R·I·T

Computer Science
Annual Report

2015

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Welcome from the Chair

It is my pleasure to welcome you to the Department of Computer Science (CS@RIT) at RIT. The Department of Computer Science housed in the B. Thomas Golisano College of Computing (GCCIS) at RIT is a vibrant community of students, faculty, staff and alumni with a spirit to excel. CS@RIT has been at the forefront of computing since the launching of the computer science baccalaureate program more than 40 years ago. Over the years, our undergraduate and graduate programs have evolved into highly popular computer Science programs and attract highly talented individuals. Our 5-year ABET accredited BS program that includes a 1-year mandatory coop is among the top computer science programs across the nation. Our students develop critical thinking skills, as well as hands-on learning. Our experiential programs provide opportunities for research, professional experience, study abroad and entrepreneurship. The department boasts of thriving alumni placed in pivotal positions in leading organizations all over the world. We have 37 faculty renowned nationally and internationally for their teaching and/or research accomplishments. Major research areas include, computer science education, cryptography, data science, distributed systems, graphics and visualization, intelligent systems, pervasive and mobile computing, programming languages, networking, robotics, security, and theoretical computer science.

Mohan Kumar,
Professor and Chair

Department and Degree Programs Overview

[...] (from L. Fitzgerald...)

The department also has an Undergraduate Program Coordinator, an Associate Undergraduate Program Coordinator, a Graduate Program Director, and an Associate Graduate Program Coordinator. In general, these individuals handle unusual situations with respect to degree requirements, approve or reject requests for exceptions, review co-op reports and assign co-op grades, verify that students can be certified for their degrees, and determine probation and suspension status.

The Undergraduate Program Coordinator makes decisions and assigns credit for transfer courses as well as Advanced Placement, CLEP, and IB situations while the Associate Undergraduate Program Coordinator currently handles all matters related to co-op. The Graduate Program Director determines which students who apply (or request to change into the graduate program) are accepted and also recommends and monitors scholarships. The Associate Graduate Coordinator currently handles all matters related to the accelerated BS/ MS dual degree program in Computer Science or other accelerated BS/MS dual degree programs that include an MS in Computer Science. Degree Programs

Bachelor's of Science in Computer Science
Master's of Science in Computer Science
PhD in Computing and Information Sciences

At the undergraduate level, minor concentrations are possible, along with double majors. Certificates in Data Management, (...) are available for Master's students. Enrollments [To be summarized...] In the spring of 2015, the Computer Science Department had the following enrollments:
MS – 2 incoming graduate students, 401 total graduate headcount
BS – 0 incoming freshmen, 18 incoming transfers, 743 total undergraduate headcount BS/MS – 6

In the summer of 2015, the Computer Science Department had the following enrollments:

MS – 0 incoming graduate students, 204 total graduate headcount
BS – 0 incoming freshmen, 4 incoming transfers, 210 total undergraduate headcount BS/MS – 6

In the fall of 2015, the Computer Science Department had the following enrollments:

MS – 140 incoming graduate students, 447 total graduate headcount
BS – 222 incoming freshmen, 37 incoming transfers, 822 total undergraduate headcount BS/MS – 3

Degree Certifications. In the spring of 2015, the Computer Science Department had the following degree certifications:

MS – 54
BS – 37
BS/MS – 7
Advanced Certificate in Big Data Analytics – 14

In the summer of 2015, the Computer Science Department had the following degree certifications:

MS – 12
BS – 13
BS/MS – 4
Advanced Certificate in Big Data Analytics – 1

In the fall of 2015, the Computer Science Department had the following degree certifications:

MS – 35
BS – 18
BS/MS – 3
Advanced Certificate in Big Data Analytics – 20

NOTES. Overview of department; mission statement, goals, aspirations, impact. - Statistics for students, minors, etc. that we want to share. - Summary of our degree programs. - Pictures of the department (labs, main office, classrooms) - Notes about our great staff (incl. advisors, sys. admins). CS@RIT ANNUAL REPORT, 2015-2016 6 **Computer Science Community (CSC) : https://csc.cs.rit.edu/ [CS Web - main page] https://www.cs.rit.edu/ [Degree programs - summarized under various links...from the "Menu" link] Statistics on student enrolments etc. - Hank and Hans-Peter, from their annual reports, and/or 'state-of-the-department' presentations at IAB.

Student, Faculty and Staff Accomplishments

Student Awards (2015)

Scholarships

ECI Systems & Engineering Scholarship ($2000): Robert Bond III

Carl Reynolds Memorial Computer Science Scholarship ($1000, undergraduate): Asia Woodside

Outstanding First Year Student Scholarship ($1000): Christopher Lentner

Outstanding Fifth Year Student Award ($1000): Douglas Dlutz

Alumni Scholarship ($1000, undergraduate): Christopher Sprague

Kenneth and Margaret Reek Scholarship ($800, graduate): Daniel Herzig

MS Project Poster Awards

Each semester MS project students conclude their project with a poster session, where they share their work with other CS faculty, students and visitors. At the end of each poster session, faculty votes for best poster are tallied, and the top three posters are selected for an award.

The best poster awards given in Spring and Fall 2015 are listed below.

Spring 2015
(1st place) Kevin Bradley, "Successor ML Features for MLton," Advisor: Dr. Matthew Fluet
(2nd place) ??
(3rd place) ??
Fall 2015
(1st place) Alagu Valliappan, *"Secure Distance Computation Using Homomorphic Encryption," Advisor: Dr. Peizhao Hu
(2nd place, tie) Anthony Bentancur, "Modified Artificial Potential Field Obstacle Avoidance for Corobots," Advisor: Dr. Zack Butler
(2nd place, tie) Kedarnath Calangutkar, "Classification of Handwritten Math Symbols using Random Forests and Hybrid Features," Advisor: Dr. Richard Zanibbi

News in 2015

Congratulations to Professor Paul Tymann

Our congratulations to Professor Paul Tymann on his appointment to the prestigious ACM Education Board.

Congratulations to Professor Hank Etlinger for Completing 40 years of Service at RIT!

Hank Etlinger was honored by President Destler for completing 40 years of Service at RIT. Professor Etlinger is Associate Professor and Undergraduate Program Coordinator of the Department of Computer Science. He has taught primarily introductory programming courses, database courses, courses in software engineering, and courses that focus on professional communication for over thirty years. He helped launch

software engineering as a separate discipline at RIT by participating on the task force that drafted the original software engineering degree proposal. In addition, he was a co-investigator for an NSF funded grant as well as an RIT Productivity Grant that that led to the creation of some of the initial software engineering courses and labs. Professor Etlinger is active in reviewing prospective textbooks for major publishers in many areas of computer science, software engineering, mathematics, and technical communications, having produced over 550 such reviews since 1983.


Welcome to CS@RIT -- A Message from the Chair

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Mohan Kumar ,
Professor and Chair

RIT ranked among the top U.S. computer science and engineering schools

Rochester Institute of Technology was ranked among the best computer science and engineering schools in the most recent *Business Insider* ratings. The university placed 14th in the Northeast and 36th in the U.S., in the ratings. RIT was recognized for its comprehensive preparation of graduates for today's workforce, particularly in important STEM fields—science, technology, engineering and mathematics.

Click here for the complete story from RIT News.
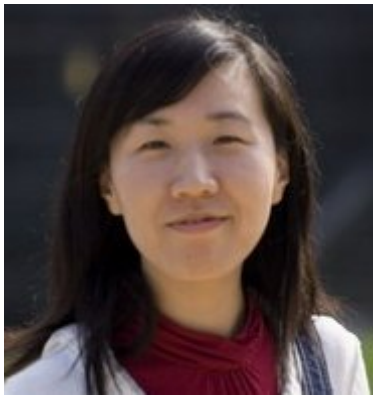

Computer Science Colloquium/Dr. Jing Gao, University at Buffalo/Dec 11, 1-2pm/GOL 3445

Jing Gao is currently an assistant professor in the Department of Computer Science at the University at Buffalo (UB), State University of New York. She received her PhD from Computer Science Department, University of Illinois at Urbana Champaign in 2011, and subsequently joined UB in 2012. She is broadly interested in data and information analysis with a focus on information integration, truth discovery, crowdsourcing, data stream mining, transfer learning, anomaly detection and information network analysis. She has published more than 70 papers in referred journals and conferences and her work has received over 2000 citations. More information about her research can be found at: http://www.cse.buffalo.edu/~jing .

CS@RIT gets success in ACM ICPC Regional contest!

RIT will be represented at the ACM ICPC Regional Final Programming Contest by the Tanyao Masters (Sarathi Hansen, Raphael Kahler, and Kerry Zhao), who along with two other RIT teams, S.H.E.E.P. (Winston Bui, Stacy Chen, and Jaben McCormack) and Vogon Constructor Fleet (Neil Guertin, Sophie Song, and Nathaniel Trojian), participated in the Regional Preliminary Round at SUNY Oswego on Oct. 10th, coached by Zack Fitzsimmons. These teams were selected at the RIT tryouts on Sept. 26th, organized by Ivona Bezakova, from a total of ten participating teams with a notable mention of Hunter Knepshield, who won the RIT tryouts, but was unable to participate in the preliminaries. Congratulations to everyone who participated and good luck to our team at the regional finals!
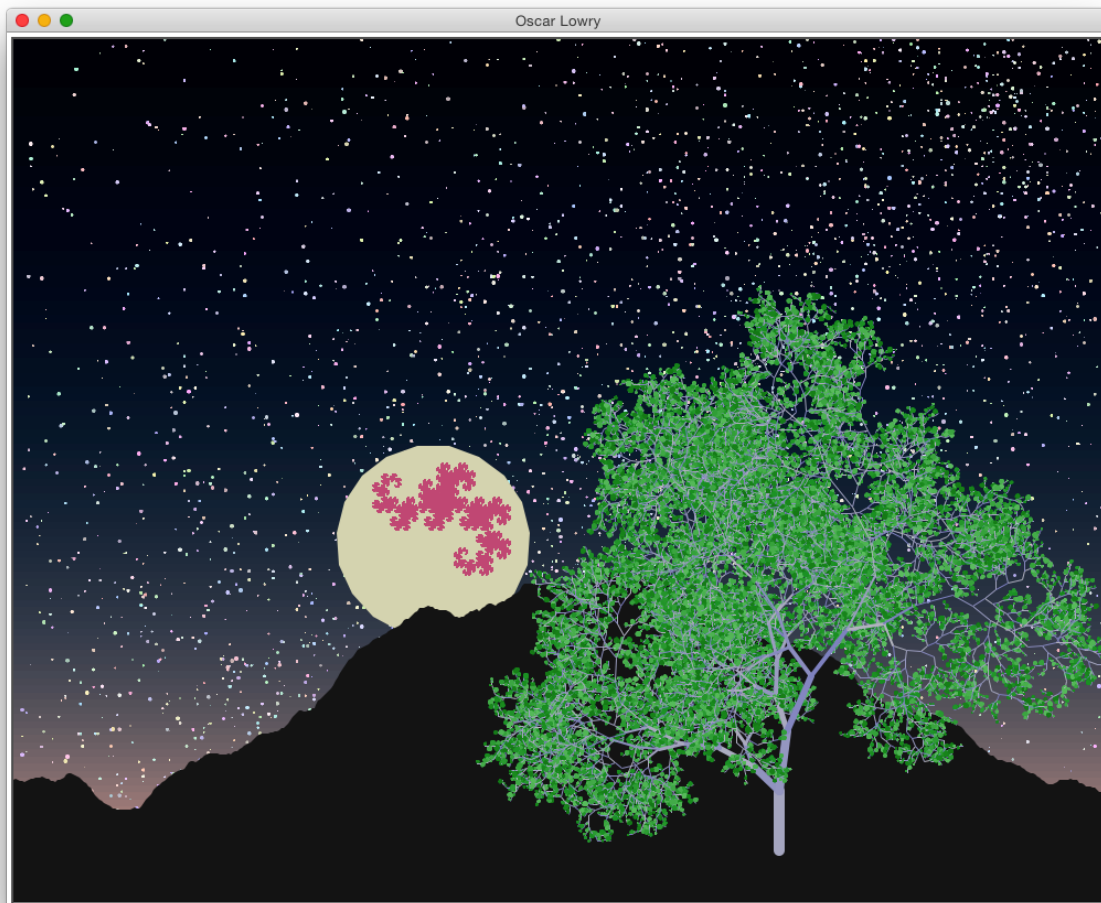
Congratulations to the CS 1 Art Show Winners!

