crucial”: Coordination and Awareness Through Family Calendars

Sean Boyden
Multimedia Streaming with TCP Vegas

Julie Stromer
Immersive and Interactive Visualization of Volume Interiors

Priyadarsih Bhattacharya
CRYSTAL - A new density-based fast and efficient clustering algorithm

Jamal Siadat
An Evaluation of Simultaneous Evolvability and Efficiency In Aspect-Oriented Software Development

Lakin Wecker
Repairing Terrain: A multiresolution approach

Nuha Kamaludden
Comparing Dynamic Software Transactional Memory and Locking Implementations of XML Documents

Art Exhibits

G. Hushlak, C. Jacob, N. Bhalla, P. Nuytten, S. Novakowski
Installation at the Victoria Convention Centre by Jeff Boyd, Christian Jacob, Jerry Hushlak and their students entitled “Surveillanceart.com”.

Workshops and Conferences

Marina Gavrilova
Int'l Symposium on Voronoi Diagrams in Science and Engineering (ISVD 2006)

Peter Hoyer
6th Canadian Summer School on Quantum Information Processing (EQUIPS06)

Robin Cockett
Foundational Methods in Computer Science (FMCS06)

Robin Cockett
Categories and Semigroups Workshop, 2006

Carey Williamson
SummerSim 2006
Faculty

**REDA ALHAJJ, Professor**

Reda's primary research is focused on object-oriented databases, data integration and re-engineering, data mining, multiagent systems, character recognition, bio-data mining and analysis.

**Selected publications 2006/2007:**


**Project:**

- Data mining, Biocomputing and Bioinformatics, XML and Data Re-engineering.

**Graduate Students:**

- **Muhaimenul Adnan**, PhD – Incremental Mining Techniques
- **Mohammed S. Alshalalfa**, MSc – Bioinformatics and Biocomputing
- **Derar Hasan Assi**, MSc – Data Mining
- **Sajib Barua**, PhD – Multiagent based approach for spatial outlier mining
- **Jeff Chang**, MSc – Association-Rules Mining
- **Furat Fawzi**, MSc – Relational Database into Fuzzy XML
- **Micheal Hanna**, MSc – Natural Language Interface to Databases.
- **Mohammad Khabbazhaye Tajer**, PhD – Data Mining
- **Keivan Kian**, PhD – CARSVML Classification by Integrating Class Association Rules
- **Igor Kiselev**, MSc – Multiagent Systems
- **Anthony Lo**, PhD – XML Databases
- **Lizhe Ma**, MSc – XML Databases
- **Faraz Rasheed**, PhD – Web databases
- **Jia Zeng**, PhD – Multiagent based approach for TIS Prediction
- **Ming Zhang**, PhD – Mining XML Documents

**http://www.cpsc.ucalgary.ca/~alhajj**
John Aycock, Assistant Professor

Research Interests:

John has been researching computer viruses, worms and other malicious software for several years, and is now looking at spam and spyware too. These are huge problems in our computer-dependent society, and it is vital that future threats are identified and countered.

One reason for lapses in computer security is program error. John also looks at software tools and programming languages which make the programming task easier and less error-prone.

Selected publications 2006/2007:


Project:

- SPARK, a toolkit for implementing domain-specific languages in Python.

Graduate Students:

Randal Acton, Phd – AI and multi-agent systems in information security (co-supervisor J. Denzinger)
Rennie de Graaf, MSc – Applied Network Security (co-supervisor M. Jacobson)
Nathan Friess, MSc – Botnets and related privacy issues
Margaret Nielsen, MSc – Privacy issues
Ryan Vogt, MSc – Sandboxing for computer security. (co-supervisor M. Jacobson)

http://pages.cpsc.ucalgary.ca/~aycock/
Denilson Barbosa, Assistant Professor

Denilson is interested in all aspects of databases and the Web, particularly the management of semi-structured data and XML. XML has become the standard format for encoding and exchanging data on the Web, and is becoming increasingly popular as underlying format for standard office applications, such as text-editors and spreadsheets. As a result, there is an increasing need for efficient XML data management techniques.

Denilson has also been working on autonomous data management, which aims at developing database systems that can improve their performance over time. In particular, he has been working on benchmarking autonomic tools and developing learning-based techniques for improving the efficacy of such tools.

Selected publications 2006/2007:


Projects:

• XML Data Management for Web Services, NSERC.
• Autonomic Data Management.
• ToXgene, a declarative generator of synthetic XML data.

Graduate Student:

Gregory Leighton, PhD – XML Data Management
Justin Park, MSc – XML Data Management

http://pages.cpsc.ucalgary.ca/~denilson/
**KEN BARKER, Professor and Head**

Ken’s research interests are quite wide-ranging under the general umbrella of database systems. Much of recent work has focused on various applications of data mining but contributions have also been made to areas of health informatics, mobile data management, XML repositories, data design, data integration, data security, and bioinformatics. He is now beginning a project aimed at created a privacy-preserving database management system.

**Selected publications 2006/2007:**


**Project:**


**Graduate Students:**

- **Steven Choy**, MSc – XML Data Modeling
- **Nelson Chu**, PhD – Tuple Space in Grids
- **Anguo Dong**, MSc – Data Mining (co-supervisor C. Sensen)
- **Angela Duta**, PhD – XML, data security and privacy
- **Paul Gordon**, PhD – Databases
- **Jeroen Keijser**, MSc – Presence in virtual Reality (co-supervisor S. Carpendale)
- **Brenan Mackas**, MSc – Databases
- **Christopher Marriott**, PhD – Databases
- **George Shi**, PhD – Ontology based Geospatial Information Retrieval and Extraction
- **Julie Stromer**, MSc – Next generation bioinformatics (co-supervisor C.Sensen)
- **Adepele Williams**, PhD – Concept hierarchies in data mining
- **Hong Xu**, MSc – Databases
- **Omotayo Adesola**, PhD – Development of efficient information for data management

Jeffrey’s research is in the area of computer vision, focusing on the analysis of motion. Much of his work has been in the area of biometric recognition of people by their gait. He co-authored an early paper that described a method that could identify individual people by looking at temporal patterns in the descriptions of walking figures. As worldwide interest in biometrics grows, Jeffrey is refining techniques in an effort to build machine systems that emulate the way humans interpret the motion they see. Jeffrey also does work on multi-media information systems that extract descriptions of dynamic scenes from video cameras, and build models of the scene for archival, transmission, and display for remote viewers. These systems combine low-level video processing algorithms with XML documents exchanged over a network to build elaborate systems for multimedia surveillance. Applications of the work include multimedia network broadcast of sporting events, surveillance for traffic and security, and interactive art.

