COMPUTER AND INFORMATION SCIENCE DEPARTMENT NEWSLETTER
November 2013

A Publication of the Brooklyn College CIS Department

Welcome to the Third Volume of the Brooklyn College Computer and Information Department Newsletter. This issue will focus on presenting the worldwide activities of our Faculty and students. This includes various conferences, workshops and publications. This Newsletter presents activities that primarily have taken place between June 2012 and August 2013. First we will start with news from our Distinguished Professors.

Rohit Parikh and Ted Raphan

Prof. Parikh gave the following talks during the past year:

1) "Is there a Church - Turing thesis for Social Algorithms?" at the conference "Turing 100," Boston University, November 2012.
2) "Some thoughts on Kripke's puzzle about time and thought", Fifth Indian Conference on Logic and its Applications", January 10–12, 2013, Institute of Mathematical Sciences, Chennai, India
3) "Epistemic Reasoning and Literature", Talk given at the Theoretical Aspects of Rationality and Knowledge conference, Tuesday January 8, 2013, Chennai, India.
4) "Plato, Gettier and Turing", talk given at the meeting of the Society for Exact Philosophy, Montreal, May 24 (joint with Adriana Renero).

Papers Published or Accepted:

1) "Choice and Uncertainty in Games" (joint with Cagil Tasdemir and Andreas Witzel) in the *proceedings of the Kozen symposium*, Springer 2012.
2) "Some thoughts on Kripke's puzzle about time and thought", in the *proceedings of the Fifth Indian Conference on Logic and its Applications*, January 2013.
3) "The Power of Knowledge in Games", with Tasdemir and Witzel, accepted for publication in the *International Game Theory Review.*
4) "Epistemic Reasoning in Life and Literature" In the volume *David Makinson on Classical Methods for Non-classical Problems*, Springer 2013.

5) "Epistemic Logic, Games and Social Software: some old and new ideas". Moscow State University, 9 AM – 10:30, June 20, 2013.

Given by remote TV transmission from New York. But the audience could see me and I could see them. I introduced one of my doctoral students, Yunqi Xue (who teaches for us), and the audience welcomed her by clapping.

Professor Parikh also mentored Farishta Satari who completed her doctoral thesis in Computer Science at the CUNY Grad Center, entitled Information Transmission in Communication Games Signaling with an Audience.

TED RAPHAN

1) I received a 3 year research award from the NIH in conjunction with Mt. Sinai School of Medicine, NIH-IDCD, R01 DC012573, for studying and modeling "Vestibular Control of the Vasovagal Response."The amount of the award coming to Brooklyn College is $167,500 for the period March 1, 2013 - Feb. 29, 2016. Because of the immense cuts in the budget, we scaled down the specific aims and will try and get the other aims funded within the next year or so as soon as we publish the significant findings.

2) An undergraduate student Maksym Stetsyuk working with me won second prize for a paper he submitted to Sigma Xi competition.
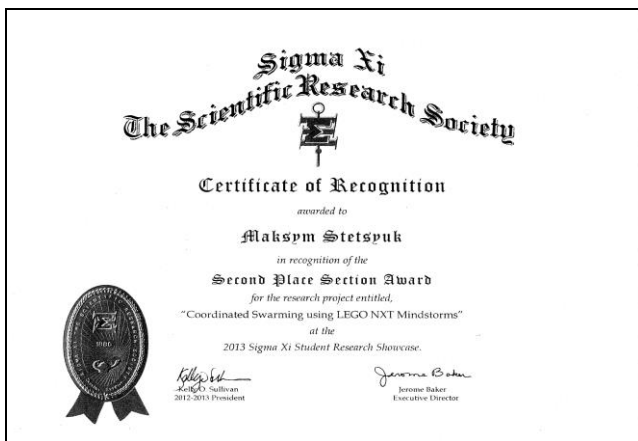
Certification of Recognition: Maksym Stetsyuk

The announcement can be found at:
http://www.sigmaxi.org/meetings/src/SRS2013Section Results .pdf
On page 6 MC05 you will note that Maksym Stetsyuk was tied for 2nd place and earned a presentation from Harvard. There were more than 200 submissions from across the globe. Maksym has now graduated and has accepted an Internship to work in the Finance Industry, while he will be attending Brooklyn College for his Master's degree. He is very versatile. Someone from the Public Relations office came up to interview the student and me about this, but so far I haven't heard anything.

