



Department of Computer and Information Sciences
 State University of New York at Fredonia
 Fredonia, NY 14063
 2149 Fenton Hall (716) 673-4820
<http://www.cs.fredonia.edu>

COMPUTER AND INFORMATION SCIENCES NEWS

Vol. 7 Newsletter for the Department of Computer and Information Sciences at SUNY Fredonia January 2014

Message from the Chair



The faculty celebrate the 10th Anniversary of the Department

This is the 10th Anniversary of the Department of Computer and Information Sciences. In 2004 we separated from the Department of Mathematics and Computer Science and until recently we were the newest department at SUNY Fredonia. The program of Computer Science, however, dates back to 1981. In 1995-96 it was reshaped to include five tracks: Computer Information Systems, Computer Systems

Software, Theoretical Computer Science, Computing in General Sciences, and Computing with Mathematical Modeling.

In Fall 2006, the department started a second program on Computer Information Systems, which proved to be very successful. Currently, both programs have approximately the same number of majors enrolled in them.

In Fall 2011 the department proposed a new interdisciplinary minor on Web Programming which attracted over 30 students within the first year of its launching. At the same time we enriched our programs with many innovative courses such as Game Development, Android, Ruby on Rails, iPhone, Windows 7 Phone, Alice, Introduction to Multimedia, Computer Security and Ethics, and Social Network Analysis which made our graduates very competitive in the job market.



Our faculty includes accomplished scholars and teachers. Department members are recipients of numerous awards such as the Wilkes Award of the British Computer Society, SUNY Fredonia President's Award of Excellence, SUNY Chancellor's Award of Excellence in Scholarship, Kasling Memorial Lecture Award, and Hagan Young Scholar Award. We love to involve the students in our research activities – an opportunity that is offered primarily to graduate students at other universities and research centers.

The Department hosts a very diverse body of students. In particular, in 2007 we started a Dual Diploma Program with Ege University in Turkey, which was extended the next year with Izmir University as well. This spring we expect 10 students from Brazil coming to Fredonia through the Brazil Scientific Mobility Program. In the recent years we have had students from China, Japan, Kenya, North Cyprus, Pakistan, Saudi Arabia, Senegal, South Korea, and other countries.



The group of Brazilian students coming to the Department

We are proud of our alumni, who are employed nationwide as computer consultants, programmers, systems analysts, network administrators, project managers, software engineers, hardware specialists, web developers, and educators. Together, we are working to improve the welfare of our campus and the community.

Reneta P. Barneva
Professor and Chair

New Faculty

This year the department welcomed the following faculty:



Prof. John Malayny taught two sections of CSIT 121 *Computer Science I* and CSIT 208 *Computer Game Design and Implementation* in Fall'13. John is our alumnus and has been helping with the High School Contest for the last couple of years. His scholarly interests are in the field of computer and information sciences' applications in the society. He recently published a paper at the 2013 International Conference on Educational Data Mining.



Prof. Adrienne Pelz graduated from SUNY Fredonia with a degree in Computer Information Systems. In Fall 2013 she taught the courses CSIT 120 *Computer Science Overview* and CSIT 101 *Programming with 3-D Graphics and Multimedia*; in Spring 2014 she will teach CSIT 251 *Information Systems Structures*.



Prof. Stephen Raghunath will be teaching two sections of CSIT 107 in Spring 2014. He graduated from SUNY Fredonia with a bachelor degree and obtained his master's degree from Indiana University-Purdue University Indianapolis in Music Technology. During his studies he engineered music education software. Prof. Raghunath is currently a Senior JavaScript Engineer for gTeam FZ LLC - an international corporation, a subsidiary of DevFactory. He has taught K-12 classes and has created mobile applications and websites as a free-lance developer.