Selected publications 2006/2007:


Projects:

• Human motion analysis: the development of a machine vision systems that evaluate human athletic performance by emulating the way humans interpret the motion of athletes.
• Tracking Systems for Multimedia Sports Broadcast: Systems that extract object trajectories of humans and other moving objects from video sequences. The extracted information is used to build dynamic scene models that we can archive, transmit over a network and display. One significant application we are developing is tracking hockey players in order to analyze their motion for coaching purposes, or for broadcast to viewers.

Graduate Students:

Jill Joevenazzo, MSc – Gait perception using passive dynamic walkers
Quoc Nguyen, MSc – Computer Vision
Akil Sadikali, MSc – Computer Vision

http://pages.cpsc.ucalgary.ca/~boyd/
Sheelagh Carpendale, Associate Professor & Canada Research Chair in Information Visualization

Research Interests: As a researcher in information visualization methodologies, Sheelagh explores different ways of making the invisible visible, and develops new interaction methods to support people actively exploring and manipulating information spaces. The goal is to promote comprehension by creating effective visual tools. Creating visualizations poses problems both in terms of developing appropriate information representations and presenting those representations in a manner that is meaningful to the user. While her research has concentrated on the second point, presentation issues, Sheelagh includes sufficient representational research in order to ground her work in real data, real tasks and real users.

Selected publications 2006/2007:

Projects: • Elastic presentation.
• Collocated collaboration.
• Interactions on large displays.
• Visualizing human dialogues.
• Visualizing uncertainty in data.

Graduate Students: Mark Hancock, PhD – Exploring Issues in 3D Collaborative Tabletop Interfaces
Uta Hinrichs, MSc – Integrated input for tabletop displays
Jeroen Keijser, MSc – Alternate control/display space mapping for 3D interaction (co-supervisor K. Barker)
Petra Neumann, PhD – Collaborative Information Visualization Interfaces
Eric Penner, MSc – Interactive exploration of 3D Visualization (co-supervisor R. Mitchell)
Charlotte Tang, PhD – Asynchronous, Collocated Collaboration
Annie Tat, MSc – Visualization Human Dialog
Matthew Tobiasz, MSc – Information Visualization
Torre Zuk, PhD – Visualization uncertainty

http://innovis.cpsc.ucalgary.ca
Dr. Cockett and his students use categorical proof theory to understand program semantics and to design programming languages with special formal properties. For example; How can one design a concurrent programming language which cannot deadlock or livelock? Using the proof theory of linear logic it is actually possible to provide such a system, however, this is far from the end of the story. There remains practical issues: How complex is the required semantic checking (type checking, linearity constrains etc.); What is the operational semantics of such a language (e.g. abstract machines, interface with operating system etc.); How expressive is such a language (useability and theoretical expressive power), etc.


- Channel based concurrency (with C. Pastro and L. Santocanale).
- Classical restriction categories (with Ernie Manes and X. Guo).
- Computability and realizability theory for restriction categories (with P. Hofstra and X. Guo).
- Smooth and differential categories (with R. Blute and R. Seely).
- Program transformation tools for datatypes (with V. Vene).
- Flow graph optimization for compilers (with M. Burrell).
- Type checking for termination and uniqueness in the CHARITY programming language (with D. Harrington).

Brett Gilles, MSc – Implementation and semantics of quantum programming languages
Xiuzhan Guo, PhD – Decision problems in linear categories
Sean Nichols, MSc – Category Theory
Ning Tang, MSc – Model compiler optimizations using Categorical Theory

http://pages.cpsc.ucalgary.ca/~robin
Mario’s research interests are scientific and medical visualization, computer graphics and animation techniques. He performs research in non-photorealistic rendering (NPR), illustrative visualization, 3D modeling and volumetric display software.

Selected publications 2006/2007:

Project:
- Research and development of NPR methods for 3D model construction/analysis, natural media simulation, rendering techniques and systems for computer-generated illustrative visualization and composition in two main contexts: (1) Traditional illustration, by providing tools to help scientific and medical illustrators with the complexities of their work, preserving their style and adapting to their preferred ways of thinking and working; (2) Scientific analysis and visualization, by mainly providing novel ways on visualizing scientific data, physical phenomena, simulations, etc., and by presenting abstractions to users in ways that reconcile expressiveness and ease-of-use.

Graduate Students:
- Fabricio Anastacio, MSc – Sketch-based Modeling of Plants (co-supervisor P. Prusinkiewicz)
- John Brosz, PhD – Modeling Terrains By Example (co-supervisor F. Samavati)
- Hung-Li Jason Chen, MSc – Volumetric Deformation and Rendering (co-supervisor F. Samavati)
- Pauline Jepp, PhD – Sculpting using Interactive Implicit Modeling. (co-supervisor B. Wyvill & J. Denzinger)
- Luke Olsen, MSc – Sketch-based Mesh Augmentation
- Torin Taerum, Phd – Computer-generated Medical Illustrations (co-supervisor F. Samavati)

http://pages.cpsc.ucalgary.ca/~mario/
Jörg Denzinger, Associate Professor

Research Interests:

Jörg’s research is in the areas of Artificial Intelligence and Multi-Agent Systems. One of his main interests is learning cooperative behaviour of agents. This encompasses developing appropriate agent architectures, basic learning and evaluation methods for behaviour (from the perspective of an individual, perhaps selfish, agent and of a team), specialized adaptation methods and methods to model other agents. The application areas he is interested in range from computer games to finding security problems in systems. His second major research topic is distributed, knowledge-based search. This deals with developing cooperation concepts so that several computers can work together on problems such as scheduling, theorem proving, optimizing processes or searching the Internet.