3) I was asked to serve on a study section to review grants for the NIH. I will be in Washington, D.C. Jun 24 -25 and that is always illuminating.

4) I published 10 papers over 2012-2013, so far. I also have one paper on locomotion on inclines that I had done with colleagues from Japan when they were here working with me. This has been accepted for publication with minor revisions and we are working on them now. I also submitted a paper with Maksym Stetsyuk to an IEEE Robotics journal entitled "Development of navigation and communication systems for study of coordinated swarming of LEGO NXT Mindstorms robots," which is in review and we are awaiting comments.

Student Awards

The CIS Department congratulates all graduates and wishes them success in their future careers. We particularly would like to acknowledge the following students who were awarded honors in CIS at graduation:

Karen Aragon, David Grinberg, David Lettier, Sarah Levitan, Ari Mermelstein, Christopher Pileggi, Michael Singh, Michael Squitieri, James Trebilcock, Charlie Yao, Penina Kraus

In addition, the CIS Department recognized several undergraduate students with the following named awards.

Jack Wolfe Award – David Lettier and Michael Singh
This award is named in honor of the late Professor Jack Wolfe, one of the founding members of the department in the 1960's and 1970's. It is given to our outstanding students who are graduating.

David Lettier is beginning an M.A. in the computer science program at Brooklyn College in the Fall 2013 semester. He worked as a research fellow at Brooklyn College during the Summer of 2013, with Professors Elizabeth Sklar and Simon Parsons, which will culminate with the setup of a robotics research environment at the University of Liverpool in the UK.

Michael Singh was an outstanding computer science student who has done research with several computer faculty before graduating.

Frank Beckman Award: - Jay Jankelewicz performed superb services to his peers and to the CIS Department by bringing back significant activities to the ACM Computer Science Chapter which he was president of for the past few years. He graduated Phi Beta Kappa, Magna Cum Laude, with a dual major in Multimedia Computing and Business, Management, and Finance as well as a minor in Logic, Reasoning, and Rationality.

Stewart Monchik Award - Michael Squitieri
Michael Squitieri is a double major in Mathematics and Computer Science, Class of 2014.

Erik Widder Award - Sarah Levitan

Softech Resources Scholarship -   Natallia Charkasava

The **Jack Wolfe Fellowship** is given to an outstanding Masters student.   **Simon Dexter** was awarded the fellowship this year.

Jay Jankelewicz   Yedidyah Langsam, Chair

Brett Levine, Lauren Kaalund, Lawrence Goetz,
Jay Jankelewicz,   Jessica Chichester

Thursday, May 30, 2013
CIS Department Graduation Party / Award Ceremony

Speech by:
Jay Jankelewicz, President of the Computer Science Society

Good afternoon!

My name is Jay Jankelewicz and I am the president of the Computer Science Society.

I wish to congratulate all those who just graduated as well as those who received an award.

I would like to introduce the other executive board members of the Computer Science Society:

Brett Levine, Vice President
Lauren Kaalund, Treasurer
Ashley Murray, Secretary and Web Developer
Jessica Chichester, Outside Consultant

We want to thank the CIS Department faculty and staff for their assistance throughout the entire academic year.

We now wish to extend our heartfelt gratitude to the Society's faculty advisor, **Professor Lawrence Goetz**, who played an integral role in helping to make the Society an active and successful entity on campus. He always made himself available when called upon and thanks to his efforts he certainly made our job of running the Society a lot easier.

We would like to present him with a token of our appreciation and now welcome him upfront to join us ...