The annual CS1 Art Show was held this past Friday, October 9th, 2015. This show was perhaps the strongest showing ever in the 5 years we've held these shows. Seven entrants received more than 10 votes for first, second or third place. All entrants should be very proud of their works, which will remain on display in Golisano 3660 for the rest of the semester. Please stop by to see the extremely creative and talented entries. Well done, CS 1 students!

The prize winners of the 20151 CS1 Art Show are:

1. Oscar Lowry

2. Ayana Adylova

3. Cassidy Horzempa and Bryson McIver

And the runners up are:

4. Micah Martin

5. Dennis Bleier

6. Christopher Partridge

7. Timothy Geary

8. Yelman Kahn

CS Masters Student among winners of 2014 AT&T; Rochester Civic App Challenge

The AT&T Rochester Civic App Challenge is a two-month "virtual hackathon" for Upstate New York software developers to leverage open data to build smartphone apps that serve community needs. The goal of the challenge is to encourage local developers to build and deliver apps and services that serve community needs, connect and engage citizens with their governments and demonstrate how mobile technologies can lead to the next generation of tech jobs and investment.

Debjit Saha, a computer science graduate student, shared third place in the challenge with Syracuse University student Ricky Laishram for creating RocReport, a marketplace for area contractors to learn about civic projects. Congratulations to Debjit.

Winners were chosen by a panel of judges, who based their decisions upon the apps' potential impact on Greater Rochester, execution and creativity or novelty. The two shared a $1000 prize which was awarded on May 14, 2014 at the RIT MAGIC Center.

Please see http://www.rit.edu/news/story.php?id=50777 for more info.

□

Einstein's prediction confirmed: RIT researchers produce significant contribution

Research conducted by Rochester Institute of Technology scientists was integral to the

breakthrough detection of gravitational waves from binary black holes that was announced today by the Laser Interferometer Gravitational-wave Observatory (LIGO) Scientific Collaboration. Hans-Peter Bischof , Professor of the Department of Computer Science, is the founding faculty member of RIT team . He received his Ph.D. in computer science at the University of Osnabrück in Germany. He works in scientific visualization, high-performance computing and language design, and his visualizations of numerical relativity simulations have appeared in science magazines and in the History Channel program, The Universe: Cosmic Holes. Bischof is a member of the LIGO Scientific Collaboration.

To read more, visit the following from RIT University News Services:

Gravitational waves detected 100 years after Einstein's prediction – RIT researchers make significant contribution to the monumental discovery: https://www.rit.edu/news/story.php?id=54606

LIGO confirms RIT's breakthrough prediction of gravitational waves : https://www.rit.edu/news/story.php?id=54611

QUEST Elementary School Science Fun Day

□

Students and faculty from the Computer Science Graphics and Applied Perception Lab will be participating in the 2014 QUEST Elementary School Science Fun Day.

The QUEST Science Fun Day is an annual event for students in grades K-6, dedicated to learning science in a hands-on and interesting way. Students travel around the school building, the nearby creek and outdoor classroom to learn about science in our everyday lives. Demonstrations are led by local science professionals, parents whose profession involve science, high school students, teachers and QUEST students.

The event will be held at QUEST Elementary School in Hilton, NY on June 6, 2014.

Professor Carol Romanowski's Teaching Cognitive Computing was Featured on RIT University NEWS!

Carol Romanowski, associate professor of computer science, shows her class how to train Watson—IBM's artificially intelligent supercomputer.

Link to the university news: http://www.rit.edu/news/story.php?id=55254&source=athenaeum

Congratulations to CS Professor Reynold Bailey, CLA Professor Cecilia Ovesdotter Alm, and a transdisciplinary team of faculty mentors on winning an NSF REU Site grant!

The goal of this REU Site is to give students experience with fundamental research in acquisition and fusion of multisource sensing data related to human beings. Students will be challenged to make sense of human behaviors and cognitive processes with hardware, software, and complex thinking, exploring the nexus of computational science, scientific practice, and the human experience.

This REU Site is a collaborative effort among RIT faculty in the B. Thomas Gollisano College of Computing and Information Sciences, the College of Liberal Arts, and the Kate Gleason College of Engineering. The REU Site team includes PI Cecilia Ovesdotter Alm, Co-PI Reynold Bailey, and several faculty mentors across the colleges serving as Senior Personnel. More information about

this REU Site and instructions for students on how to apply to the 2016 summer REU program can be found at: https://cs.rit.edu/~reu/ .

Congratulations to 2014-2015 CS Scholarship Winners

A number students have been awarded scholarships from the Computer Science Department for the 2014-2015 school year. A list of awards are given below. We offer our sincerest congratulations to all of the recipients.

Connor Billen (Kenneth and Margaret Reek Scholarship Award)
Nathan Castle (Outstanding 1st Year Student Prize)
Stacy Chen (ECI Scholarship)
Douglas Dlutz (ECI Scholarship)
Madison Flaherty (Carl Reynolds Scholarship Award)
Kaitlin Hipkin (ECI Scholarship)
Dean Knight (Alumni Outstanding 5th Year Student Prize)
Douglas Krofcheck (Alumni Scholarship - Graduate)
Phillip Lopez (ECI Scholarship)
Robert McCartney (Outstanding Graduate Scholarship)
Jaben McCormack (ECI Scholarship)
Vincent Petrone (ECI Scholarship)
Tom Jose Thomas (Carl Reynolds Scholarship Award)
Oleg Vyshnyvetskyi (Outstanding Graduate Scholarship)

PhD Student Publishes State-of-the-Art Technique for Finding Text in Images at Top-Tier Conference

Siyu Zhu (PhD student, Imaging Science) and Dr. Richard Zanibbi recently had a paper on finding text in images accepted at CVPR, the leading international computer vision conference (http://cvpr2016.thecvf.com). Their paper, "A Text Detection System for Natural Scenes with Convolutional Feature Learning and Cascaded Classification," describes a new technique that obtains state-of-the-art results for the ICDAR 2015 Focused Scene Text Localization task, a standard benchmark. Previously, the best results had been obtained by a commercial system.

Congratulations to Professor Zack Butler on receiving Eisenhart Award for Outstanding Teaching!

Professor Zack Butler is one of the three recipients of the Eisenhart Award for Outstanding Teaching for the 2015-2016 academic year. This primary honor accorded each recipient is the campus-wide recognition of his or her outstanding teaching, celebrated in spring term and at the Academic Convocation in May. More information about this award can be found at http://www.rit.edu/academicaffairs/eisenhart/index.php . Congratulations!

Dr. Christopher Homan received a grant from NIH!

Dr. Christopher Homan received an NIH award of $20,578.00 in support of his project titled "ECapacity Development & Growth In The ASPIRE Network". This R25 grant, in response to PAR-13-107 (Global Health Research and Research Training eCapacity Initiative) from the Fogarty International Center (FIC), will develop and build eCapacity (hereafter donated as "eC") in the context of the Asia-Pacific International Research and Education (ASPIRE) Network *. There are* two areas for eC.ASPIRE focus: epidemiology as explored through Internet-based social media (" *social epidemiology* ") and mobile health (*mHealth*) using technology-augmented methods to enhance mental health integration into primary care settings, women's health services, and related community activities. Together, these are intended to promote health service utilization and proactively set in motion upstream processes that prevent suicide and attempted suicide by addressing antecedent risks.

Professor Raj appointed to ABET Computing Accreditation Commission ExCom

Professor Rajendra K. Raj has been appointed as a member of the Executive Committee of the

2016-17 ABET Computing Accreditation Commission (CAC), which is responsible for reviewing and accrediting computer science, information systems, information technology, and general computing degree programs in the U.S. and several other countries across the world. He will also chair the CAC Criteria Committee, which reviews and enhances the criteria used for accrediting these computing degree programs. Both Professor Raj and Professor Paul Tymann are also members of the 2015-16 ABET Computing Accreditation Commission; having two commission members from the same department is extremely rare and is demonstrative of the quality of the education provided by RIT's Computer Science department.

Note. The B.S. degree in Computer Science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org .

Dr. Xumin Liu wins Best paper award at ICWS

Dr. Liu and her coauthor Isankumar Fulia a former student won the best paper award at the IEEE International Conference on Web Services (ICWS 2015), New York City, June 26-July 2, 2015. In addition, Xumin recently published two other articles coauthored with MS students at high quality conferences.

1. Xumin Liu, Isankumar Fulia, Incorporating User, Topic, and Service Related Latent Factors into Web Service Recommendation, IEEE International Conference on Web Services (ICWS 2015), New York City, June 26-July 2, 2015. Received the Best Paper Award at the Conference. (Acceptance Rate : 17.4%)

2. Xumin Liu (Rochester Institute of Technology USA) Arpeet Kale (Rochester Institute of Technology) Javed Wasani (Rochester Institute of Technology) Chen Ding (Ryerson University) Qi Yu (Rochester Institute of Technology US), Extracting, Ranking, and Evaluating Quality Features of Web Services through User Review Sentiment Analysis, IEEE International Conference on Web Services (ICWS 2015), New York City, June 26-July 2, 2015. (Acceptance Rate : 17.4%)

3. Aditi Jain, Xumin Liu, and Qi Yu, Aggregating Functionality, Use History, and Popularity of APIs to Recommend Mashup Creation, International Conference on Service Oriented Computing (ICSOC) 2015. (Acceptance Rate: 16%).

Dr. Richard Zanibbi to coordinate international Math

Information Retrieval competition.

Computer Science Professor Richard Zanibbi is co-organizing an international math information retrieval competition being held as part of the NTCIR-12 (NII Testbed and Community for Information Access Research) conference in Tokyo next year. Other organizers include researchers from Universities in Japan, Germany, and Scotland.

Mathematical Information Retrieval (MIR) is concerned with finding information in documents that include mathematics, using queries that contain a combination of keywords and math formulae. Students from the CS Document and Pattern Recognition Lab (dprl) have participated in past competitions, earning top honors at the 2014 NTCIR conference.

The results of the competition will be presented at the NTCIR-12 conference in Tokyo, Japan, June 2016.

CS faculty co-organize IEEE PerCom 2016.

Mohan Kumar is the Co-General Chair for the IEEE International Conference on Pervasive Computing and Communications (PerCom) 2016 to be held in Sydney, Australia during March 14-18, 2016. Mohan is a co-founder of IEEE PerCom, now in its fourteenth year and the premier annual scholarly venue in the areas of pervasive computing and communications.   Please visit http://www.percom.org for more information about the conference.