Selected publications 2006/2007:


Projects:

- Cooperative Data Mining for Health Care Applications.
- Improving Agent Communication by Taxonomy-based Learning.
- Cooperative Search with Global and Agent-specific Goals.
- Intelligent Agents in Commercial Computer Games.
- Evolving Attack Teams to Test and Improve Computer Security.

Graduate Students:

Randal Acton, PhD – AI & multi-agent systems in information security (co-supervisor J. Aycock)
Joseph Chang, MSc – AI-methods in the re-use of software (co-supervisor R. Walker)
Alan Fedoruk, PhD – Development of a framework for cooperative search
Jie Gao, PhD – Cooperative data mining methods in health care data
Pauline Jepp, PhD – Sculpting using Interactive Implicit Modeling. (co-supervisor M. Costa Sousa & B. Wyvill)
Tyson Kendon, MSc – AI & multi-agent systems
Jordan Kidney, PhD – Testing for unwanted emergent behavior in multi-agent systems
Shelly Park, MSc – Capturing verbal documentation in Agile planning (co-supervisor F. Maurer)
Sanjeev Paskarde, MSc – AI & multi-agent systems
Keith Randell, MSc – Learning techniques to solve (NP-hard) optimization problems

http://pages.cpsc.ucalgary.ca/~denzinge/
Wayne’s research concerns the design and analysis of algorithms for problems in computer algebra. Randomized algorithms, and algorithms for computations over finite fields have been the focus of much of Wayne’s recent work. This research generally attempts to analyze and improve algorithms for fundamental computational problems, such as the solution of systems of linear equations. Since fundamental problems are studied, potential applications of this work are diverse.

Wayne’s work is also informed by experimental work and the evidence about the performance of various heuristics in realistic applications that such work can provide. In particular, Wayne’s recent work attempts to explain the behaviour of heuristics that have recently been used to solve large sparse systems of equations that are formed when the “Number Field Sieve” algorithm is used for integer factorization. His analytical work can (and has) provide explanations for poorly understood phenomena reported in the experimental literature, as well as modifications of algorithms in order to deal with infrequent failure conditions that experimental work might miss.

Selected publication 2006/2007:

Projects:
- Analysis of Block Lanczos and Block Wiedemann Algorithms: An analysis and improvements of heuristics that are currently used to solve large, sparse systems of equations in number-theoretic applications (including modern integer factorization algorithms), resulting in randomized algorithms that are both efficient and provably reliable in all cases.
- Decomposition of Matrix Algebras: Efficient and reliable algorithms for use by mathematicians in their experimental work to investigate properties of groups, rings, and similar structures. Several of the algorithms proposed to date have been implemented in the computer algebra systems Magma and GAP and are now in use.

Graduate Student:
Wei Wei Zheng, PhD – Design and analysis of algorithms for large sparse matrix computations

http://www.cpsc.ucalgary.ca/~eberly
Faculty

Marina’s research is on applications of geometric algorithms to biometrics, GIS, image processing and computer modeling. Related issues such as data representation, numerical stability, optimization and efficient analysis of models are of interest. Specific areas where the developed methodologies are applied include mechanical and biological systems, terrain visualization, GIS (geographical information systems) and synthesis of biometric data.

Selected publications 2006/2007:

- LNCS Springer ICCSA 2006 Book of Proceedings, Editor (4 volumes)
- IEEE-CS ISVD 2006 Book of Proceedings, Editor
- Bereg, Sergey, M.L. Gavrilova, Y. Zhang Robust point location in Generalized Voronoi Diagrams, IEEE-CS proceedings, ISVD 2006, pp. 54-59, Banff, AB, Canada, July 2006

Projects:

- GIS data models and techniques.
- Computational Science.
- Biometric Technologies.

Graduate Students:

Russel Apu, PhD – Adaptive memory subdivision for strategic motion planning and navigation
Priyadarshi Bhattacharya, MSc – Risk Analysis of Ship Routes using Topological Information
Mahmudul Hansan, MSc – Synthesizing Techniques based on Multiresolution Commence studies
Md. Maruf Monwar, PhD – Multimodal Biometric System

www.cpsc.ucalgary.ca/~marina
Saul Greenberg, Professor & Associate Head, Graduate Affairs

Research Interests:

Saul is an active researcher in Human Computer Interaction, a sub-area of Computer Science concerned with methods and principles on how to design computer interfaces so that people can interact effectively with them. He specializes in computer supported cooperative work, where he investigates how people work together, how the computer and related technologies (groupware) affect group behaviour, and how software can be designed to support and augment group work. He also investigates context-aware computing, where computers can be crafted to fit within their environment in a way that encourages natural interaction.

Selected publications 2006/2007:


Project:


Graduate Students:

- Timothy Au Yeung, MSc – Human computer Interaction
- Robert Diaz-Marino, MSc – Toolkit using Diamond Touch tabletop surfaces
- Carman Neustaedter, PhD – Design of digital family calendars
- Michael Nunes, MSc – Computer Supported Cooperative Work
- Stephanie Smale, MSc – Groupware
- Kimberly Tee, MSc – Informal Awareness and casual interaction
- Edward Tse, PhD – SDGToolkit

http://www cpsc.ucalgary.ca/~saul
MOUSTAFA HAMMAD, Assistant Professor

Moustafa’s current research interests lie in the area of Database Systems. Specifically, his work focuses on proposing, building, and evaluating database technologies for non-traditional data types. The following are some of the research avenues that he is currently exploring. (1) Stream Data Systems: Specifically, query processing and storage management of applications that receive endless amounts of data (data streams). Such applications include sensor-based environments, earth sciences, real time business processing, object’s tracking, and network monitoring. (2) Multimedia Databases: Specifically, video modeling, access control, buffer management, and video query processing. (3) Spatio-temporal Databases: Specifically, designing efficient index structures and querying moving objects. (4) Architecture-aware database design: Specifically, the efficient utilization of the underlying hardware in the database design such as memory systems (e.g., caches) and the multi-threaded CPU pipelines, while designing database components.