<hand Professor Goetz the plaque and then read off the engraved text>

> PROFESSOR LAWRENCE GOETZ
> **Outstanding Faculty Advisor**
> **Your kindness, generosity, and**
> **dedication are appreciated.**
> **Computer Science Society E-board**
> **2012 – 2013**

We hope that you will cherish this token of our appreciation as the words etched on it are heartfelt.

Once again, thank you **Professor Goetz** for all that you have done for our Society.

<executive board members shake hands with Professor Goetz and take photos>

Sarah Levitan - NSF Graduate Research Fellowship
"Making Autism Compute"

With an estimated 1 million to 1.5 million Americans having an autism spectrum disorder and the prevalence of autism believed to have risen to 1 in 88 births, there needs to be a reliable method of diagnosis so that young children can get the early intervention that will help them to live full lives.

Sarah Ita Levitan (Brooklyn College, B.S. in computer science, 2013) hopes to develop an objective, computer-based system that would analyze children's speech, looking for patterns that would identify those with autism spectrum disorders. Her idea helped her win a 2013 National Science Foundation Graduate Research Fellowship. This three-year, $126,000 grant is the most prestigious award for graduate study in the science, technology, engineering and mathematics (STEM) disciplines, and it will support her research in Columbia University's computer science doctoral program.

"As of now, there isn't a simple diagnostic test for autism," Levitan says. "It is done by a set of subjective assessments

to evaluate if children have behavioral disorders. There have been a lot of studies in psychology on different speech patterns. They have looked at things like echolalia, where children repeat things back to you, or turn-taking in conversation. Whereas most people try not to cut each other off, some individuals with autism spectrum disorders seem to have trouble communicating and turn-taking; they tend to be a lot slower in responding or cut people off."

Her interest in autism spectrum disorders dates to high school and college, where she volunteered and then worked for the Hebrew Academy for Special Children in Brooklyn. "While working with these children, I observed first-hand how early detection could make a world of a difference," says Levitan.

At Brooklyn College, she worked on a computational biology research project with Dina Sokol, Associate Professor of Computer and Information Science. "She studies tandem repeats in DNA, which are used to diagnose diseases and in human identity testing. She developed an algorithm to find the repeats, but there are so many, it's hard to know what to do with them. I've been working with her on clustering the data into groups of similar repeats," Levitan says.

She credits Sokol with being "an incredible mentor. She introduced me to research as an undergraduate, encouraged me to apply for an undergraduate research grant, and she is the faculty advisor for the Women in Computer Science Club."

At Sokol's suggestion, Levitan applied for a Distributed Research Experiences for Undergraduates award from the Computer Research Association's Committee on the Status of Women in Computing Research. That led to spending the summer after her junior year conducting research in the laboratory of Julia Hirschberg, director of Columbia's Spoken Language Processing Group.

She studied entrainment, the common phenomenon of people unconsciously sounding like one another during a conversation, through a computer analysis of supreme court discussions. "In conversation, people tend to adapt similar speech patterns, such as adopting a higher pitch or speaking louder. There's a lot of fascinating psychology involved as well as computer science," she says.

The experience encouraged Levitan to start a chapter of the women's computing organization, the Association for Computing Machinery-Women, on campus. "As an undergraduate, I've seen a major gender imbalance in computer science. I'd like to encourage more women to consider majoring in computer science and provide a forum for networking and support.
For many women, computer science isn't on their radar when they consider what fields to go into. That is unfortunate because there are so many interesting and exciting research areas where a degree in computer science can take you."

DINA SOKOL and PAULA WHITLOCK

An exciting new club has come into existence in the Computer Science Department. Sarah Ita Levitan and Robin Cohen started an ACM-W (Association for Computing Machinery) chapter in Brooklyn College called BC WiCS - Women in Computer Science. Led by their faculty advisor, Dr. Dina Sokol, and assisted by their secretary/treasurer Renee Blumenfrucht, the chapter was founded to "promote women in computer science and provide a forum for networking and spreading ideas."