Peizhao Hu is Co-chairing the Conference Demo Session and a workshop on Context and Activity Modeling and Recognition. Peizhao Hu, Carlos Rivero, Minseok Kwon, and Joe Geigel, and

students Alagu Valliappan, Yogesh Jagadeesan, Ashita Chetan, and Robert McCartney have papers/demos in affiliated events at the conference. Adam Fowles a BS/MS student has received NSF travel grants to attend the conference.

Paper on an Improved Tangent Formula Search Engine to Appear at SIGIR 2016

Computer Science PhD student Kenny Davila , Dr. Richard Zanibbi, and Drs. Frank Tompa and Andrew Kane from the Univeristy of Waterloo (Canada) will have their paper entitled *"Multi-Stage Math Formula Search: Using Appearance-Based Similarity Metrics at Scale"* appear in the proceedings of SIGIR 2016 , the leading international conference on information retrieval. They will present their paper at the conference in Pisa, Italy this coming July.

The paper describes improvements to the Tangent formula search engine created by the Document and Pattern Recognition Lab . David Stalnaker created Tangent for his MSc thesis in 2013, building upon ideas from Thomas Schellenberg's earlier MSc thesis . Nidhin Pattaniyil added support for matrices and keywords in 2014 for his MSc project, producing top results for the international NTCIR-11 math retrieval task (EE Times Story , ACM TechNews Story).

Drs. Tompa and Kane began collaborating with Kenny Davila and Dr. Zanibbi in Oct. 2014, when Dr. Zanibbi visited the University of Waterloo for a month during his sabbatical. Dr. Tompa is a Distinguished Professor Emeritus at U.Waterloo, a Fellow of the ACM, and an influential researcher in the areas of databases and information retrieval. Dr. Kane is a postdoctoral researcher at the University of Waterloo specializing in high-performance retrieval systems.

The SIGIR paper describes an improved retrieval model based on pairs of symbols in formulae, a new two-pass retrieval architecture, and a new formula similarity metric, the *Maximum Subtree Similarity (MSS)* . Together, these modifications produce state-of-the-art retrieval results, and greatly improve Tangent's handling of queries containing variables and wildcards (e.g. to identify variants of the Pythagorean theorem using different variable names, or find all exponents with base 'e'). The paper also describes substantial reductions in storage and run-time requirements, allowing the system to be used in real-time for large collections such as Wikipedia.

Image Caption: Example search results from the Tangent search engine. The results shown were produced using the NTCIR-11 Wikipedia collection containing over 380,000 formulae.

$\ell\,(m)$

Graphs | Search

Returned 26 matches (100 formulae, 95 docs)
   Lookup 1.207 ms, Re-ranking 18.658 ms
   Found 2015 tuple postings, 460 formulae, 318 documents
[formulas] [documents] [documents-by-formula]

1.0000
0.0000
3.0000
$\ell\,(m)$

1.0000
0.0000
2.0000
$\ell\,(t)$ $\ell\,(\varepsilon)$ $\ell\,(A)$

$\ell\,(b)$ $\ell\,(a)$ $\ell\,(w)$

$\ell\,(x)$ $\ell\,(Q)$ $\ell\,(s)$

$\ell\,(\gamma)$ $\ell\,(n)$ $\ell\,(y)$

$\ell\,(Y)$

1.0000
0.0000
2.0000
$\zeta\,(m)$ $p\,(m)$ $y\,(m)$

Alumni Profiles

Anna Sweet

Anna graduated with her Bachelor's degree from Computer Science in 2004. She currently works at Valve and is responsible for their business development, focusing on Steam distribution, all things Steam Machines and Steamworks integration. She joined Valve in 2008, after working at Microsoft and MySpace.

Tristan O'Tierney

Tristan graduated with his Bachelor's degree from Computer Science in 2006. He was one of the founders of Square in 2009 with Twitter cofounder Jack Dorsey to make it easier for microbusiness owners to accept credit card payments. Tristan has also worked as a Mac engineer at Yahoo, Apple, and VMware and created the official Obama 2008 iPhone app. He built one of the first Twitter client apps on the App Store called Twinkle while working as an iOS developer for video game company Tapulous. He's also well known for his online Objective-C tutorial and enjoys hacking on projects like FlickrBooth in his spare time.

Kurt Kluever

Kurt graduated with both his Bachelor's and Master's degrees from Computer Science in 2008. He currently is a Software Engineer at Google in New York City, NY where he specializes in backend infrastructure, Google+, and Java Core Libraries. Kurt joined Google in 2008 after having been on co-op with Google in San Francisco, CA during his CS undergraduate program.

Paul Solt

Paul graduated with both his Bachelor's and Master's degrees from Computer Science in 2010. He runs a development studio called, Artwork Evolution. They design photo apps, entertainment apps, and games for iPhone, iPad, and Mac. Paul has taught iPhone programming as an Adjunct Professor at Rochester Institute of Technology (RIT) and teaches popular online courses through iPhoneDev.tv, Skillshare.com and Udemy.com. Paul's work experience includes Apple and Microsoft where he worked in computer graphics and on mobile teams.

Teaching, Academics and Academic Support

BS – Computer Science

The B.S. degree in Computer Science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org . The program provides students with both a broad and deep foundation in theory and modern software and hardware concepts as well as introduces students to numerous programming languages and paradigms. Students have an opportunity to engage in significant programming and software development work (it's not unreasonable to think of Computer Scientists as technology inventors), but we also offer students more and more opportunities to engage in both traditional and applied research. In addition to required Computer Science courses, students have an opportunity to take Computer Science electives in areas such as: architecture and operating systems; computer graphics and visualization; data management; distributed systems; intelligent systems; languages and tools; security; and theory.

Employers not only look for students who have strong technical skills, but who also understand mathematics, science, and the importance of effective communication. The BS program provides students with a solid foundation in mathematics, science, liberal arts and an opportunity to take outside electives, complimenting the strong technical core that the program offers.

The demands of industry and government require college graduates to master both the fundamentals, and the applied aspects of their profession. To meet this requirement, two applied educational experiences are woven into the program. Students are required to complete a cooperative educational experience as well as an extensive set of laboratory experiences, many as members of a team. These experiences not only strengthen a student's technical skills, but gives them the ability to communicate clearly and work effectively as part of a team.

The career outlook for computer science graduates is strong. The combination of our strong technical preparation and co-op experiences, give our graduates a leg up in industry, allowing them to join virtually any career field as a computing professional. Not only do our graduates enter the profession with more extensive skills and background than typical entry-level hires, but they can often leverage this to more rapidly advance their careers.

Outcomes and Objectives

The B.S. degree in Computer Science is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org

Program Educational Objectives

Our program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation. They will be able to:

> Pursue advanced study in computing or participate in modern software development.
>
> Collaborate Successfully with colleagues and clients.
>
> Work as ethical and responsible members of the computing profession and society.

Program Outcomes

To allow our BS graduates to meet our long-term program educational objectives, the department has developed seven program outcomes, which are narrower statements used to describe what our students are expected to know and be able to do by graduation. Students graduating from our B.S. program are able to:

> Apply the theory and principles of computer science.
>
> Demonstrate fluency in high-level programming languages, environments, and tools for computing.
>
> Demonstrate knowledge of the principles of computer organization, operating systems, and networks.
>
> Apply computing skills and work effectively in teams in industry or research.
>
> Demonstrate advanced knowledge of a selected area within the computer science discipline.
>
> Prepare technical documents and make effective oral presentations.
>
> Comprehend and analyze both legal and ethical issues involving the use of computing in society.

Enrollment and Certifications

B.S. Program Enrollment
2012-2013
Fall 2012 – 703
Winter 2012-2013 – 649
Spring 2013 – 611
Summer 2013 – 212
2013-2014
Fall 2013 – 733
Spring 2014 – 639
Summer 2014 – 222
2014-2015
Fall 2014 – 757
Spring 2015 – 710
Summer 2015 – 210
2015-2016
Fall 2015 – 822

B.S. Degree Certification
2012-2013
Fall 2012 – 15
Winter 2012-2013 – 29
Spring 2013 – 46
Summer 2013 – 45
Total for full academic year – 135
2013-2014
Fall 2013 – 28
Spring 2014 – 47
Summer 2014 – 22
Total for full academic year –- 97
2014-2015
Fall 2014 – 35
Spring 2015 – 44
Summer 2015 – 17
Total for full academic year – 96

MS – Computer Science

The MS program in computer science consists of a core curriculum, a diverse set of clusters, and many additional electives. The core provides students with a solid background in the theoretical principles underlying computer science, which ensures that graduates acquire the intellectual tools necessary to keep up-to-date in this rapidly evolving discipline. The clusters provide students with the opportunity to obtain depth in a computer science discipline. The electives add the necessary breadth of knowledge required by industry. This combination prepares our graduates to engineer modern computing systems, and contribute in all aspects of systems life cycles.

Clusters are offered in a variety of areas, including computer graphics and visualization , data management , distributed systems , intelligent systems , programming languages and tools , security , and theory . Certain pre-approved courses from other departments also may be counted toward the degree.

The program helps students prepare for academic and research careers in computer science or a related discipline. The program is designed for students who have an undergraduate major or minor in computer science as well as those who have a strong background in a field in which computers are applied.

Faculty members in the department are actively engaged in research in artificial intelligence, wireless networks, pattern recognition, computer vision, visualization, data management, combinatorics, and distributed computing systems. There are many opportunities for graduate students to participate in these activities toward thesis or project work and independent study.

Applicants should have a baccalaureate or equivalent degree from an accredited institution and a minimum grade point average of 3.0 (B). RIT undergraduate students in computer science, computational math, biomedical computing, or computer engineering technology may study for both their BS and MS degrees through accelerated programs. Applicants from foreign universities must submit the Test of English as a Foreign Language (a score of at least 213) and Graduate Record Exam scores. GRE scores also can be considered for applicants whose undergraduate grade point average is lower than 3.0.

PhD in Computing and Information Sciences

The B. Thomas Golisano College of Computing and Information Sciences (GCCIS) offers a Ph.D Program in Computing and Information Sciences.   This program is administered at the college level.

This use-inspired basic research degree is designed to produce independent scholars, well-prepared educators and cutting-edge researchers poised to excel in their work within computing and interdisciplinary environments in academia, government and industries. The degree highlights two of the most unique characteristics of the Golisano College of Computing and Information

Sciences - the breadth of its program offerings and its scholarly focus on the theoretical and practical aspects of cyberinfrastructure (CI) as applied to specific problems across multiple domains. It is a blend of computing's intra-disciplinary and inter-disciplinary areas.

More information on the program can be found here .

First Year Computer Science at RIT

> *"We teach the AI not the pretty pictures."*

Our Process

The computer science department has a unique way to teach the first year computing sequence at RIT. The approach, originally called "Computational Problem-solving" has evolved in a number of ways since its introduction in 2009-2010.

A team of professors delivers the instruction to multiple sections of 50 students each. The lecture period is 1 hour and 50 minutes, and there is a one hour recitation each week to reinforce the material and present new variations and details. Finally there are the problem-solving sessions that take place before the lab implementation period.