Selected publication 2006/2007:


Projects:

- A Scalable Data Management Framework for Streaming Data Sources.
- SeMag: A Sensor Data Management System.
- Development of Lidar-aided Mono-plotting & true Ortho-Photo Generation.

Graduate Students:

Mohammed E. Hegazy, PhD – Database Management Systems
Fatima M. Farag, PhD – Database Management Systems

www.cpsc.ucalgary.ca/~hammad
Lisa’s research concerns the design and analysis of distributed algorithms. One specific research interest is fault tolerance. Current systems consist of many processors and other components and hence are increasing likely to fail in some way as their size and interconnection complexity grows. So robust algorithms that can withstand or recover from various faults are required. For example, a self-stabilizing distributed system can recover from an arbitrary transient fault without external intervention or re-initialization, and eventually resume correct behaviour.

Another research interest is memory consistency. Multi-processors employ a variety of buffering, caching, and communication techniques that enhance speed but can result in unexpected computations. We developed a framework for precisely defining the memory behaviour of multiprocessor systems, and now use this framework to compare multi-processor machines, design efficient programs for them, and to port programs between them.

Selected publications 2006/2007:


Projects:

• Itanium Memory Consistency.
• Models for Self-stabilization.

Graduate Students:

Steven Cheng Hum Yuen, MSc – Sequential consistency on weak memory models
LilAnne Jackson, PhD – Porting between machines with different memory consistency
Parthasarathy Ramanujam, MSc – Combining game theory with network coding
Peter Höyer is interested in theoretical aspects of computer science and in the relationship between physics and computer science. His research is mainly on algorithms, data structures, and complexity theory, with a focus on algorithms for quantum computers. A quantum computer is a computational device that is based on quantum physics as opposed to being based on bits as a traditional computer. His research goal is characterizing problems that can be solved efficiently with the help of quantum mechanics. Problems that on the surface seem very complex, yet contain an internal well-behaved structure, are particularly well-suited for being solved on quantum computers. His research methodologies are theoretical and aims at a fundamental understanding. His research is part of an effort to say what it means to compute something on a very basic level.

Selected publications 2006/2007:


Project:

- Develop new quantum algorithms, understand their relationship with classical algorithms, and prove lower bounds.

Graduate Students:

Catalin Dohotaru, MSc – Quantum Algorithmics
Nathan Wiebe – Physics and Astronomy (co-supervisor B. Sanders)
Christian Jacob, Associate Professor (Joint appointment with the Department of Biochemistry & Molecular Biology, Faculty of Medicine)

Research Interests:
Christian's Evolutionary & Swarm Design Group (www.swarm-design.org) is building agent-based simulations of mostly biological systems for different levels of granularity, from vehicular and pedestrian traffic simulations to the modelling of army ant raids. In collaboration with our colleagues in the Faculty of Medicine, we focus on 3-dimensional agent-based models of biomolecular systems, such as gene regulatory networks, bacterial chemotaxis, immune system reactions, and blood clotting. These mathematical and computer models open new opportunities for biological and life sciences, bioinformatics and computational biology research in order to understand systems with massively parallel interactions and their emergent properties.

Christian also collaborates with Prof. Jerry Hushlak from the Department of Art to investigate the use of evolutionary swarm intelligence systems to build virtual “swarm sculptures” (www.swarmart.com) and interactive computer installations that illustrate principles of emergence in Art & Science.

Selected publications 2006/2007:

Graduate Students:
Karel Bergmann, MSc – Cryptanalysis using evolution-inspired algorithms (co-supervisor R. Scheidler)
Navneet Bhalla, PhD – Evolutionary Self-Assembly
Namrata Khemka, PhD – Optimization for Biomolecular Modelling
Paul Nuytten, MSc – Swarm Intelligence Models of Neural Growth
Marcin Pilat, PhD – Evolutionary Morphology
Sebastian Von Mannen, PhD – Swarm-based Developmental Design
Ian Burleigh, PhD – The Computational Beauty of Music

http://www.cpsc.ucalgary.ca/~jacob
Mike’s main areas of research are cryptography (data security) and computational number theory. In particular, he is involved in investigating the suitability of certain number-theoretic structures and problems as bases for public-key cryptosystems, enabling applications such as secure key-exchange and digital signatures. The efficiency of such cryptosystems is tested by implementing the best-known algorithms and devising improvements. The security is tested by developing sequential and distributed algorithms for solving the underlying number-theoretic problem.

Selected publications 2006/2007:

• FPGA implementation of point multiplication on Koblitz curves using Kleinian integers, “CHES 2006,” Yokohama, Japan, October 2006.

Projects:

• Improving the efficiency of public-key cryptographic protocols based on elliptic curves and low-genus hyperelliptic curves.
• Investigating the security of cryptosystems based on arithmetic in number fields and function fields.
• Improving index-calculus algorithms for computing class groups and discrete logarithms in class groups of quadratic number and function fields.
• Developing new, improved algorithms for unconditional class group and regulator computation in quadratic fields, and for various computations related to algebraic number theory.