On Thursday March 14th, WiCS hosted an inaugural event in the Computer Science Conference room. Dr. Shoshana (Neuburger) Marcus, who received her PhD in Computer Science from the CUNY Graduate Center, gave a talk titled "Graduate School and Genomics." She spoke about her graduate school experience and her current research.

Dr. Marcus is currently a postdoc at Cold Spring Harbor Laboratory, in the Simons Center for Quantitative Biology, where she works on developing computational solutions to analyze DNA sequences.

On April 30, BC WiCS , along with the Computer Science Society, the Magner Career Center, and the Women's Center hosted another exciting event. This time, a panel of five women in the computer science field spoke about their experiences in this male-dominated area. The goal of the event was to encourage women to pursue or continue pursuing Computer Science degrees, regardless of the

sometimes-intimidating gender ratio, by providing role models of successful women in the field.

The Panel featured Dr. Paula Whitlock (Computer Science Professor), Dr. Rebecca Boger (Earth and Environmental Sciences Professor – GIS research interests), Rivka Levitan (BC alumna, 4th year PhD at Columbia), Valia Mitsou (PhD candidate at the CUNY Graduate Center), and Jouxne Laird (Masters student at BC).

The panelists spoke about their careers and specific interests in computer science, the points in their education at which they were introduced to CS, and their opinions as to why the field is male-dominated. They also shared their favorite resources in the field, including websites, networking groups, and professional associations.

The overall message of the panelists in addressing the field's gender imbalance was to be tenacious about pursuing a CS career. They spoke about the classic perception of the computer scientist as a gamer in his

basement and the importance of not letting that image deter you from the field just because you do not fit the stereotype. Students and faculty were energized by the event, and we all look forward to participating in more of these events in the coming semester.

If anyone would like to join BC WiCS or learn more about the club, please contact us at bcwics@gmail.com.

Miscellaneous News From Our Faculty

DAVID ARNOW

AWARD: Awarded Senior Membership, Association for Computing Machinery, August, 2012.

PRESENTATION: "Faculty Perspective." Symposium on Innovation in e-Educational Materials. American Association of Publishers. New York, Oct. 16, 2012.

PANEL: "Textbook Pricing: Present and Future" (with Gehringer, Golub, Cohen, and Shaffer). SIGCSE-2013 Technical Symposium. Denver, March 6-9, 2013.

SCOTT DEXTER

Subject: Student feedback on CIS 3140 (Design and Implementation of Software Applications 2)
One of our students (who recently took 3140 with me) just got a job offer as a web developer at Mt Sinai, after quite a grueling interview process. After one of the rounds of interviews, he told me that our discussion of testing in 3140 really made a difference for him -- even though we hadn't really done any testing in the course, he was able to talk about some different approaches. They were apparently quite impressed that he'd even had a class that touched on this subject.

JIM COX

My PhD. student presented our work at the International Colloquium on Theoretical Aspects of Computing, 2013 in Shanghai.

The paper was published in Springer LNCS 8049. Random Walks on Some Basic Classes of Digraphs W.J. Cheng, J. Cox, S. Zachos Theoretical Aspects of Computing-ICTAC 2013, 122-140.

Wen is also speaking on our work Friday at The New York Colloquium on Algorithms and Complexity.

DANNY KOPEC

In September 2013 I was asked by Brian White, Vernon Ireland and their co-authors to contribute a chapter to their forthcoming book on Complex Systems Systems Failures. Coincidently, students in my course CIS 7540 (Systems Methodology) are asked to do Case studies in complex systems failures. This was a rare opportunity to combine teaching with research and publication directly.

I am very pleased that five graduate students Bustamante Brathwaite, Eranga Gamage, Shawn Hall, Karunya Rajagopalan, and Mariusz Tybinski took me up on my offer to make contributions. Mariusz Tybinski was working on a thesis on medical errors and how they have been reduced since the Institute of Medicine Report in 1999 so a contribution from him was a natural fit. Shawn Hall had completed an MSc. Thesis with me in 2011 on designing a system for implementing Requirements in Hospital Information Systems. Shawn is also unique in that he obtained a job working exactly in the area of his thesis topic – he travels a lot doing quality control of hospital information systems.