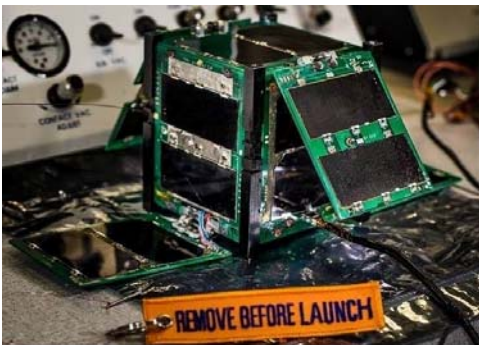


Dr. Anthony Tsetse comes to Fredonia from Livingstone College, NC, where he was responsible for teaching undergraduate computer science courses, supervising lab sessions, grading assignments, and advising students. He got his Doctor of Science degree from Towson University in

2012, a master's degree in Information Technology from IT University of Copenhagen (Denmark) and another master's degree in Communication and Media Engineering from Offenburg University of Applied Sciences (Germany), and a BSc (hons) in Computer Science from KNUST, Kumasi (Ghana). His research interests are in a new computing paradigm where application objects directly communicate with hardware, thus eliminating the need of operating systems.

Scholarly Activities

Dr. John Hansen designed a **communication system for satellite launched into orbit**. The *Minotaur I* rocket, launched by NASA from its Virginia facility in November, is carrying a unique satellite that will communicate using a digital interface system designed by Dr. Hansen.



CAPE-2 PicoSat Undergoing Pre-launch Testing.
The Swing Out Panels Contain Solar Cells to Power the Satellite.

The rocket was carrying its main payload and 29 miniature satellites ("picosats") including the CAPE-2 satellite, which was constructed by students

at the University of Louisiana at Lafayette. In order to provide digital data communications, CAPE-2 contained an onboard system designed by Hansen. The satellite measures just 10 cm (4 inches) on each

side and weighs just over two pounds. It is capable of converting text to speech, tweeting, sending email, repeating voice messages, transferring files and collecting data from buoys in the Gulf of Mexico.

Dr. Hansen's digital data interface system, called "TNC-X" has been used in digital communications systems in over 40 countries, often to support first responder teams preparing for disaster situations. For the Cape-2 project, Dr. Hansen modified the design so it would be appropriate for use in orbit. TNC-X interfaces with the on-board computer and the satellite's radio to provide a command and control interface to the ground command station as well as transmit telemetry, and digital communications such as email and tweets.



Time Lapse Image of the launch of Minotaur I Rocket from Wallop's Island on November 19, 2013

Dr. Hansen offers a course on Programming for Embedded Microcontrollers in which the students build a series of embedded projects of increasing complexity. He is a recipient of Teacher of the Year Department Award.

Dr. Reneta Barneva served as invited speaker at the 15th International Conference "Humans and

Computers" held on February 11-12, 2013 at the University of Shizuoka, Japan. The conference attracted participants from three continents -



America, Asia, and Europe. There were two sessions in satellite sites – the University of Aizu, Japan and Düsseldorf University of Applied Science, Germany.

Dr. Barneva's talk was on Space and Time Efficient Algorithms in Imaging Sciences. Currently, due to the expansion of digital image acquisition, there exist large databases and digital warehouses of images in medicine, security, geosciences, astronomy, metallurgy, and many other fields. In order to take maximal advantage of these huge databases, time- and space-efficient algorithms are required. She considered some examples of such algorithms in imaging sciences.

Dr. Gurmukh Singh in co-authorship with P. Mali, A. Mukhopadhyay and S. Sarkar **published the article "Wavelet analysis of shower track distribution in high-energy nucleus-nucleus collisions"** in the Journal of Advances in High Energy Physics, Research ID 759176, Vol. 2013, 1-13 (2013). The paper employs the technique of continuous wavelets to discover patterns in relativistic energy nuclear collisions from experiments conducted at Brookhaven National Lab (BNL), Upton, NY and the European Center for Nuclear Research (CERN), Geneva, Switzerland. The technique of continuous wavelets has also been used to recognize patterns in data communications. Recently wavelet technique has attracted attention in signal processing. Although it is not a new theory in a sense that many of the ideas and techniques involved in wavelets (sub-band coding, quadrature mirror filters, etc.) were developed independently in various signal processing applications, it has been successfully employed in a number of practical applications such as transient signal analysis, image analysis, communications systems, and other signal processing fields. **Dr. Singh** also had his work **"Developmental Education through Digital Technologies and Techniques in Natural Sciences"** accepted as poster presentation at the 22nd Annual Conference on Instruction & Technology (CIT 2013) held May 21-24, 2013 at SUNY IT, Utica, NY. He has been awarded a scholarship toward the conference registration by the SUNY Faculty Advisory Council on Teaching & Technology and the CIT Planning Committee.