Graduate Students:

Wai Fong Chan, MSc – Efficient point multiplication on Koblitz curves
Reinderd DeGraaf, MSc – Applied network security (co-supervisor J. Aycock)
Jonathan Hammell, MSc – Cryptography
Andreas Hirt, PhD – Anonymous network communication (co-supervisor C. Williamson)
William Lorimer, PhD – Authentication protocols and zero-knowledge
Ahmed Obied, MSc – Unauthorized use of information systems (co-supervisor C. Williams)
Mark Velichka, MSc – Using index calculus to solve the discrete log problems
Ryan Vogt, MSc – Sandboxing for computer security (co-supervisor J. Aycock)
Rob’s research interests focus on agent based systems, concept mapping, and formal methods. He is currently developing a flexible and easy-to-use infrastructure for agent development as a research tool. This will lead to the ability to test the effectiveness of various conversational strategies, for example, Is the “traditional” conversation protocol approach better or worse than the social commitment approach to complex agent-based conversations? This work dovetails with previous work on concept mapping systems, in that the agent infrastructure supports a multi-user interface and data store for the concept mapping system. Conversely, the concept mapping system will form a sophisticated view (and controller) of the agent environment. A formal model of the agent infrastructure is also under development.

**Selected publication 2006/2007:**


**Project:**

- Development of the CASA agent based infrastructure. Implementation of a formally-specified social commitment protocol under CASA.

**Graduate Students:**

- Gabriel Becerra Ayala, MSc – Minds and Agents in Ambient Intelligent Environments
- Ibrahim Jadalowen, MSc – Course based
- Chad La Fournie, MSc – Course based

http://sem.ucalgary.ca/%7Ekremer/
Christian is studying quasi-Monte Carlo methods, which can be seen as a deterministic version of the Monte Carlo method. These methods are mostly used for multi-dimensional numerical integration, and they try to improve upon the Monte Carlo method by using more uniformly distributed samples to build their approximation. Christian’s current research is mostly focused on using quasi-Monte Carlo methods in complex applications, and finding better parameters for different quasi-Monte Carlo constructions.


Projects:
- Using simulation and diffusion approximations to model plant development.
- Quality measures and parameter searches for quasi-Monte Carlo constructions.
- Pricing American options using quasi-Monte Carlo methods and other variance reduction techniques.
- Using highly-uniform sampling in Metropolis-type algorithms.

Mikolaj Cieslak, MSc – Solving chemical processes usually represented as a set of coupled ordinary differential equations using Gillespie’s stochastic method (co-supervisor P. Prusinkiewicz)

Jennie La, MSc – (Department of Mathematics and Statistics)
Zongpeng Li, Assistant Professor

Research Interests:

Zongpeng’s research interests are in computer networks and distributed algorithms. Recently, he has been working on distributed network optimization for multicast applications such as media streaming and file distribution. Zongpeng is also interested in information theory, coding theory, and wireless communications.

Selected publications 2006/2007:


Projects:

- Optimization Algorithms in Data Networks.
- Scalable P2P On-demand Media Streaming Based on Network Coding.

Graduate Student:

Mingwei Gong, PhD – Networks
Parthasarathy Ramanujam, MSc – Networks
Phillipa Sessini, MSc – Characterizing Web network traffic (co-supervisor A. Mahanti)
Ajay Gopinathan, MSC – Network Optimization and Game Theory

www.cpsc.ucalgary.ca/~zongpeng
Kenneth’s research focuses on two distinct areas - Computer Science Education and the role of users in software evaluation. He has spent some time looking at the role of discrete mathematics in the undergraduate program, specifically with respect to student mathematical maturity and its effect on the ability of students to effectively learn discrete math. Looking to expand this to also include linear mathematics and calculus to attempt to determine if there is an optimal sequence for the mathematics that is currently required for Computer Science majors. In the area of software evaluation, Kenneth's is focusing on the use of investigative techniques more common to the Social Sciences but that are applicable to finding relationships among users and the software that they use. This is in many ways an analysis of users and particular software to identify relationships affecting the interaction of the user with the software. In both areas, he is especially interested in games programming and software.

Kenneth is currently involved with an interdisciplinary group that is working toward creating a network of researchers involved in educational games. This is partially funded by a grant from SSHRC. He is also working on data from the last eight years that includes performance in the three areas of mathematics that are required for Computer Science students. This should add significantly to findings already obtained in looking at discrete mathematics performance. A final major project is one in which he wishes to create a profile of skills that are critical components in computer games, especially educational computer games - an area that is receiving increased recent attention.

Jessica Mason, MSc – Game Programming

http://www.cpsc.ucalgary.ca/Dept/contact.php?profile=loose
ANIRBAN MAHANTI, Assistant Professor

Research Interests:

Anirban’s research interests are in the areas of performance evaluation of distributed computer systems and computer networks. His specific research interests include multimedia streaming systems, Web performance, network measurement and modeling, network protocols and architectures, and distributed systems.

Selected publications 2006/2007:


Projects:

• Multimedia Streaming Protocols and Performances.
• Internet Traffic Classification.

Graduate Students:

Naimul Basher, MSc – Web traffic
Jeffrey Erman, MSc – Internet Traffic Classification
Phillipa Sessini, MSc – Characterizing Web network traffic (co-supervisor Z. Li)

http://pages.cpsc.ucalgary.ca/~mahanti
Frank’s research interests include agile software methodologies (such as Extreme Programming, Scrum DSDM, etc.), software engineering approaches for e-Business software development, web engineering, globally distributed software development, and experience and knowledge management. Frank is the head of the e-Business engineering group at the University of Calgary and serves as the Associate Head Planning and Research.

Selected publications 2006/2007:


Projects:

- MASE – Tool Support for Agile Project Management.
- Single Display Groupware for Agile Software Teams.
- Alan – A robotic colleague for agile teams (with J. Denzinger & E. Sharlin).
- FitClipse – Tool support for early acceptance testing and interaction design.
- AcceptJ2EE – Acceptance testing of distributed J2EE applications.