Bustamante Braithwaite, Eranga Gamage, and Karunya Rajagopalan did a group project on the Therac and Panamanian Radiation Therapy Machine Disasters and this turned out to be their contribution to the book.

Our three CASES comprise the Medical Errors Chapter in the book, and Karunya Rajagopalan also contributed a paper with me on the Miracle on the Hudson – and on how a catastrophe was averted. The editing process went on for the better part of a year.

The Book: *Case Studies in System of Systems, Enterprises, and Complex Systems Engineering.*

Editors: A. Gorod, B. E. White, V. Ireland, S. J. Gandi, and B. Sauser
Forthcoming 2014, Taylor & Francis / CRC Press.
Chapter Contribution: "Errors in Medical Systems and Methods for Reducing Them" By Bustamante Brathwaite, Eranga Gamage, Shawn Hall, Karunya Rajagopalan, Mariusz Tybinski, and Danny Kopec.
Case Study Contribution: "Failures in Transportation Systems US Airways Flight 1549: Root Cause Analysis for The Miracle on the Hudson". By Karunya Rajagopalan and Danny Kopec.

CRC Handbook of Computer Science and Engineering (Third Edition, 2014, Forthcoming) Chapter 62 – SEARCH (in AI) By D. Kopec, J. Cox, and S. Lucci.

In Spring 2013 I supervised four MSc. Theses that were completed. They were by:

Shweta Shetty – "Developing a Theory for Problem Solving".
Karunya Ragajopolan – "The Theoretical, Practical, and Ethical Uses of Mobile Technologies for Medical Information Systems Management".
Laurino Richards -- "Analyzing the Implementation of Electronic Medical Records for Mobile Devices".
Mariusz Tybinsky – "How IT can be used to Prevent Medical Errors: Effects of Recent Remedies and Future Suggestions".

I also supervised a CIS 5001 Project by Chris Pileggi, one of our 2013 Honors Graduates on "Problem Solving and The Human Window." The thesis by Ms. Shetty was so impressive to a publisher that he decided to publish it with the additional work of Mr. Pileggi as a book under my supervision.

Artificial Intelligence Problems and Their Solutions
By Danny Kopec, Shweta Shetty, and Chris Pileggi
Mercury Learning, Inc. (January, 2014), Approx 300pp.
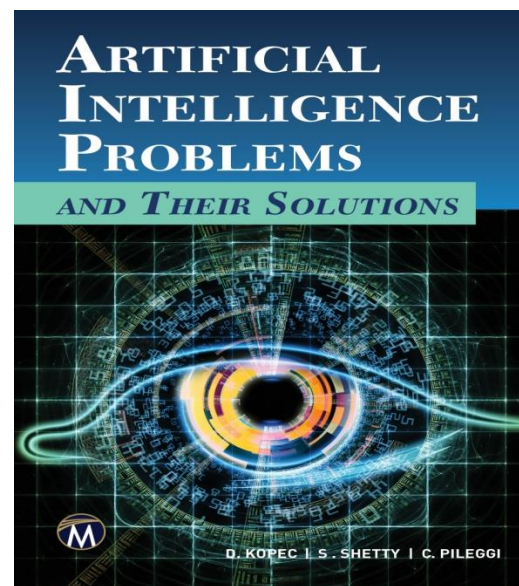
In the Spring 2014 semester Professor Kopec is teaching a new Upper Tier Course he designed: CIS 3119 "Invention, Machines, Society"

NOSON YANOFSKY

In 2009 Prof. Yanofsky finally was approved to teach an Upper Tier Core Course entitled "Paradoxes and The Limits of Knowledge"(CIS 3310). It has jointly been approved by the Philosophy Department, Mathematics Department and