Computational problem-solving sessions center around a team of three or four students who work for about an hour on a set of problem-solving activities related to the subsequent lab assignment. Students gather at tables and work using pencil and paper in the lecture classroom. Upon arrival to problem-solving, students receive hard-copy of the problem to solve. The students form teams, and the team's pen-and-paper work product is the source of each student's problem-solving grade.
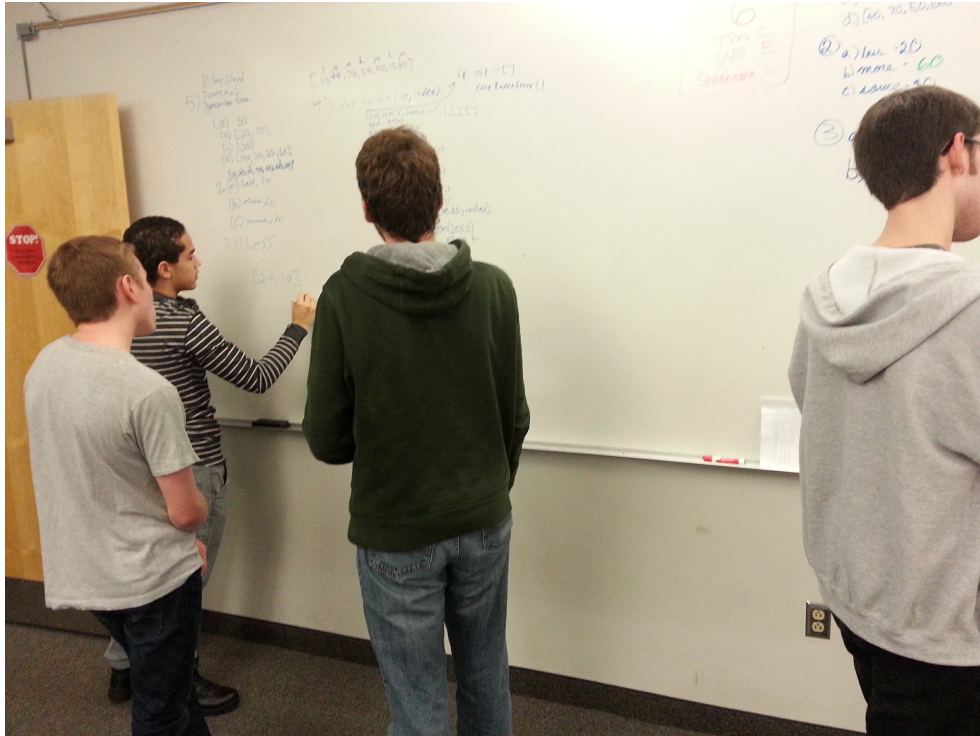
The time frame for problem-solving work is roughly 35-40 minutes, after which the instructor and student lab instructors (SLIs) collect the teams' papers and choose a team or two to present their work and conduct a 15-20 minute discussion on the solutions shown. After problem-solving, students move to computer labs for implementation. During this move, the instructor grades the problem-solving work, copies the papers and returns the copies to the students. The SLIs take lab attendance and continue working with the students. During the lab session, students work alone as individuals and do not share or collaborate on the coding.

Topics of Instruction

The table below shows the list of topics that the first year program teaches. As you can see, it is a comprehensive introduction to the discipline.

First Semester Course	Second Semester Course
Python Functions	Java Object-oriented Programming
Turtle Graphics with Python	Interfaces, Inheritance, Abstract Classes and Generic Classes
Recursion	Java Collections Framework
Loops, Assignment and Types Strings and Files	Graphs
Array Lists Searching, Sorting, and Complexity	Shortest Paths
Greedy Algorithms and Classes	Backtracking

First Semester Course	Second Semester Course
Stacks, Queues and Linked Lists	Java GUI Programming
Testing and Debugging	Event-driven Programming
Hashing	Threads
Trees and Heaps	I/O Streams and Networking

Student Team Activities

In addition to the topics covered, students team up to develop the AI to playing a computer-based game. The culmination of the year is called 'Battle Royale' in which the top student teams from each section duke it out in a ranked competition for the best game-playing artificial intelligence. Below a team explains their game-playing algorithm.
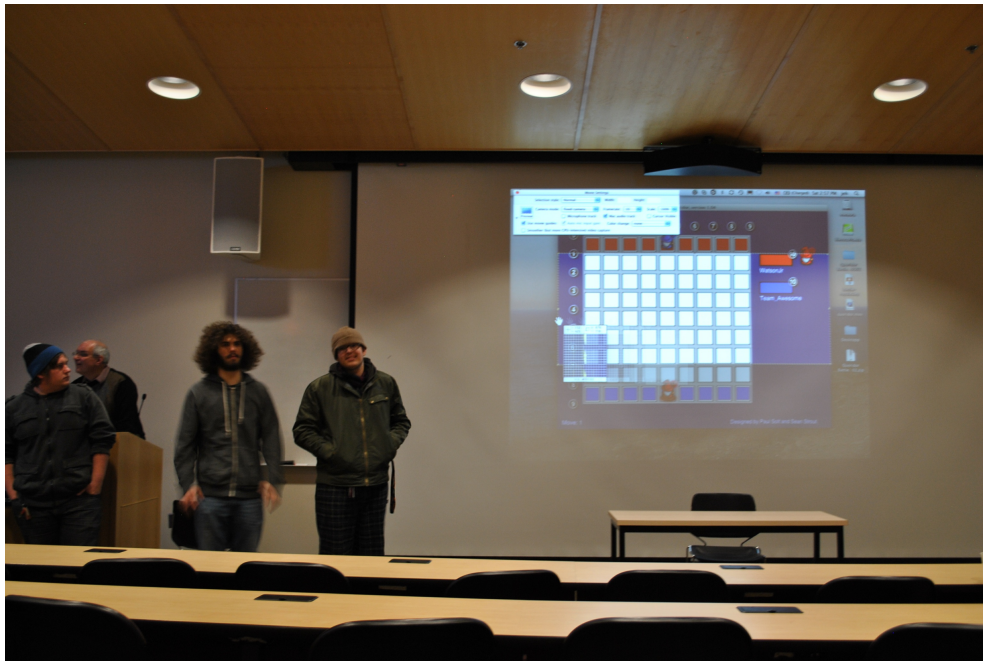
Student Support

The department provides a wide range of support services to the students. A staff of Teaching Assistants (TAs) runs what's called the Mentoring Center, where students can get assistance on items and issues related to their work on assignments. The TAs also lead recitation sessions on a weekly basis and deliver review sessions for exam preparation.

The Student Lab Instructors (SLIs) assist the TAs in running the mentoring center, and they also assist the instructors with the problem-solving sessions and lead the lab implementation sessions that follow problem-solving.

The SLIs and instructors follow the student discussion board, which is where student post questions and get answers at all hours through the course management system.

At the institute level Supplemental Instructors (SIs) attend classes and work with smaller student groups outside class.

Student Advising and Services

The Computer Science Advising team is committed to the success of all students within the department. The professional staff academic advisors empower students to make decisions that enhance their educational, personal, and professional growth and development. Through consistent interactions, advisors build strong relationships with students. We believe academic advising is driven by students. Academic advisors guide students on how to navigate through the overall college experience.
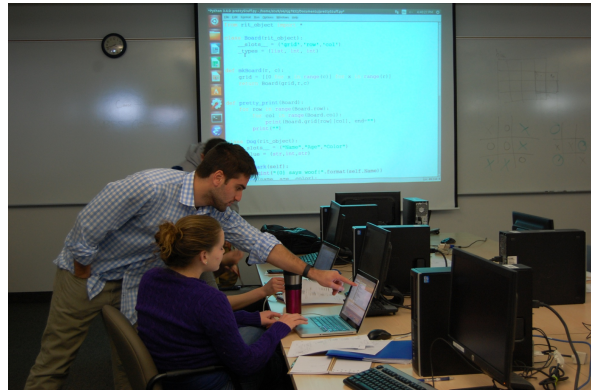
Coordinators are frequently called upon to sign off on most requests, from simple grade changes to changes in program status. Such requests are typically submitted through academic advisors or department staff.

Academic advisors should be a student's first point of contact for assistance and advising, and are assigned to students based on particular cohorts. The Computer Science academic advisors typically have a student to advisor caseload of roughly 300:1. Advisors are available to discuss schedule changes and planning, curriculum worksheet questions, change of program, course withdrawal, concerns with a course, co-op, full-time equivalency, I-20 extensions, reduced course loads, minors, double majors, graduate scholarship, and project or thesis.

The department also utilizes faculty advisors, but these are not assigned. While faculty advisors can discuss both academic and personal issues and address many of the same issues as the professional advisors, the real strength of faculty advisors lies in their professional expertise. We encourage students to talk to their faculty advisor about career options, choices to make in selecting Computer Science or outside electives, or perhaps to get their opinion on several co-op opportunities that they may have.

Cooperative Education

Computer Science BS

Program Overview

Computer science covers a wide spectrum of areas within the field of computing, ranging from theoretical to practical. Computer science professionals can specialize in areas such as artificial intelligence, computer graphics, computer theory, networking, security, robotics, parallel computing, data mining, computer architecture, systems software, and game development, among others. Programming is an important aspect of computer science, but computer scientists also must be adaptable as well as adept at problem solving and analytical reasoning, able to understand design principles, and fluent in using computers. Professionals in the computing field are in demand in a wide variety of industries, and RIT's computer science program equips students to take advantage of these opportunities by providing the necessary technical skills and valuable background in communication, professional responsibilities and ethical behavior.

Course Descriptions

https://www.rit.edu/programs/computer-science-bs

Degrees Awarded

Bachelor of Science
Master of Science
Combined BS/MS Degree

Enrollment

Approximately 840 BS students; approximately 60 BS/MS students; approximately 450 MS students.

Cooperative Education & Experiential Education Component

BS Students are required to complete a minimum of three co-op work assignments. One assignment occurs during summer and two assignments take place during semesters.

Salary Information

	Avg.	Range
Co-op:	$21.15	$7.50 - $48.00
BS:	$84,000	$40,000 - $120,000
BS/MS:	$95,000	$60,000 - $105,000

Student Skills & Capabilities

The Computer Science Department emphasizes problem solving, object-oriented programming, documentation and testing, and an approach that includes careful analysis of design alternatives when solving problems. Team and collaborative efforts are encouraged.

Prior to starting their first co-op assignment, students will typically have completed: Computer Science I and II (which introduce problem solving and data structures using Python and Java); The Mechanics of Programming (which uses C); Concepts of Computer Systems (which includes an introduction to assembly language as well as some high-level hardware design issues and architectures) and Introduction to Computer Science Theory, as well as an introductory Software Engineering course. In addition, students will have completed two Calculus courses and courses in Discrete Mathematics, Probability and Statistics, and Linear Algebra.

During the upper years of their program, students expand their background with respect to programming languages, data management, intelligent systems, theory and algorithms. Students gain additional depth in one or more areas within Computer Science by choosing from both undergraduate and graduate level Computer Science courses.

Accreditation

The BS degree is nationally accredited by the Computing Accreditation Commission of ABET, www.abet.org

Equipment & Facilities

Well over 100 workstations and servers. Linux operating systems environment. PC lab, MAC lab, and specialized labs in Graphics, Database, Distributed Systems, Document & Pattern Recognition, Computational Studies, Portable Eye Tracking, as well as several labs devoted to research and development.