The paper "Lossless Compression of Dithered Images" of **Dr. Ziya Arnavut** and the former double major in Computer Science and Computer Information Systems **Basar Koc** was **accepted for publication in IEEE Photonics Journal**.

Dr. Barneva gave a keynote talk **"Education in computer science and the role of the teacher in the environment of open educational resources"** at the 6th ESRI



Conference "The Education and Scientific Research in the Information Society" which was held in Plovdiv, Bulgaria May 30-31, 2013. The conference was sponsored by the Association for the Development of Information Society, The Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences, and the University of Plovdiv.

Open Educational Resources (OER) are a new phenomenon that may significantly impact higher education and the occupation of university professors. On the other hand, OER have a number of advantages, including adaptive learning and an automatic analysis of the learning process data that may lead to improvement of the curriculum. Dr. Barneva examined the current state-of-art in higher education and the related problems. She shared her reflections on the impact of the new means on the education in general and on the education in computer science and its specifics, in particular.

Dr. Singh (together with Ashwini Kumar and B. K. Singh) published the article **"Systematic study of multiparticle production in nucleus-nucleus interactions at 14.6 A GeV,"** in the Journal of Physics, Indian Academy of Sciences, Vol. 80(1), 103-1115 (2013).

Dr. Tsetse and co-authors Bharat Rawal and Harold Ramcharan had their paper titled **"Emergence of DDoS Resistant Augmented Split Architecture"** accepted for publication by the 10th International

Conference on High Capacity Optical Networks and Emerging/Enabling Technologies (HONET 2013) held in Cyprus. Their paper proposes a novel approach to preventing DDoS attacks using protocol splitting.



Dr. Daisuke Hara gave a talk at a joint department seminar and CS Club meeting entitled "**A Probabilistic Approach to the Syllable Formation of Japanese Sign Language.**" Dr. Hara is a professor at **Toyota Technological Institute - Japan**. He got his Ph.D. degree from the University of Chicago under the mentorship of the famous professor John A. Goldsmith. He is the author of several publications in the field of linguistics.



Prof. Jan Pavlik from the Institute of Mathematics of the Faculty of Mechanical Engineering, **Brno University of Technology, Czech Republic** visited the department and gave a talk on "**Pareto Optimality and Its Geometric Applications.**" He explained the general principle of Pareto Optimality as a property of significance with respect to binary relations. Then, he demonstrated how this universal tool can be used for description and analysis of various situations. He showed some examples and an instance of the principle in geometry. Its further

investigation leads to various results which can possibly be applied in geography and related sciences.

Student Projects and Presentations



Students **Zachary Daily, Brian Rashty, Justin Soderberg and Robert Szkutak** and **Prof. Malayny and Olson** created a program concept designed to combat

bullying in classrooms by allowing teachers to collect data about bullying incidents throughout the school – data which can be used to alter classroom layouts to lessen the likelihood of a reoccurrence. They presented a paper at The 6th International Conference on Educational Data Mining (EDM 2013) which was very well received. Their work was featured at The Statement Magazine.

Two computer and information sciences students, **Nicholas Freville** and **Adam Toth** have assembled a **Beowulf cluster, comprised of three tiny computers called Raspberry Pi's**, that work in tandem to solve complex problems.

With 512 MB of memory, each computer – about the size of a credit card and encased in a hard plastic case – is as powerful as a smart phone, Toth explained. There is no keyboard, but these devices can perform a variety of functions when hooked up to a monitor and keyboard.