Graduate Students:

- Ruth Ablett, MSc – Using a robot to facilitate continuous integration in an Agile environment (co-supervisor E. Sharlin)
- Kobe Davis, MSc – Software Engineering
- Chengyao Deng, MSc – Acceptance Testing for Distributed J2EE Applications
- David Fox, MSc – course based
- Harpit Grewal, MSc – Course based study
- Girgori Melink, PhD – Early acceptance testing
- Robert Morgan, MSc – Group collaboration support to agile planning
- Shelly Park, MSc – Daily Scrum Meeting Summarizer for Agile Development Teams
- Caryna Pinheiro, MSc – course based
- Xueling Shu, MSc – Automated Performance Testing for Java3D Applications
- Patrick Wilson, MSc – course based
- Carmen Zannier, PhD – An Empirical Evaluation of Decision Making in Software Design

http://ebe.cpsc.ucalgary.ca/Frank.Maurer
JAMES PARKER, Professor

Research Interests:
Jim is currently working on computer game technology, especially the synthesis and coding of digital audio. This includes creating sound effects and music, and manipulating, classifying and recognizing. He has been involved in pattern recognition and computer vision research for over 20 years, and applies this knowledge to practical projects. He and his students have designed and built a number of computer games. His students are currently working on pattern recognition in biometrics (signature, face, and voice recognition), virtual reality, games and entertainment technology (audio analysis and synthesis), and natural computer interfaces (gesture and gaze recognition, similarity search for pictures and sounds). He is the founder of the Digital Media Lab, which works with local and distance game developers and animation groups, and has research ties with the Banff New Media Institute, Education, Kinesiology, Fine Arts, and Engineering.

Selected publications 2006/2007:

Projects:
• Caching of audio files in computer games: Implementing a sound file scheduling algorithm that will be integrated into a game.
• Query by example for sound: Given a sound file, find others in a set of files that sound like it.
• Determining Body Pose In Images: An image that includes a human body is given - What is the angle of the arms/legs? There is a very practical use for this, if it can be accomplished in a fast enough time.

Graduate Students:
Sonny Chan, MSc – Advancing medical image processing (co-supervisor J. Mitchell
Shannon Jaeger, MSc – Virtual reality and games for teaching
Christopher Marriott, PhD – Learning in populations of artificial lifeforms

http://pages.cpsc.ucalgary.ca/~parker
PRZEMYSLAW PRUSINKIEWICZ, Professor

Research Interests:
Dr. Prusinkiewicz and his students look at facilitating the modeling of plants using the conceptual framework of Lindenmayer Systems (L-Systems). They investigate the dynamics of reciprocal interaction between plants and their environment and explore the relationships between various theoretical models used to describe plant architecture. This makes it possible to understand the data required, the limitations and capabilities necessary to model plants that result in images which are photorealistic and highly complex. They have developed software environments for conducting simulated experiments, called the Virtual Laboratory and L-Studio.

Selected publications 2006/2007:

Projects:
• Modeling plants from genes to phenotypes.
• New programming paradigms and languages for modeling, simulation and visualization of biological systems.

Graduate Students:
Fabricio Anastacio, MSc – Sketch-based modeling (co-supervisor M. Costa Souza)
Jevaprakash Chelladurai, PhD – Modelling and visualization of plants
Adam Runions, MSc – Modeling and visualization of venation patterns
Richard Smith, PhD – Computational models of spiral phyllotaxis

http://pages.cpsc.ucalgary.ca/~pwp
www.algorithmicbotany.org
Jon's research interests span the areas of interval analysis, global optimization, computer graphics and solid modeling. Within these areas he aims to develop algorithms for solving a variety of problems such as robust computations of intersection tests, finding good inclusion for functions over intervals computing zeros of function, etc. He has also worked on global illumination as applied to the modeling of plants and on physically based computer graphics.

Selected publications 2006/2007:


Projects:

- Computer-aided design algorithms.
- Interval analysis algorithm.
- Physical based computer graphic simulations.
- Geometric computations.

Graduate Students:

Ravdeep Sekhon, MSc – Realistic implementation of veins in leaves
Ye Wang, PhD – Computational Geometry

http://pages.cpsc.ucalgary.ca/~rokne/
GüNTHER RuHE, Professor (Joint appointment with the Department of Electrical &
Computer Engineering)

Research Interests:
Guenter Ruhe is an iCORE Professor. This is a joint appointment in the Departments of
Computer Science and Electrical and Computer Engineering. His research is in the area of
intelligent support, in particular for design and analysis of releases in incremental software
development, analysis of software requirements, project management, and selection of com-
ponents-of-the-shelf (COTS) products. A new generation of intelligent decision support tool
has been designed, implemented and initially evaluated. ReleasePlanner™ is a tool suite that
provides flexible and web-based tool support for assigning requirements of features to releases
so that the most important risk, resource, and budget constraints are fulfilled.

Selected publications 2006/2007:

• J. Li, G. Ruhe, A. Al-Emran, M. M. Richter, A Flexible Method for Effort
  No 1, pp 65-106
• G. Du, M. M. Richter, G. Ruhe, An Explanation Oriented Dialogue Approach and its
  pp 223-249.
• J. Momoh, G. Ruhe, Release Planning Process Improvement –An Industrial Case
• A. Ngo-The, G. Ruhe (eds.), Requirements Engineering Decision Support (Special Issue), Software Engineering and

Projects:
• Intelligent support for release and design decision of evolvable software systems.
• Intelligent design decisions.
• Simulation-based decision support for software quality assurance (SimQuali).

Graduate Students:

Thamer Albourae, MSc – Lightweight Re-planning for Software Releases
James Ambler, MSc – Software Engineering
Frazul Chowdhury, MSc – Software Engineering
Bradley Cossette, MSc – Software Engineering
Gengshen Du, PhD – Decision Support for Scenario-based Release Planning
Kendra Hamilton, MSc – Software Engineering
Jingzhou Li, PhD – Management of Tabular-based Requirements Using Rough Sets
James McElroy, PhD – Software Engineering
Vladimir Melink, PhD – Software Engineering
Omolade Salii, PhD – Software Release Planning in Evolving Systems
Irfan Ullah, PhD – Planning Releases for Software Product Lines

http://sem.cpsc.ucalgary.ca/~ruhe
REIHANEH SAFAVI-NAINI, Professor and iCORE Chair in Information Security

Research Interests:

Rei’s research interest is information security. Her more recent works have been on information theoretic security, provable security, network security, digital and privacy rights management, and multimedia security. She is particularly interested in authentication problem in digital world.