Nature of Work

The widespread and increasing use of computers and information technology has generated a need for highly trained, innovative workers with extensive theoretical and practical technical expertise. Job tasks and occupational titles used to describe these workers evolve rapidly and continually, reflecting new areas of specialization or changes in technology, as well as the preferences and practices of employers. *(Source: U.S. Bureau of Labor Statistics O.O.H.)*

Training / Qualifications

A bachelor's degree commonly is required for software engineering, computer programming, and systems analyst jobs, although a master's degree is preferred for some positions. Computer scientists must be able to think logically and creatively. They must possess a strong aptitude for math and other technical topics, as these are critical to the computing field. Computer software engineers and programmers must have strong problem-solving and analytical skills. Ingenuity and creativity are particularly important in order to design new, functional software programs. The ability to work with abstract concepts and to do technical analysis is especially important for systems engineers because they work with the software that controls the computer's operation. Because they often deal with a number of tasks simultaneously, they must be able to concentrate and pay close attention to detail. Although computer scientists sometimes work independently,

they frequently work in teams on large projects. As a result, they must be able to communicate effectively with computer personnel, such as programmers and managers, as well as with users or other staff who may have no technical computer background. *(Source: U.S. Bureau of Labor Statistics O.O.H.)*

Job Outlook

Many computer programmers work in computer system design and related services, an industry that is expected to grow as a result of an increasing demand for new computer software. In addition, new applications will have to be developed for mobile technology and the healthcare industry. Job prospects will be best for programmers who have a bachelor's degree or higher and knowledge of a variety of programming languages. Keeping up to date with the newest programming tools will also improve job prospects. *(Source: U.S. Bureau of Labor Statistics O.O.H. '13-'14)*

Job Titles

Computer Scientist, Software Engineer (Applications Software Engineer, Systems Software Engineer), Technical Specialist, Software Developer, Computer Programmer, Systems Analyst, Network Architect, Web Developer, Software Tester, Software Quality Assurance Specialist.

Employment

Computer scientists held about 25,600 jobs in 2014. Although they are increasingly employed in every sector of the economy, the greatest concentration of these workers, about 26 percent, was in the Federal government. Many computer scientists were also employed by software publishing firms, scientific research and development organizations, and in education.

Computer software engineers and computer programmers held about 1.1 million jobs in 2014. Although computer software engineers and computer programmers can be found in a wide range of industries about 32 percent were employed in computer systems design and related services. Many also worked for software publishers, manufacturers of computers and related electronic equipment, financial institutions, and insurance providers.

Computer systems analysts held about 567,800 jobs in 2014. Although they are employed in many industries, 27 percent of these workers were in the computer systems design and related services industry. Computer systems analysts also were employed by governments; insurance companies; financial institutions; and business management firms. Employment growth is also expected in IT consulting firms. As more small and medium size firms demand advanced systems, the practice of analysts moving between businesses is expected to increase. *(Source: U.S. Bureau of Labor Statistics O.O.H.)*

Significant Points

-Computer scientists, software engineers, programmers and systems analysts are among the occupations projected to grow the fastest and add the most new jobs over the 2014-24 decade
-Excellent job prospects are expected as organizations continue to adopt increasingly sophisticated technologies
-Job prospects will be best for applicants with a bachelor's or higher degree and relevant experience (software engineer, computer programmer, systems analyst in industry)
-Most computer scientists (research or academia) are required to possess a Ph.D. (Source: O.O.H.)

Selected Employer Hiring Partners

Amazon, Apple Inc, BlueTie, Calero Software, Carestream Health, Cisco Systems, Citigroup, CryptoLabs, Datto Inc, Electronic Access Solutions, eLogic Group, EnerNOC Inc, Facebook, Factset Research Systems, Fidelity Investments, General Electric, Google, Harris Corp, IBM, Intel, Intuit, Lockheed Martin, Microsoft, MOOG Inc, National Security Agency, Oracle, Ortho-Clinical Diagnostics, Paychex, Rochester Software Associates, Thomson Reuters, Vanguard, Vistaprint, Windstream, Xamarin.

Computer Science MS

Program Overview

The Computer Science Department of Rochester Institute of Technology offers a graduate program leading to a master's degree in computer science. This program prepares students for a wide variety of computer-related careers. Our students are qualified to work in the areas of product development and applied research, using the latest software tools and languages. The program is designed for students who have an undergraduate major or minor in computer science as well as those who have a strong background in a field in which computers are applied, such as engineering, science, or business. Students concentrate in one of the following clusters:

Computational Vision and Acoustics
Computer Graphics and Visualization
Data Management
Distributed Systems
Intelligent Systems
Languages and Tools
Security
Theory

Course Descriptions

https://www.rit.edu/programs/computer-science-ms

Degrees Awarded

Master of Science Degree

Enrollment

Approximately 400 MS students.

Cooperative Education & Experiential Education Component

Graduate students have the option of completing up to a maximum of 12 months of work experience.

Salary Information

Co-op: $25.75 $10.00 - $45.72
MS: $78,119 $55,000 - $105,000

Student Skills & Capabilities

Computing skills include, but are not limited to the following:
Languages: Java, C++, C#, C, Lisp, Prolog,   XML
Operating Systems: Linux, OS X, Windows
Hardware: Mac, PC

Equipment & Facilities

Over 150 Linux workstations,
40 PC's Windows/Linux, 20 Macs.

Nature of Work

The rapid spread of computers and information technology has generated a need for highly trained workers to design and develop new software systems and to incorporate new technologies. These workers include a wide range of computer specialists. Job tasks and occupational titles used to describe these workers evolve rapidly, reflecting new areas of specialization or changes in technology, as well as the preferences and practices of employers.

Training / Qualifications

While there are many training paths available for computer science specialists, mainly because employers' needs are so varied, the level of education and experience employers seek has been rising, due to the growing number of qualified applicants and the specialization involved with most programming and analysis tasks.

Employers look for people with the necessary programming skills, especially on newer, object-oriented programming languages and tools, such as C++ and Java, who can think logically and pay close attention to detail. The job calls for patience, persistence, and the ability to work on exacting analytical work, especially under pressure. Ingenuity, creativity, and imagination also are particularly important when programmers design solutions and test their work for potential failures. The ability to work with abstract concepts and to do technical analysis is especially important for

systems programmers, because they work with the software that controls the computer's operation. Because programmers are expected to work in teams and interact directly with users, employers want programmers who are able to communicate with non-technical personnel. Many colleges offer classes in a variety of areas, such as computer graphics and visualization, database systems/data mining, distributed systems, intelligent systems, languages and tools, security, and theory.

Students can participate in consulting or research in the areas of artificial intelligence, wireless networks, computer vision, computational combinatorics, and distributed computing systems. There are many opportunities for graduate students to participate in these activities for thesis or project work and independent study and for employment upon graduation.

Job Outlook

Many computer programmers work in computer system design and related services, an industry that is expected to grow as a result of an increasing demand for new computer software. In addition, new applications will have to be developed for mobile technology and the healthcare industry. Job prospects will be best for programmers who have a bachelor's degree or higher and knowledge of a variety of programming languages. Keeping up to date with the newest programming tools will also improve job prospects. *(Source: U.S. Bureau of Labor Statistics O.O.H.'13-'14)*

Job Titles

Software Developer, software engineer, programmer/analyst, network administrator, database administrator, PC analyst.

Employment

Computer science professionals are employed in almost every industry, but the largest concentrations are in computer systems design and related services and in software publishers, which includes firms that write and sell software. Large numbers of programmers also can be found in management of companies and enterprises, telecommunications companies, manufacturers of computer and electronic equipment, financial institutions, insurance carriers, educational institutions, and government agencies.

Selected Employer Hiring Partners

Apple, ABB Industrial Systems, Amazon, Austin Detek, Cerner Corporation, Cisco, Dialogic Incorporated, Digital, Eastman Kodak Company, Google, Hewlett-Packard, IBM, Intuit, Lehman Brothers, Lucent Technologies, Microsoft, Metrosonics, Nortel, Paychex, Rogue Wave, Sun

Microsystems, Thomson Reuters, Xerox

Industrial Advisory Board

The Industrial Advisory Board of the Department of Computer Science consists of leaders and practitioners from the academic, industrial, and government sectors who help the department to ensure that real-world concerns are incorporated into our degree programs, curricula, and research activities.

A primary goal of the IAB is to help CS@RIT to create curricula that continues to meet the changing needs of industry. The IAB meets once a year for a day at RIT, where the IAB members meet with faculty and students, share their experiences and feedback, and plan future collaborations.

Meeting

The most recent Industrial Advisory Board meeting was held at RIT on October 2, 2015 (Fri.). It was purposefully scheduled immediately following the Fall 2015 RIT Career Fair (Sept. 30 (Wed.)) and interview day (Oct. 1 (Thr.)), allowing IAB members to arrange a single trip to RIT for the Career Fair and the IAB meeting. This meeting was organized by Drs. Matthew Fluet and Carol Romanowski.

Slides from the IAB meeting are available at: http://www.cs.rit.edu/~mtf/iab/20151002-presentations.pdf

Highlights of the meeting include:

"CS@RIT: State of the Department"

Faculty gave brief reports on various aspects of CS@RIT (Dept. Chair remarks, BS Program overview, MS Program overview, Dept. retreat highlights, Assessment highlights, Research highlights), with questions and feedback from IAB members.

"Identifying CS@RIT's 'Greatness through Difference'"

The RIT 2015-2025 Strategic Plan: Greatness Through Difference is guiding RIT over the next 10 years and college- and department-level activities that are aligned with the strategic plan will be well received by the university. There is an opportunity to "be on the offensive," ready to shape policies and guidelines to achieve both institute- and department-level objectives. Faculty and IAB members engaged in small-group discussions on how we can continue to provide quality education, enhance our research, and at the same time contribute to and benefit from, the President's Strategic Plan. The following summarizes some of the more interesting guiding questions and subsequent discussion.

+ Q: How can CS@RIT become a model department with regard to
  employer satisfaction assessment?

  D: Success factors for co-op (the program): keeps engineers
  "fresh" and "up to date" with what happens; co-op students are
  not "just labor"; employers offer co-ops not "just to place
  nice" with RIT. Success factors for cop-op (students): problem
  solving, soft skills, collaboration skills, initiative; how to
  teach this in the curriculum? Suggestions for co-op program:
  help with on-boarding co-op students (similar to new employee
  orientation, emphasize not just technical growth but also
  socialized component of fitting into the company); 360-degree
  review for co-op students; what should faculty do to improve
  upon co-op experience for students when they return.

+ Q: How can CS@RIT encourage and support entrepreneurship among
  students? Is it desireable for all students to have a "startup"
  mentality?

  D: Not necessary that every student participate in a start-up
  experience, but it would be great if experience at RIT could
  give each student the "start-up mentality". Ideas that perhaps
  could be implemented to provide more students with activities in
  this regard: encouraging them to participate in start-up
  contests; getting together with business students who might have
  to develop business plans or models, but who needed technical
  advising; working on open source projects; building mobile apps.

+ Q: What opportunities are there for CS@RIT faculty to further
  research with industry partners? How to balance industry
  priorities ("product") and academic priorities ("publish")?

  D: Develop a faculty co-op program. Help faculty keep fresh
  about industry. Consider sabbaticals or just project based.
  Adds value to employer and to RIT. Companies such as eBay are
  eager to collaborate with faculty. Include faculty in strategic
  planning of companies. Encourage industry partnership by
  providing credit toward service and funding for faculty to go to
  industry and meet alumni working in industry.

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+ Q: What research experiences for CS@RIT students are attractive
  to employers? How should we advise students on the value of a
  research experience, even though most students do not expect to
  have a research career?

  D: For a potential future employer, a semester of traditional
  co-op at a company would be more attractive than a semester of
  full-time research with a faculty member.  Traditional co-op
  seen to provide a broader set of skills transferable to a new
  employer than a research activity.
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+ Q: What international experiences for CS@RIT students are
  attractive to employers?