Computer Science Department. The course has proven very popular with students and faculty. I have had the privilege and pleasure of teaching the course ten times during the past four years. It can be taught from a Mathematical, Computer Science, or Philosophical perspective. Professor Yanofsky developed a very nice 300 page spiral bound booklet for the course which is now published by MIT Press and further expanded into a book entitled **The Outer Limits of Reason**. Congratulations Noson and for the birth of his new baby little boy "Boruch", born October 23, 2013.
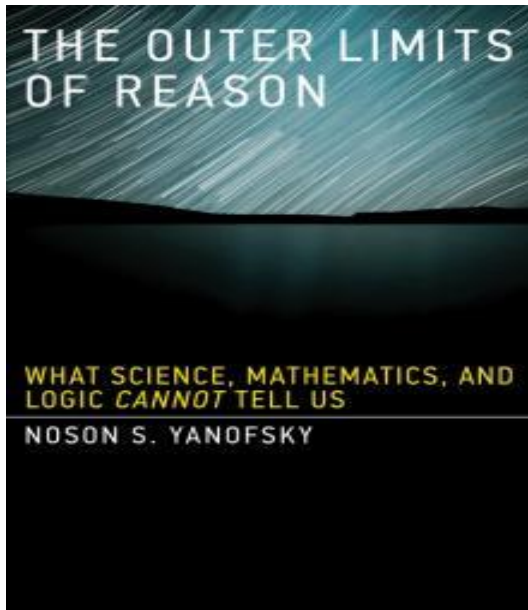
A brief overview from the MIT Press Website follows: Many books explain what is known about the universe. This book investigates what cannot be known. Rather than exploring the amazing facts that science, mathematics, and reason have revealed to us, this work studies what science, mathematics, and reason tell us cannot be revealed. In *The Outer Limits of Reason*, Noson Yanofsky considers what cannot be predicted, described, or known, and what will never be understood. He discusses the limitations of computers, physics, logic, and our own thought processes**.**

Yanofsky describes simple tasks that would take computers trillions of centuries to complete and other problems that computers can never solve; perfectly formed English sentences that make no sense; different levels of infinity; the bizarre world of the quantum; the relevance of relativity theory; the causes of chaos theory; math problems that cannot be solved by normal means; and statements that are true but cannot be proven. He explains the limitations of our intuitions about the world—our ideas about space, time, and motion, and the complex relationship between the knower and the known.

Moving from the concrete to the abstract, from problems of everyday language to straightforward philosophical questions to the formalities of physics and mathematics, Yanofsky demonstrates a myriad of unsolvable problems and paradoxes. Exploring the various limitations of our knowledge, he shows that many of these limitations have a similar pattern and that by investigating these patterns, we can better understand the structure and limitations of the reason itself. Yanofsky even attempts to look beyond borders of reason to see what, if anything, is out there.

Talks Given:
May/2013 - "Kolmogorov Complexity of Categories"
Samson Abramsky's Birthday Festival. Oxford University.

July/2013 - "Algorithmic Information of Categories"
Sammy Eilenberg Centennial Celebration. Warsaw Poland.

DINA SOKOL
Papers:
- Y. Liang, D. Sokol, S. Zelikovitz and S. I. Levitan (2012). Classification of Tandem Repeats in the Human Genome. *International Journal of Knowledge Discovery in Bioinformatics, 3*(3), 1-21.

- D. Sokol and J. Tojeira. Speeding up the Detection of Tandem Repeats over the Edit Distance. *Theoretical Computer Science* (2013), http://dx.doi.org/10.1016/j.tcs.2013.04.021 Student: Ph.D. student, Yupu Liang, passed her Dissertation Defense on June 18, 2013.

PAULA WHITLOCK

My research student, Manshen Lin, a joint Mathematical Finance and Computational Mathematics major, gave a presentation at the 8th Annual Spuyten Duvil Undergraduate Mathematics Conference on April 6th, 2013 at Manhattan College. Her presentation in the modeling session was entitled, "Stock Price Prediction".

Activities
On July 11th and 12th, Paula Whitlock was an international reviewer for the Austrian Science Foundation in Vienna, Austria evaluating proposals in quasi-Monte Carlo methods.