Authentication of information is arguably the most important security goal in modern electronic communication systems. Authentication systems provide assurance for communicants about entities involved in the communication and the messages that are exchanged. Authentication systems must also meet the challenges resulting from the advancement of technologies and the introduction of new services. Applications such social networking and instant tele-conferencing require secure authentication in dynamic groups. A growing concern is users’ privacy and the assurance that users’ data cannot be later used to breach their privacy. A useful authentication system must be provably secure and also sufficiently efficient to be acceptable by the users.

Selected publications 2006/2007:


Projects:

• Cryptography
• Intrusion Detection in Sensor Networks
• Privacy enhancing systems
• Technologies for management of digital rights

http://pages.cpsc.ucalgary.ca/~rei/
Faramarz Samavati works on various aspects of Computer Graphics. His research areas are Geometric Modeling, Sketch-Based Modeling, Visualizations and Non-photo Realistic Rendering. More specifically, the research topics in his area are Surface Modeling, Volumetric Modeling, Subdivision Surfaces, Splines, Least Squares, NURBS, Multi-resolution and Wavelets. As one of his important research results, he was able to obtain Multi-resolution representation for smooth objects by reversing subdivision and without direct use of wavelets. Faramarz and his group also explore various applications of these modeling techniques in Biometric, Medical, terrain and Seismic simulation and visualization.

- Multi-resolution in Computer Graphics.

John Brosz, PhD – Terrain modeling by example
Hung-Li Jason Chen, MSc – Volume Deformation (co-supervisor M. Costa Sousa)
Mahsa Eshraghyi Boroojeni, MSc – Interactive modelling
Luke Olsen, PhD – Constraining Wavelets for Multi-resolution
Richard Pusch, MSc – Interactive modelling
Javad Sadeghi, PhD – Interactive modelling
Mitra Shirmohammadi, MSc – Geometric modeling with L-systems
Torin Taerm, PhD – Medical Illustrations (co-supervisor M. Costa Sousa)

http://pages.cpsc.ucalgary.ca/~samavati/
Renate's principal areas of interest include computational number theory and cryptography. Specifically, her research explores algorithms for finding invariants of algebraic number fields and function fields, as well as the design and analysis of cryptographic systems whose security is based on the problem of computing such invariants. Currently, the best known methods for finding invariants are sub-exponential and frequently exponential, so the cryptosystems in question are very secure. She is interested in faster cryptographic and number theoretic algorithms, as well as efficient implementations.

Selected publication 2006/2007:


Projects:

- Algorithms and Cryptography in Algebraic Function Fields.
- Efficient Arithmetic in Global Quadratic Fields.
- Privacy and Number Theoretic Cryptography.
- Cubic Function Fields from Quadratic Infrastructure (with M. J. Jacobson, Y. Lee, and H. C. Williams).
- Quartic Function Fields (with Q. Wu).

Graduate Students:

Karel Bergmann, MSc – Cryptanalysis using evolution-inspired algorithms (co-supervisor C. Jacob)

Taisya Krivoruchko, MSc – Electronic voting: Registration

www.math.ucalgary.ca/~rscheidl
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Faculty

**EHUD SHARLIN, Assistant Professor**

Ehud is interested in physical interfaces between humans and computers, tangible user interfaces, human–robot interaction, and virtual and mixed reality interfaces. Physical interfaces rely directly on the physical world using its extremely rich collection of objects, tools, interaction rules and concepts, all well learned and well practiced by humans from their everyday experiences. Good physical interfaces embody function and content and can be very intuitive and simple to use.

**Selected publications 2006/2007:**


**Projects:**

- Mixed reality-based human robot interfaces.
- Sheep and Wolves - game-based testbed for human robot interaction.
- The 3D Tractus: a 3D tangible drawing board (with M. Costa Sousa).
- Alan: a robotic companion for agile software engineering teams (with F. Maurer and J. Denzinger).

**Graduate Students:**

- **Ruth Ablett**, MSc – Using a robot in an Agile environment (co-supervisor F. Maurer)
- **Cheng Guo**, MSc – Robot Interfaces
- **James Young**, PhD – Exploring the artistic language
- **Min Xin**, MSc – The 3D Tractus

**http://pages.cpsc.ucalgary.ca/~ehud/**
Jonathan’s research focuses on empirically understanding social and technical aspects of software creation and evolution, such as how programmers do their work, how programming tools are used and how teams of programmers collaborate. The long-term goal of his research program is to improve both programming practices and tool support.

Some of Jonathan’s recent empirical work identified questions that programmers ask about a code base and demonstrated where current programming tools fall short in helping programmers answer those questions. Building on this work, he is currently carrying out several projects involving prototyping and evaluating new kinds of programming tools.


Graduate Students:
- David Fox, MSc – Software Engineering
- Caryna Pinheiro, MSc – Software Engineering

http://ucalgary.ca/~sillito/
Rob performs research into grid computing, parallel discrete event simulation and parallel network emulation. The main grid computing research activities includes a project that aims to understand many issues relating to monitoring grid environments. The goal is to produce models of computer, network and monitoring components and models of different monitoring activities. This should enable monitoring requirements to be mapped programmatically to a grid environment. Another grid related project is considering how data replication and caching decisions should be made by grid data management systems in environments with access to dynamically controlled optical light path networks.


• Model based grid monitoring (Joint project with HP Labs, Palo Alto).
• Proactive Data Management.
• High performance overlay networks.
• Internet Protocol Traffic and Network Emulator (IP-TNE).