  D: Are international experiences advertised enough to students?
  Employers see value in study abroad.  Could study abroad
  experience be substituted for one term of co-op?  Possibly, as
  it probably added something different to what students graduate
  with and probably didn't take away much because students would
  still have several terms of traditional co-op.  Issues related
  to logistics and vetting student study abroad experiences would
  need to be dealt with.
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Student Interviews

Pairs of IAB members met with total of 14 current BS and MS students. Using a prepared interview questionnaire, the IAB members rated each student on his/her program's outcomes as part of CS@RIT's accreditation activities.

Current Members

[*] attended the Fall 2015 Industrial Advisory Board meeting

David Cok, Associate VP of Technology, Gramma Tech

Tony Dal Santo [*], Senior Principal Engineer, Harris

Timothy Fossum [*], Chair & Professor, SUNY College at Potsdam

James Janicki, Business Unit Directory, RTEmd (Sparton Corporation)

Sean Janis, Software Development Manager, Mobile, Amazon.com

Mike Kirby [*], Xerox

Julianne Klie, Executive, Veritor Executive

Kurt Kluever [*], Software Engineer, Google

Greg Kohl, Chief Administrative Officer, SharSharp Notions, LLC

Paul Monette [*], Thomson Reuters

David Oran, Cisco Fellow, Cisco Systems

Douglas Phair, Technology Evangelist, MITRE

Aaron Robinson [*], Senior Dev, Microsoft

William Skiba [*], Senior Principal Engineer, Harris

Mary Swift, Watson Core Technology, IBM

Anoop Thomas, Graphics Programmer, Rockstar Games

David Wagner, President and CEO, Vanteon Corporation

Laura Weime [*], Senior Software Engineer, EVA Automation

Lisa Withers [*], President and CEO, Spectracom Corporation

People

Faculty

Dr. Daniel Ashbrook
Affiliated Faculty

Dr. Reynold Bailey
Associate Professor and Associate Undergraduate Program Coordinator

Reynold Bailey, Ann McNamara, Nisha Sudarsanam, and Cindy Grimm. Subtle gaze direction. ACM Trans. Graph., 28(4):100:1–100:14, September 2009.

Reynold Bailey, Ann McNamara, Aaron Costello, Srinivas Sridharan, and Cindy Grimm. Impact of subtle gaze direction on short-term spatial information recall. In Proceedings of the Symposium on Eye Tracking Research and Applications, ETRA '12, pages 67–74, New York, NY, USA, 2012. ACM.

Dr. Ivona Bezáková
Associate Professor

Dr. Hans-Peter Bischof
Professor and Graduate Program Director

H.P. Bischof. Das Netzbetriebssystem Plan 9: Konzepte und Programmierung. Hanser, 1999.

Peter Berczik, David Merritt, Rainer Spurzem, and Hans-Peter Bischof. Efficient merger of binary supermassive black holes in nonaxisymmetric galaxies. The Astrophysical Journal Letters, 642(1):L21, 2006.

T.J. Borrelli
Senior Lecturer

Jeremy Brown
Lecturer

Dr. Zack Butler
Associate Professor and Associate Graduate Coordinator

Zack Butler, Max Bogue, Ravdeep Johar, and Balaji Iyer. Easily-programmable corobots for student use. In Proc. of the International Conference on Advanced Robotics, November 2013.

Zack Butler and Alfred Rizzi. Distributed and cellular robotics. In Bruno Siciliano and Oussama Khatib, editors, Handbook of Robotics, chapter 39. Springer, 2008.

Dr. Roxanne Canosa
Associate Professor

R. L. Canosa. Real-world vision: Selective perception and task. ACM Transactions on Applied Perception.

K. Damico and R. L. Canosa. Agglomerative clustering using hybrid features for image categorization. In Proceedings of the IS&T/SPIE Conference - Imaging and Multimedia Analytics in a Web and Mobile World, San Francisco, CA, 2014.

Warren R. Carithers

Associate Professor

Robert Duncan

Lecturer

Henry A. Etlinger

Associate Professor and Undergraduate Program Coordinator

Dr. David Garcia

Visiting Professor

Dr. Aaron Deever

Lecturer

A. Deever. Video capture system producing a video summary, 2013.

A. Deever. In-camera all-digital video stabilization. In Proceedings International Conference of Imaging Science, pages 190–193, 2006.

Dr. Raafat Elfouly

Visiting Professor

Raafat Elfouly. Lighting and outdoor signs management system and load management system for low and medium tensions.

Raafat Elfouly et al. A heuristic approach for underwater sensing and processing deployment. In 11th International Computer Engineering Conference, December 2015.

Dr. Matthew Fluet

Associate Professor

Matthew Le and Matthew Fluet. Partial aborts for transactions via first-class continuations. In ICFP'15: Proceedings of the 20th ACM SIGPLAN International Conference on Functional Programming, pages 230–242. ACM Press, September 2015. 29% acceptance rate.

Matthew Fluet. A type- and control-flow analysis for system f. In IFL'12: Revised Selected Papers of the 24th Symposium on Implementation and Application of Functional Languages, volume 8241 of Lecture Notes in Computer Science, pages 122–139. Springer-Verlag, September 2013.

Dr. Joe Geigel

Professor

Joe Geigel, Marla Schweppe, David Huynh, and Brian Johnstone. Adapting a virtual world for theatrical performance. Computer, 44(12):33–38, 2011.

Joe Geigel and Alexander Loui. Using genetic algorithms for album page layouts. IEEE Multimedia, 10(4):16–27, 2003.

Dr. James Heliotis
Professor

Dr. Edith Hemaspaandra
Professor

E. Hemaspaandra, L. Hemaspaandra, and J. Rothe. Exact analysis of Dodgson elections: Lewis Carroll's 1876 voting system is complete for parallel access to NP.

P. Faliszewski, E. Hemaspaandra, a n d L. Hemaspaandra. U s i n g complexity to protect elections. Communications of the ACM, 53(11):74–82, 2010.

Dr. Chris Homan
Associate Professor

Christopher M Homan and Lane A Hemaspaandra. Guarantees f o r the success frequency of an algorithm for finding dodgson-election winners. Journal of Heuristics, 15(4):403–423, 2009.

Lane A Hemaspaandra, Christopher M Homan, Sven Kosub, and Klaus W Wagner. The complexity of computing the size of an interval. SIAM Journal on Computing, 36(5):1264–1300, 2006.

Dr. Peizhao Hu
Assistant Professor

Scott Johnson
Lecturer

Alan Kaminsky
Professor

Alan Kaminsky. BIG CPU, BIG DATA: Solving the World's Toughest Computational Problems with Parallel Computing. Creative Commons, 2015.

Matthew Kelly, Alan Kaminsky, Michael Kurdziel, Marcin Lukowiak, a n d Stanislaw Radziszowski. C u s t o m i z a b l e s p o n g e - b a s e d authenticated encryption using 16-bit S-boxes. I n IEEE Military Communications Conference, pages 43–48, 2015.

Dr. Fereydoun Kazemian
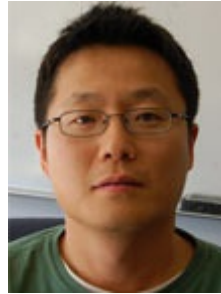*Associate Professor*

Dr. Thomas Kinsman
Lecturer

Dr. Mohan Kumar
Professor and Chair

Swaroop Kalasapur, Mohan Kumar, and Behrooz A Shirazi. Dynamic service composition in pervasive computing. Parallel and Distributed Systems, IEEE Transactions on, 18(7):907–918, 2007.

J Mohan Kumar and Lalit M. Patnaik. Extended hypercube: A hierarchical interconnection network of hypercubes. Parallel and Distributed Systems, IEEE Transactions on, 3(1):45–57, 1992.

Dr. Minseok Kwon
Associate Professor

Minseok Kwon and Sonia Fahmy. Topology-aware overlay networks for group communication. In Proceedings of the 12th International Workshop on Network and Operating Systems Support for Digital Audio and Video, NOSSDAV '02, pages 127–136, New York, NY, USA, 2002. ACM.

Sonia Fahmy and Minseok Kwon. Characterizing overlay multicast networks and their costs. IEEE/ACM Trans. Netw., 15(2):373–386, April 2007.
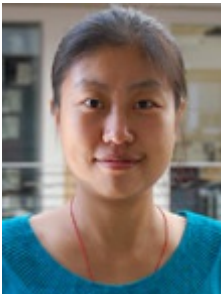
Dr. Xumin Liu
Associate Professor

Qi Yu, Xumin Liu, Athman Bouguettaya, and Brahim Medjahed. Deploying and managing web services: issues, solutions, and directions. VLDB J., 17(3):537–572, 2008.

Xumin Liu, Athman Bouguettaya, Jemma Wu, and Li Zhou. Ev-lcs: A system for the evolution of long-term composed services. IEEE T. Services Computing, 6(1):102–115, 2013.
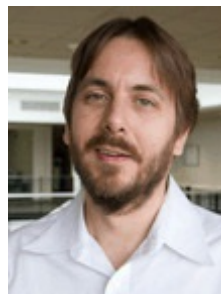
Wiley McKinzie
Professor

Dr. Abdelmiser Mooman
Lecturer

Dr. Arthur Nunes-Harwitt
Lecturer

Arthur Nunes-Harwitt. From naïve to norvig on deriving a prolog compiler. In Proc. of 2014 International Lisp Conference, pages 70–78. ACM, 2014.

Arthur Nunes-Harwitt. Advice about debugger construction. In Proc. of 2005 International LISP Conference, pages 289–298. ACM, 2005.

Dr. Stanislaw Radziszowski
Professor

Stanisław Radziszowski. Small Ramsey Numbers. Electronic Journal of Combinatorics, Dynamic Survey DS1:1–94, 1994–2014. Revision #14.

Brendan McKay and Stanisław Radziszowski. R(4, 5) = 25. Journal of Graph Theory, 19:309–322, 1995.

Dr. Rajendra K. Raj
Professor

R. K. Raj and H. M. Levy. A compositional model for software reuse. The Computer Journal, 32(4):312–322, 1989.

R. K. Raj. The active collections framework. SIGAPP Appl. Comput. Rev., 7(1):9–13, April 1999.

Dr. Leon Reznik

Professor

L. Reznik. Fuzzy Controllers. Elsevier-Butterworth-Heinemann, Oxford-Boston, 1997.

L.Reznik, G. Von Pless, and T. Al Karim. Distributed neural networks for signal change detection: On the way to cognition in sensor networks, March 2011.

Dr. Carlos Rivero

Assistant Professor

Carlos R. Rivero, Inma Hernández, David Ruiz, and Rafael Corchuelo. Benchmarking data exchange among semantic-web ontologies. IEEE Trans. Knowl. Data Eng., 25(9):1997–2009, 2013.

Carlos R. Rivero, Inma Hernández, David Ruiz, and Rafael Corchuelo. Generating SPARQL executable mappings to integrate ontologies. In 30th International Conference Conceptual Modeling - ER, pages 118–131, 2011.

Dr. Carol Romanowski

Associate Professor

Ben K. Steele

Lecturer

Ben Steele, 2015. Developed the new whiteboard-based approach to problem-solving activities for first year CS courses, improving over the paper-based approach used since 2008.

Ben Steele, 1998. At Xerox corporation, redesigned communications software for multi-processor printing system (iGen) in Java, obtaining 90% of C socket programming benchmarks. Gave two related lectures, 'Hierarchical Machine Control: An Architectural Pattern to Support Diagnostics', at the Embedded Systems West Conference, 09/1999, San Jose, CA, and 'Device Control with Java and RPC', Embedded Systems Conference, 03/1999, Chicago, IL.