A Beowulf cluster is a parallel computing system achieved by linking normally identical, commodity-grade computers into a small local area network (LAN). The result gives a huge boost of power despite using inexpensive, personal computer hardware.

"These computers are not high-performance machines, but when clustered together, their performance is boosted," explained **Dr. Junaid Zubairi**, who supervised the class project undertaken by Toth and Freville.

Prof. Robert Olson and his students in the course CSIT 463:

Introduction to Digital Image Processing and Computer Vision **developed a music visualization tool**. No MIDI files were used and each pixel is being drawn via code. The height of each bubble is determined by the frequency of the note being played and the size of each bubble is determined by the duration of the note being played. Coded in C# using Visual Studio 2012.



At the University **Student Research and Creativity Exposition** held on May 2, 2013 the department presented **18 projects developed by 19 students**:

A Study of Rubik's Cube and Its Implementation, **Efe Alacamli**, mentor **Dr. Arnavut**

Survey of Biometric Recognition Systems, **Namik Berk Cakmak**, mentor **Dr. Arnavut**

Shortest Path Algorithms for Robotic AI, **Erdinc Masat**, mentor **Dr. Arnavut**

Distributed BACI Race Simulation, **Richard Parenti**, mentor **Dr. Zubairi**

Career Opportunities in Computer and Information Sciences, **Efe Alacamli**, **Erdinc Masat**, mentor **Dr. Barneva**

Developing Flight Routing Module for Distributed Flight Tracker, **Richard Parenti**, **Jeffrey Lewandowski**, mentor **Dr. Zubairi**

Applying K-means Clustering to the Social Graphs of Student Classrooms, **Robert Szkutak**, mentor **Prof. Olson**



Evaluating Classroom Diversity Using Social Networking Analysis, **Zach Daily**, mentor **Prof. Olson**

CASSI: Development of an Efficient Classroom Sorting Heuristic, **John Malayny**, mentor **Prof. Olson**

Web Interface for Education Decision Support System, **Justin Soderberg**, mentor **Prof. Olson**

Disk and System Performance with Bonnie++ and Nbench, **Mark Mackey**, mentor **Dr. Zubairi**

3G Sensor Transmission, **Daniel Coffaro**, **Robert Lavin**, mentor **Dr. Zubairi**

Interactive Applications of MS Excel and MS Visual Studio .NET 2010, **Brandon Artymowycz**, mentor **Dr. Singh**

Simulation of a Projectile and Random Theory of Rolling Dice, **Timothy Aselin**, mentor **Dr. Singh**

Game Programming, **Jeffrey Swift**, **Nicholas Freville**, **Patrick Hodge**, mentor **Dr. Singh**

Algorithm Development to Investigate Compatibility of Three Software Systems, **Ankit Ahuja**, mentor **Dr. Singh**

Monitoring Users and Internet Service Providers for Fair Use, **Ankit Ahuja**, mentor **Dr. Zubairi**

Processor Scheduler Simulator, **Kyle Smolinski**, **Ankit Ahuja**, mentor **Dr. Zubairi**

Curriculum Updates

Social Network Analysis

The course Social Network Analysis developed by **Prof. Olson** will be offered for first time in Spring'14. It attracted broad student interest. The course will presents how data of various popular networks such as Twitter, Facebook, LinkedIn, etc. can be analyzed to derive information to identify disjoint or overlapping communities, to predict economic development or events, to optimize the functionality of the networks and their geographical distribution. The course includes topics such as history of social network analysis; introduction to graph theory; paths and cycles; Small World Hypothesis; centrality; homophily and reciprocity; density; cliques and clustering; 2-mode networks; geographical and temporal network models; social network data; applications in business; applications in marketing; applications in political science; applications in criminal justice and national security; social network analysis and privacy.