On July 18th, Paula Whitlock presented a lecture entitled "Insights from graph theory on Metropolis random walks in one dimension," at the Ninth IMACS Seminar on Monte Carlo Methods held at the Universite de Savoie, Annecy, France. The co-authors were James Cox and Wen-Ju Cheng.

Jie Li, Paula Whitlock's Ph.D. student, successfully defended her dissertation, "Ultrafast Pseudorandom Number Generation Using Permutations and Random Mappings" on September 11th, 2013.

Papers:

- Artemchuk, Sergey and Paula A. Whitlock. "Parallelization and Optimization of 4D Binary Mixtures Monte Carlo Simulations Using OpenMPI and CUDA." Monte Carlo Methods and Applications, Proceedings of the 8th IMACS Seminar on Monte Carlo Methods, Aug. 29 - Sept. 2, 2011, Borovets, Bulgaria. K.K. Sabelfeld and I. Dimov, eds. Berlin: Walter de Gruyter GmbH. 11-20, 2013.

- Mayorov, Mikkail and Paula A. Whitlock. "Parallelization of Algorithms for Solving a Three-dimensional Sudoku Puzzle," Monte Carlo Methods and Applications, Proceedings of the 8th IMACS Seminar on Monte Carlo Methods, Aug. 29 - Sept. 2, 2011, Borovets, Bulgaria. K.K. Sabelfeld and I. Dimov, eds. Berlin: Walter de Gruyter GmbH. 145-53, 2013.

- Bishop, Marvin and Paula A. Whitlock. "Phase Transitions in Four-dimensional Binary Hard Hypersphere Mixtures." Journal of Chemical Physics 138: 084502, 2013.

GAVRIEL YARMISH

Whereas Noson wrote the book on the outer limits of reason and taught it, all I can say is that I *read* the book ☺.

It is a fascinating topic and motivated me to look more into both Gödel and Rice's theorems and to draft an article. There are a number of colleagues in out department more learned than me on this topic with whom I expect to consult about my ideas.

I have been asked to be a reviewer for the *Journal of Supercomputing* and just reviewed a paper on parallel implementations of matrix operations based on the computer's cache.

I expect to give a talk in March titled: **A software implementation of the Simplex Method**.

I wrote **Steepest Edge as Applied to the Standard Simplex Method** *Optimization Online*, August 2013.

I have submitted the paper **Stochastic Linear Programming Models for Asset Allocation.**

I have collaborated with Josh Fogel of the Business Department. We published **Consumers and computer software advertisements in spam e-mail** in the *Journal of Internet Banking and Commerce. 17(2).* I come across this topic in our course on *electronic commerce* course where marketing schemes are a major topic.

I collaborated with Danny Kopec and C. Schweikert on **Representational Choices for Problem Solving** published in the *Proceedings of the 2012 International Conference on Artificial Intelligence (ICAI 2012),* volume 1, pp. 185-190. It is important to understand how to best represent and visualize problems that have to be solved both for teaching and programming purposes. This was a forerunner to the book by Kopec et. al. described above.

Recent Advances in Applications of Mathematical Programming to Business and Economic Problems is expected to be published soon in *Review of Business & Finance Studies (RBFS)* (2014) v5 n1.

I am working with Simon Dexter on his Master's thesis **Ranking of Existing Protein Structure Prediction Algorithms via parallel RMSD**.

NENG-FA ZHOU

Neng-Fa Zhou, with assistance by Jonathan Fruhman, has designed the Picat language (picat-lang.org). Picat is a multi-paradigm language that provides pattern matching, deterministic and non-deterministic rules, loops, functions, constraints, and tabling as its core modeling and solving features. Picat has attracted great attention from the community. Over two dozen of people have volunteered to review the design. Hakan Kjellerstrand, a Swedish software engineer, has written more than 500 programs in Picat.

Newsletter Editors:
   Danny Kopec
   Sajida Noreen
   Gavriel Yarmish

Thanks to Audrey Williams for editorial assistance!