Sean Strout

Senior Lecturer

Paul Tymann

Professor

Phil White

Senior Lecturer

Dr. Richard Zanibbi

Associate Professor

A. Agarwal R. Gaborski R. Zanibbi M. Kanadje, Z. Miller and S. Ludi. Assisted keyword indexing for lecture videos using unsupervised keyword spotting. 71(1):8–15, Feb. 2016.

Nidhin Pattaniyil and Richard Zanibbi. Combining TF-IDF text retrieval with an inverted index over symbol pairs in math expressions: The tangent math search engine at NTCIR-11. In Proceedings of the 11th NTCIR Conference on Evaluation of Information Access Technologies, Tokyo, Japan, Dec. 2014.

Staff

Jennifer Burt
Senior Staff Assistant - Assistant to the Chair

James "Linus" Craig
Manager of Technical Services

Peggy Decker
Staff Assistant
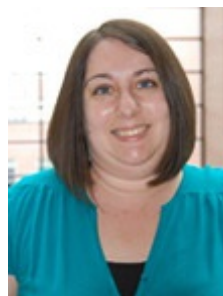
Donald Denz
Academic Advisor

Liane Fitzgerald
Manager of Student Services

Jason Harrison
Staff Assistant

Rebecca O'Connor
Academic Advisor

Mina Pulcini
Senior Academic Advisor

Susan Quatro
Senior Staff Assistant - Facilities

Christina Rohr
Senior Academic Advisor

Mark Stamer
Technician

Sam Waters
System Administrator

Cindy Wolfer
Academic Advisor

Adjuncts

Jake Brandt
Adjunct Faculty

☐ **William Childs**
Adjunct Faculty

☐ **Christopher Dickens**
Adjunct

☐ **Samuel Fryer**
Adjunct

Patrick Gillis
Adjunct

Matthew Hosking
Adjunct Faculty

Dr. Trudy Howles
Professor

David Patric
Adjunct

Srinivas Sridharan
Adjunct

Robert St. Jacques
Adjunct

Departmental Areas

Computer Science Education

Explorations into the pedagogy of Computer Science focusing on new methods and paradigms for the teaching of the CS curriculum.

Prof. Ivona Bezakova
Prof. Zack Butler
Prof. Joe Geigel
Prof. James Heliotis
Prof. Xumin Liu
Prof. Rajendra Raj
Prof. Sean Strout
Prof. Paul Tymann

Computer Graphics and Visualization

This area provides the technical foundations for studies in Computer Graphics. Areas for advanced study include Advanced Graphics Programming, Image Synthesis, Computer Animation, Virtual Reality, and Data Visualization.

Prof. Joe Geigel
Prof. Warren Carithers
Prof. Sean Strout
Prof. Reynold Bailey
Prof. Hans-Peter Bischof

Data Management

Studies foundational data management and knowledge discovery challenges prevalent in design, analysis and organization of data. This area can be applied in a variety of domains including data management in resource constrained environments, enterprise and multimedia databases, active and secure databases and knowledge discovery algorithms.

Prof. Henry Etlinger
Prof. Xumin Liu
Prof. Rajendra Raj
Prof Carlos Rivero
Prof Carol Romanowski
Prof. Leon Reznik

Distributed Systems

This area studies systems formed from multiple cooperating computers. This includes the analysis, design, and implementation of distributed systems, distributed middleware, and computer networking protocols, including security.

Prof. Alan Kaminsky
Prof. Hans-Peter Bischof
Prof. James Heliotis
Prof Peizhao Hu
Prof. Mohan Kumar
Prof. Minseok Kwon
Prof. Leon Reznik

Intelligent Systems

Intelligent Systems encompasses the study of algorithms and architectures that enable effective decision making in complex environments. Researchers in this area include faculty, undergraduate and graduate students working on projects in computer vision, robotics, virtual theatre, sensor networks, data mining, document recognition, and the theoretical foundations of decision-making (e.g. Markov chains and the properties of voting protocols).

Prof. Zack Butler
Prof Roxanne Canosa
Prof. Edith Hemaspaandra
Prof. Chris Homan
Prof. Leon Reznik
Prof. Lingwei Wang
Prof. Richard Zanibbi

Languages and Tools

The Languages and Tools area studies language design and implementation together with architecture and use of software development tools.

Prof. Hans-Peter Bischof
Prof. Matthew Fluet
Prof. James E. Heliotis
Prof. Fereydoun Kazemian
Prof. Rajendra K. Raj

Publications

Conference Papers

Acar, Umut A., *et al*. "Coupling Memory and Computation for Locality Management." *Proceedings of the First Summit on Advances in Programming Languages (SNAPL'15); May 3 - 6, 2015, Asilomar, CA.* Ed. Thomas Ball, *et al*. Dagstuhl, Germany: Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2015.

Adsit, Connor and Fluet, Matthew. "An Efficient Type- and Control-Flow Analysis for System F." *Proceedings of the The 26th International Symposium on Implementation and Application of Functional Languages (IFL'14); October 1 - 3, 2014, Boston, MA.* Ed. Sam Tobin-Hochstadt. New York, NY: ACM, 2015.

Bethamcherla, Vasudev Prasad, *et al*. "Face - Speech Sensor Fusion for Non - Invasive Stress Detection." *Proceedings of the The 1st Joint Conference on Facial Analysis, Animation and Auditory - Visual Speech Processing (Sept 11-13, 2015, Vienna, Austria).* Ed. Michael Pucher, *et al*. Vienna, Austria: ISCA.

Bethamcherla, Vasudev, *et al*. "Face-speech Sensor Fusion for Non-invasive Stress Detection." *Proceedings of the 1st Joint Conference on Facial Analysis, Animation and Audio-Visual Speech Processing, September 2015, Vienna Austria.* Ed. Auditory-VIsual Speech Association. Vienna, Austria: *n.p.* .

Bigelow, Charles and Zanibbi, Richard. "Analysis Of Typographical Trends In European Printing 1470-1660." *Proceedings of the Conf. of the American Printing History Association.* Ed. American Printing History Assoc. Rochester, NY: *n.p.* , 2015.

Butler, Zack and Bezakova, Ivona. "On Beyond Sudoku: Pencil Puzzles for Introductory Computer Science." *Proceedings of the SIGCSE 2015.* Ed. Adrienne Decker and Kurt Eiselt. Denver, CO: ACM.

Butler, Zack and Ivona Bezakova. "On Beyond Sudoku: Pencil Puzzles For Introductory Computer Science." *Proceedings of the The 46th ACM technical symposium on Computer science education (SIGCSE).* Ed. Carl Alphonse and Jodi Tims. Kansas City, MO: Association for Computing Machinery (ACM), 2015.

Elfouly, Hesham Alyumayani, Raafat. "International Computer Engineering conference 2015." *Proceedings of the ICENCO 2015.* Ed. Samir Shaheen. Cairo, Egypt: IEEE, 2015.

Erdelyi, G., Hemaspaandra, E., and Hemaspaandra, L. "More Natural Models of Electoral Control by Partition." *Proceedings of the Fourth International Conference on Algorithmic Decision Theory.* Ed. Toby Walsh. Lexington, KY: *n.p.* , 2015.

Fitzsimmons, Z. and Hemaspaandra, E. "Complexity of Manipulative Actions When Voting with Ties." *Proceedings of the Fourth International Conference on Algorithmic Decision Theory.* Ed. Toby Walsh. Lexington, KY: *n.p.* , 2015.

Heliotis, James. "A Python Helper Class for Beginning Data Structures." *Proceedings of the 31st Annual Regional Conference of the Consortium for Computing Science in Colleges, Eastern Region.* Ed. Vincent Cicirello and Aakash Taneja. Stockton, NJ: *n.p.* .

Jain, Aditi, Xumin, Liu, and Yu, Qi. "Aggregating Functionality, Use History, and Popularity of APIs to Recommend Mashup Creation." *Proceedings of the 13th International Conference on Service-Oriented Computing.* Ed. Alistair Barros and Daniela Grigori and Nanjangud C. Narendra and Hoa Khanh Dam. GOA, India: Springer.

Kelly, Matthew, *et al* . "Customizable Sponge-Based Authenticated Encryption Using 16-Bit S-boxes." *Proceedings of the IEEE Military Communications Conference 2015.* Ed. Qinqing Zhang. Tampa, FL: IEEE, 2015.

Kelly, Matthew, *et al* . "Customizable Sponge-Based Authenticated Encryption Using 16-bit S-boxes." *Proceedings of the MILCOM'2015, Tampa, FL, October 2015.* Ed. MILCOM. Tampa, FL: MILCOM, 2015.

Kulkami, Sourabh, *et al* . "SDN-ERS: Building a SDN-Based Communication Framework for Emergency Response Systems." *Proceedings of the The Network Innovators Community Event (GENI NICE) collocated with ICNP2015.* Ed. N/A. San Francisco, CA: *n.p.* .

Le, Matthew and Fluet, Matthew. "Combining Shared State with Speculative Parallelism in a Functional Language." *Proceedings of the The 26th International Symposium on Implementation and Application of Functional Languages (IFL'14); October 1 - 3, 2014, Boston, MA.* Ed. Sam Tobin-Hochstadt. New York, NY: ACM, 2015.

Le, Matthew and Fluet, Matthew. "Partial Aborts for Transactions via First-Class Continuations." *Proceedings of the The 20th ACM SIGPLAN International Conference on Functional Programming (ICFP'15); August 31 – September 2, 2015, Vancouver, BC, Canada.* Ed. Kathleen Fisher and John Reppy. New York, NY: ACM, 2015.

Liu, Xumin and Fulia, Isankumar. "Incorporating User, Topic, and Service Related Latent Factors into Web Service Recommendation." *Proceedings of the 2015 IEEE International Conference on Web Services.* Ed. John A. Miller and Hong Zhu. New York City, NY: IEEE.

Liu, Xumin, *et al* . "Extracting, Ranking, and Evaluating Quality Features of Web Services through User Review Sentiment Analysis." *Proceedings of the IEEE International Conference on Web Services.* Ed. John A. Miller and Hong Zhu. New York City, NY: IEEE.

McCartney, R., J. Yuan, and H.-P. Bischof. "Gesture Recognition with the Leap Motion Controller." *Proceedings of the Int'l Conf. IP, Comp. Vision, and Pattern Recognition 2-15, Las Vegas.* Ed. Hamid R. Arabnia. Las Vegas, Nevada/USA: *n.p.* .

Mishra, Sumita, *et al* . "On Building Cybersecurity Expertise in Critical Infrastructure Protection." *Proceedings of the 2015 IEEE International Symposium on Technologies for Homeland Security (HST 2015).* Ed. Gerald Larocque and Mike French. Boston, MA: IEEE, 2015.

Mishra, Sumita, *et al* . "On Building Cybersecurity Expertise in Critical Infrastructure Protection." *Proceedings of the 2015 IEEE International Symposium on Technologies for Homeland Security (HST 2015).* Ed. Gerald Larocque, Mike French. Boston, MA: IEEE, 2015.

Morabito, Patrick N., *et al* . "Agent-Based Models of Copycat Suicide." *Proceedings of the Social Computing, Behavioral-Cultural Modeling, and Prediction.* Ed. Nitin Agarwal, Kevin Xu, and Nathaniel Osgood. Washington, DC: Springer.

Paul, Will, *et al* . "Stressed Out: What Speech Tells Us About Stress." *Proceedings of the Interspeech, September 2015, Dresden Germany.* Ed. Sebastian Ã¶ller, Hermann Ney, Bernd MÃ¶bius, Elmar NÃ¶th, Stefan Steidl. Dresden, Germany: *n.p.* .