Minor on Big Data

The amount of stored data is growing exponentially. Analyzing large data sets, called *big data* is becoming increasingly competitive to increase the productivity, make the marketing more targeted, predict events, boost performance, improve quality, and improve the usability. There are several ways of using big data and generating valuable outcomes. Big data analysis can be used virtually in every domain from healthcare to political analysis to economics, to natural and social sciences.

Prof. Olson has developed an interdisciplinary minor on Big Data. After a core of computer and information sciences courses and statistics the students will specialize in various areas such as political science, business, criminal justice, or biology. The minor has been discussed at a department meeting and if approved will be launched in Fall'14.

Student Activities

On April 11-13, 2013, the **CS Programming Team participated in the CCSC North East Programming Contest** led by **Dr. Singh. Prof. Olson** mentored two student works accepted for presentation at student poster session at CCSCNE.



Pictured from left to right: The CS Team and its mentor Dr. Gurmukh Singh, Nicholas Freville, Jeff Swift, Patrick Hodge.

On October 12-13, 2013 **six students from the department participated in the programming competition HackUpstate**, sponsored by Syracuse University and SUNY Oswego and hosted at the Syracuse Technology Garden. The goal of the competition was to build the best product possible in only 24 hours and then give a presentation on it. Students from nine colleges, including SUNY Fredonia, attended the event as well as many professionals from various corporations. The NYS Chief Technology Officer attended all the presentations given.

In 24 hours Aaron Chan, Daniel Coffaro, Nicholas Freville, Jason Guy, Jeffrey Swift, and Robert Szkutak built a web-based video game in HTML5, CSS, and Javascript. They wrote tools to help them develop the algorithms of the game in C++. They also used PHP code hosted on the department student server Pizza to have the game send a text message to the cell phone of the person playing the game.

The news was featured by Syracuse local newspapers.



Pictured from left to right: Jason Guy, Daniel Coffaro, Robert Szkutak, Aaron Chan, Jeffrey Swift, and Nicholas Freville

Honors and Awards

Dr. Juanid Zubairi received an **Instructional Incentive Award** for over \$1000.

Prof. Cole was honored for a third time in a row with the **Best Teacher of the Year** Department Award.



The Department alumna **Georgie Fu** gave a keynote address at the recognition ceremony of the SUNY Fredonia chapter of Golden Key International Honour Society which was held Nov. 10, 2013 at the Williams Center Multipurpose Room. Georgie Fu is a 2012

summa cum laude graduate, SUNY Chancellor's Award for Excellence recipient, and a former Golden Key chapter president. She was featured by the Campus Report.

As we do every year, the department held its Honors and Graduation party at the end of the year. The following students were honored:

Andrew Cavaretta - Maytum scholarship
Collin Preston - John Beck scholarship
Andrew Morrison - Maytum scholarship
Aaron Chan - Feng Chiang scholarship
Amanda Sutter - Debbie J. Joy scholarship
Robert Szkutak - Maytum scholarship
Jaikub Smith - Maytum scholarship
Nicholas Freville - Maytum scholarship

Prof. Mendez received a **grant from Carnahan Jackson Foundation** to develop free textbook for the students in the courses Web Programming I and II. The grantor's desire is to save students money on textbooks purchase and make the courses more affordable. Prof. Mendez has been with the department since 2008 and he has been teaching the courses on web programming very successfully in a traditional classroom or online.

SUNY FREDONIA COMPUTER AND INFORMATION SCIENCES NEWS

Computer and Information Sciences Endowment

The department thanks its many alumni and sponsors who have contributed to the endowment and scholarship accounts. As the support from the state is dwindling down every year, we need more of your support to provide that margin of excellence in our programs. Your support has helped us provide scholarships and awards to deserving students. Therefore, THANK YOU and please continue your support. You can send your donations to the Fredonia Foundation's office in the name of the department.

Writer: Dr. Reneta P. Barneva

Editor: Ms. Melanie Austin

Web Site: <http://www.cs.fredonia.edu/>

Please send your **comments and suggestions** to Ms. Austin

Email: Melanie.Austin@fredonia.edu

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