Idowu Adewale, MSc – User oriented monitoring for grid environments
David Aikema, MSc – Virtual organization management
Abhinav Akshay, MSc – Grid Environments
Tanvire Elahi, PhD – Model based job scheduling (co-supervisor B. Unger)
Nayden Markatchev, MSc – Grid environments
Ting Xi Tan, MSc – Grid Environments
Rob’s primary research concerns easing problems of software evolution and reuse. This centers around the observation that software is developed assuming that one sees essentially the entire “world” — you know what classes exist, what libraries are in use, their exact interfaces and properties, etc. The reality is that libraries, standards, and languages all change over time. By isolating a module from the world around it, but still allowing it to interact with the world, we could make our modules less likely to need to change. Rob has created a mechanism called implicit context for permitting such apparent isolationism. Rob is also heavily involved in the recently-introduced programming paradigm called aspect-oriented software development.

**Selected publications 2006/2007:**


**Projects:**

- Context insensitivity for software evolution.
- Aspect-oriented software development and its assessment.
- Large-scale unanticipated software reuse.
- Technical risk estimation.

**Graduate Students:**

- **Joseph Chang**, MSc – AI-methods in the re-use of software (co-supervisor J. Denzinger)
- **Bradley Cossette**, MSc – Language-independent probabilistic change impact analysis
- **Ryan Cottrell**, MSc – Context-sensitive call chain suggestions
- **Reid Holmes**, PhD – Tools and techniques for software developers
- **Puneet Kapur**, MSc – Context sensitive tools
- **Mark McIntyre**, MSc – Dataflow-based suggestions of near clones
- **Bhavya Rawal**, MSc – Incorporation of transformations into change history mining

John’s research focuses on quantum computation and information. This area of research is concerned with models of computation based on quantum mechanics, and on the information-theoretic properties of quantum mechanical systems. In particular, he is interested in quantum computational variants of interactive proof systems, quantum algorithms for group-theoretic problems, and properties of quantum entanglement.


Dmitry Gavinsky, PhD – Quantum communication complexity
Heath Gerhardt, PhD – Quantum and iterated quantum processes
Gus Gutoski, PhD – Quantum interactive proof systems with competing provers
Jibran Rashid, MSc – Norms and distance measures of quantum super-operators
William Rosgen, PhD – Bell inequalities and quantum nonlocality

http://pages.cpsc.ucalgary.ca/~jwatrous
Carey’s general research interests are in computer networks and computer systems performance evaluation. Specific interests include Internet protocols, wireless networks, network traffic measurement, workload characterization, network simulation, and Web server performance. A self-described “Internet mechanic”, Carey focuses a lot of his research on the interactions between Internet protocols, and the resulting impacts on user-perceived performance. Much of this work is experimental, with an applied focus on industrially-relevant network performance problems. He is currently an iCORE Professor in “Broadband Wireless Networks, Protocols, Applications, and Performance” and holds an NSERC/iCORE/TELUS Mobility Industrial Research Chair in Wireless Internet Traffic Modelling.

**Selected publications 2006/2007:**


**Projects:**

- Wireless Internet Traffic Modeling.
- Multi-channel MAC Protocols for Wireless Networks.
- Stochastic Capacity Networks.

**Graduate Students:**

- **Jean Cao**, PhD – QoS issues in Wireless LAN
- **Mingwei Gong**, PhD – Wireless resource management and scheduling
- **Emir Halepovic**, PhD – Evaluation of large-scale peer-to-peer computing applications
- **Andreas Hirt**, PhD – Anonymous network communication (co-supervisor M. Jacobson)
- **Ahmed Obied**, MSc – Honeypots (co-supervisor M. Jacobson)
- **Nadim Parvez**, PhD – TCP Protocols for wired/wireless networks

Brian Wyvill, Professor

Research Interests:
Brian’s research interests centers around the theme of computer animation. In 3D modelling he (and his brother Geoff Wyvill) have designed methods for interacting and rendering implicit surfaces. These models, called SOFT objects, are very useful in animation for representing deformable surfaces. More recently, he has been working on the BlobTree, which includes blends, CSG boolean operations, Barr warps, and texturing of implicit surfaces. He is currently working on new methods for controlled blending, animation, precise contact modelling and volume control.

Selected publications 2006/2007:
- Ryan Schmidt, Brian Wyvill, Mario Costa Sousa, Joaquim A. Jorge, ShapeShop: Sketch-Based Solid Modeling with the BlobTree, 2nd Eurographics Workshop on Sketch-based Interfaces and Modeling, Dublin, Ireland, August 2005.
- Brian Wyvill, Kevin Foster, Pauline Jepp, Ryan Schmidt, Mario Costa Sousa, Joaquim A. Jorge, Stylistic Rendering of Implicit Models, 1st EG Workshop on Computational Aesthetics in Graphics, Visualization and Imaging, Girona, Spain, May 2005.
- Ryan Schmidt, Brian Wyvill, Mario Costa Sousa, Sketch Based Modeling with the Blob Tree, ACM Siggraph 2005 Sketch presentation, August 2005.

Projects:
- Better Blending between Multiple Nodes of the Blobtree.
- BlobTree Modeling System.

Graduate Students:
Erwin de Groot, PhD – Visualization methods for implicit surfaces
Pauline Jepp, PhD – Sculpting using Interactive Implicit Modeling. (co-supervisor M. Costa Sousa & J. Denzinger)
Vishal Kochhar, MSc – Computer Graphics

http://pages.cpsc.ucalgary.ca/~blob/
Faculty:
Anton Colijn - Faculty Association

Instructors
Katrin Becker
Frank Deur
Donna Fremont
Ivo Jirasek
Rose Joshua
Leonard Manzara
Craig Schock
James Tam
Nathaly Verwaal
Chris Walpole

Adjunct Professors:
Don Ariel
Hakan Erdogmus
Abram Gamer
Joaquim Jorge
Jalal Kawash
Tom Keenan
Maria L. Lantin
J. Ross Mitchell
Charles P. Pfleeger
Shari L. Pfleeger
Michael M. Richter
Christoph Sensen
Robert Simmonds
Peter D. Vize
Thomas W. Williams
Ian Witten

Emeritus Faculty:
Graham Birtwistle
James Bradley
Mike Brebner
Brian R. Gaines
David Hill
John Kendall
Mildred L. G. Shaw
Brian W. Unger
Michael R. Williams
Computer Halloween Party