Paul, William, *et al* . "Stressed out: What Speech Tells Us About Stress." *Proceedings of the Sixteenth Annual Conference of the International Speech Communication Association. (Sept 6-10, Dresden, Germany).* Ed. Bernd Mobius and Elmar Noth. Dresden, Germany: *n.p.* .

Powers, N., *et al* . "The Cloudlet Accelerator: Bringing Mobile-Cloud Face Recognition into Real-Time." *Proceedings of the IEEE Globecom Workshop CCSNA.* Ed. Ramesh Rao. San Diego, CA: *n.p.* , 2015.

Qayyum, Shiraz, Hu, Peizhao, and Kumar, Mohan. "COSC: Paths with Combined Optimal Stability and Capacity in Opportunistic Networks." *Proceedings of the Local Computer Networks (LCN), 2015 IEEE 40th Conference on.* Ed. IEEE. Clearwater Beach, FL: IEEE, 2015.

Qayyum, Shiraz, Hu, Peizhao, and Kumar, Mohan. "COSC: Paths with Combined Optimal Stability and Capacity in Opportunistic Networks." *Proceedings of the Proceedings the 40th IEEE conference on Local Computer Networks (LCN2015).* Ed. Salil Kanhere. Clearwater Beach, Florida: IEEE.

Romanowski, Carol, *et al* . "Regional Response to Large Scale Emergency Events: Building on Historical Data." *Proceedings of the Ninth Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection.* Ed. Sujeet Shenoi and Mason Rice. Arlington, VA: *n.p.* , 2015.

Romanowski, Carol, *et al* . "Regional Response to Large Scale Emergency Events: Building on Historical Data." *Proceedings of the Ninth Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection.* Ed. Sujeet Shenoi, Mason Rice. Arlington, VA: *n.p.* , 2015.

Schneider, Jennifer, *et al* . "Measurement of Locality Specific Resilience." *Proceedings of the 2015 IEEE International Symposium on Technologies for Homeland Security (HST 2015).* Ed. Gerald Larocque and Mike French. Boston, MA: IEEE, 2015.

Schneider, Jennifer, *et al* . "Measurement of Locality Specific Resilience." *Proceedings of the 2015 IEEE International Symposium on Technologies for Homeland Security (HST 2015).* Ed. Gerald Larocque, Mike French. Boston, MA: *n.p.* , 2015.

Schrading, Nicolas, *et al* . "#WhyIStayed, #WhyILeft: Microblogging to Make Sense of Domestic Abuse." *Proceedings of the The 2015 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT).* Ed. Rada Mihalcea, Joyce Yue Chai, and Anoop Sarkar. Denver, CO: *n.p.* .

Schrading, Nicolas, *et al* . "An Analysis of Domestic Abuse Discourse on Reddit." *Proceedings of the 2015 Conference on Empirical Methods for Natural Language Processing.* Ed. Daniele Pighin and Yuval Marton. Lisbon, Portugal: *n.p.* .

Scicali, Alberto and Hans-Peter Bischof. "Usability Study of Leap Motion Controller." *Proceedings of the Int'l Conf. Modeling, Sim. and Vis. Methods, 2015, Las Vegas.* Ed. Hamid R. Arabnia. Las Vegas, Nevada: *n.p.* .

Sridharan, Srinivas and Bailey, Reynold. "Automatic Target Prediction and Subtle Gaze Guidance for Improved Spatial Information Recall." *Proceedings of the 12th ACM SIGGRAPH Symposium on Applied Perception, Tübingen, Germany, September 2015.* Ed. Stephen Spencer (ACM). New York, NY: ACM.

Weiss, Richard, *et al* . "Trust Evaluation in Mobile Devices: An Empirical Study." *Proceedings of the The 14th IEEE International Conference on Trust, Security and Privacy in Computing and Communications (IEEE TrustCom-15), Helsinki, Finland, 20-22 August, 2015.* Ed. UNKNOWN. HELSINKI, FINLAND: IEEE COMPUTER SOCIETY.

Wood, Christopher, Lukowiak, Marcin, and Radziszowski, Stanislaw. "Constructing Large S-boxes with Area Minimized Implementations." *Proceedings of the MILCOM'2015, Tampa, FL.* Ed. MILCOM. Tampa, FL: MILCOM, 2015.

Zhong, Mingyang, *et al* . "Advancing Android Activity Recognition Service with Markov Smoother." *Proceedings of the Proceedings of 11th Workshop on Context and Activity Modeling and Recognition @ PerCom 2015.* Ed. Diane Cook. St. Louis, Missouri: IEEE.

Invited Papers

Zanibbi, Richard and Orakwue, Awelemdy. "Math Search for the Masses: Multimodal Search Interfaces and Appearance-Based Retrieval." Intelligent Computer Mathematics (Proc. CICM). (2015).

Invited Keynotes/Presentations

Geigel, Joe. "Interdisciplinary Coursework Combining Art and Technology A Computer Science Perspective." *ACM SIGGRAPH 2015 Education Birds of a Feather (BoF) Talks (SIGGRAPH '15).* ACM/SIGGRAPH. Los Angeles, CA. 11 Aug. 2015. Conference Presentation. £

Radziszowski, Stanisław P. "Some Computational and Theoretical Problems for Ramsey Numbers." *Third Gdansk Workshop on Graph Theory.* Technical University of Gdansk. Gdansk, Poland. 16 Sep. 2015. Keynote Speech.

Zanibbi, Richard. "Math Search for the Masses: Multimodal Search Interfaces and Appearance-Based Retrieval." *Conference on Intelligent Computer Mathematics (CICM).* CICM Conference. Washington, DC. 14 Jul. 2015. Keynote Speech.

Book Chapters

Hemaspaandra, E., Hemaspaandra, L., and Rothe, J. "The Complexity of Manipulative Actions in Single-Peaked Societies." *Economics and Computation: An Introduction to Algorithmic Game Theory, Computational Social Choice, & Fair Division.* ., .: Springer, 2015. 327-360. Print.

Kwon, M. "A Tutorial on Network Latency and Its Measurements." *Enabling Real-Time Mobile Cloud Computing through Emerging Technologies.* Ed. T. Soyata. Hershey, PA: IGI Global, 2015. 272-293.

Invited Articles/Publications

Faliszewski, P., Hemaspaandra, E., and Hemaspaandra, L. "The Complexity of Manipulative Attacks in Nearly Single-Peaked Electorates." *Proceedings of the 24th International Joint Conference on Artificial Intelligence* . (2015).

Journal Editor

(Associate-Editor), Richard Zanibbi, ed. *International Journal on Document Analysis and Recognition.* Berlin: Springer, 2015. Print.

Journal Papers

Athman, Bouguettaya, *et al* . "Efficient Agglomerative Hierarchical Clustering." *Expert Systems with Applications* 42. 5 (2015): 2785-2797.

Bezakova, Ivona, Erin W. Chambers, and Kyle Fox. "Integrating and Sampling Cuts in Bounded Treewidth Graphs." *Association for Women in Mathematics Series, Springer.* Accepted for publication. (2015): 1-14.

Brandt, F., *et al* . "Bypassing Combinatorial Protections: Polynomial-Time Algorithms for Single-Peaked Electorates." *Journal of Artificial Intelligence Research* 53. (2015): 439-496.

Butler, Zack and Hays, Jacob. "Task Allocation for Reconfigurable Teams." *Robotics and Autonomous Systems* 68. 1 (2015): 59-71.

Chatbri, Houssem, *et al* . "Shape Matching using Keypoints Extracted from both the Foreground and the Background of Binary Images." *Proc. Int'l Conf. Image Processing, Theory, Tools and Applications* . (2015): 205--210.

Dybizbański, Janusz, Dzido, Tomasz, and Radziszowski, Stanislaw. "On Some Zarankiewicz Numbers and Bipartite Ramsey Numbers for Quadrilateral." *Ars Combinatoria* 119. (2015): 275-287.

Eary, Chance, Kumar, Mohan, and Zaruba, Gergely. "Delay Tolerant Lazy Release Consistency for Distributed Shared Memory in Opportunistic Networks." *Pervasive and Mobile Computing* . (2015): 1-14.

Faliszewski, P., Hemaspaandra, E., and Hemaspaandra, L. "Weighted Electoral Control." *Journal of Artificial Intelligence Research* 52. (2015): 507-542.

Heyman, Andrew, *et al* . "Fuzzy System Design for Security and Environment Control Applications." *International Journal of Uncertainty, Fuzziness, and Knowledge Based Systems* 23. Suppl. 1 (2015): 43-56.

Homan, Christopher M. and Sven Kosub. "Dichotomy results for fixed point counting in boolean dynamical systems." *Theoretical Computer Science* 573. (2015): 16â€"25.

K., Semenov,, Reznik L., and Solopchenko G. "Fuzzy Intervals Application for Software Metrological Certification in Measurement and Information Systems." *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems* 23. Suppl. 1 (2015): 95-104.

Kanadje, Manish, *et al* . "Assisted Keyword Indexing for Lecture Videos using Unsupervised Keyword Spotting." *Pattern Recognition Letters* 71. 1 (2016): 8-15.

Qayyum, Shiraz, Umair, Sadiq, and Kumar, Mohan. "MOEME: Real-time Mobility and Orientation Estimation for Mobile Environments." *Elsevier's Pervasive and Mobile Computing* 2 3 . (2015): 156-170.

Reznik, Leon and Sergey Lyshevski. "Data Quality Indicators Composition and Calculus: Engineering and Information Systems Approaches." *Sensors & Transducers* 185. 2 (2015): 140-148.

Rivero, Carlos R., *et al* . "Discovering and Analysing Ontological Models From Big RDF Data." *Journal of Database Management* 26. 2 (2015): 48-61.

Rivero, Carlos R., *et al* . "MostoDEx: A Tool to Exchange RDF Data Using Exchange Samples." *Journal of Systems and Software* 100. (2015): 67-79.

Romanowski, Carol, *et al* . "Regional Response to Large-scale Emergency Events: Building on Historical Dat." *International Journal of Critical Infrastructure Protection* 11. (2015): 12-21.

Romanowski, Carol, *et al* . "Regional Response to Large-scale Emergency Events: Building on Historical Data." *International Journal of Critical Infrastructure Protection* 11. (2015): 12-21.

Sadiq, Umair, *et al* . "Service Composition in Opportunistic Networks: A Load and Mobility Aware Solution." *Computers, IEEE Transactions* 64. 8 (2015): 2308-2322.

Saleem, Muhammad, Suleman, *et al* . "Personalized Decision-Strategy Based Web Service Selection Using a Learning-to-Rank Algorithm." *IEEE Transactions on Services Computing* 8. 5 (2015): 727-739.

Stalker, David and Zanibbi, Richard. "Math Expression Retrieval Using an Inverted Index Over Symbol Pairs." *Proc. Document Recognition and Retrieval (Proc. SPIE)* 9402. (2015): 940207(1-12).

Yali, Wu, *et al* . "Ramsey Numbers of C_4 versus Wheels and Stars." *Graphs and Combinatorics* 31. 1 (2015): 2437-2446.

Yali, Wu, Yongqi, Sun, and Radziszowski, Stanislaw. "Wheel and Star-critical Ramsey Numbers for Quadrilateral." *Discrete Applied Mathematics* 186. (2015): 260-271.

Yin, Wei, Hu, Peizhao, and Indulska, Jadwiga. "Rate Control in the mac80211 Framework: Overview, Evaluation and Improvements." *Computer Networks* 81. (2015): 289-307.

Funding

The professors listed here had active grants in the year 2014. The table columns are Primary Investigator, Sponsor, and Research Title.