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The Research Mission

TTIC aims to achieve international impact through world-class research in fundamental computer science. Here we try to clarify the intended meaning of “impact”, “fundamental”, and “computer science”.

Impact. The mission statement focuses on academic impact. Objective measures of academic impact are difficult to define and controversial to interpret. However, the following measures help to define “academic”.

- Publication counts weighted by the strength of the venues in which the publications appear.
- Citation counts.
- The number of co-authors of TTIC faculty at other prominent computer science institutions.
- A report of an external advisory committee where the committee members are unarguably top researchers in computer science.
- The rank of TTIC in well-established ordered listings of computer science departments.

Note that the number of patents filed is not mentioned. Patents may be a natural outcome of academic research but are not a direct goal of TTIC. The amount of extramural research funding is also absent. Although funding is clearly an important tool in achieving impact, it is only a tool and not an end in itself.

Fundamental. The mission statement focuses on fundamental scientific research. Intuitively, a scientific result is fundamental to the extent that it has open-ended implications.

Computer Science. Computer science is viewed as the creation and application of knowledge about computation. Algorithms and complexity theory are both fundamental to the engineering of computer systems. Conversely, potential applications, such as automated speech recognition, have challenged people to make theoretical advances. The mission of TTIC is to contribute fundamental knowledge that is relevant to computer technology.

The Educational Mission

The educational mission of TTIC is to achieve international impact through the accomplishments of its Ph.D. graduates.
MESSAGE FROM THE PRESIDENT

It is my great honor to have been appointed by the Board of Trustees and serve as the second President of the Toyota Technological Institute at Chicago (TTIC). The three-year term of appointment began on April 1, 2013. I am Professor Emeritus at Tokyo Institute of Technology (Tokyo Tech) in Japan, and am still serving as a professor at the Academy for Global Leadership of Tokyo Tech. Therefore, I am on-location at TTIC for one week and at Tokyo Tech the remaining three weeks of each month.

Dr. Stuart A. Rice, who has served TTIC as Dean from October 2006, and then as Interim President since October 2010, announced his resignation from the latter position effective March 31, 2013. Under his leadership, TTIC continued its growth and development in best practices and policy, and especially in research and education programs in fundamental computer science.

Throughout 2012-2013, TTIC continued its steady progress towards fulfilling its mission: achieve international impact through world-class research and education in fundamental computer science and information technology. The level of recognition and impact of research at TTIC continues to steadily increase, the latest examples being the Best Paper Award of SPAA‘13, the Best Paper Award at FOCS 2012, the Best Student Paper Award at INTERSPEECH 2012, and an NSF CAREER award. TTIC now has four NSF CAREER awards and two Sloan fellowships. The faculty actively pursued federal research grants with sufficient success that the grant volume sensibly remains the same as in 2011-2012.

TTIC hosted two workshops, Midwest Speech and Language Days on May 2-3, 2013, and Midwest Vision Workshop on May 9, 2013, providing forums for presenting recent work, informal discussion and the exchange of ideas. Both workshops, which included oral and poster presentations, were very successful drawing 40-60 participants from many institutions.

Our relationship with the Toyota Technological Institute (TTI) in Nagoya, Japan continues to strengthen. Two TTI exchange students and one visiting scholar spent a quarter at TTIC during the 2012-2013 academic year, with one more exchange student expected to be in residence the duration of next autumn quarter 2013.

The Institute’s relationship with the University of Chicago remains strong, both with respect to various kinds of administrative aid, student support and with respect to the potential for collaborative research.

TTIC will be celebrating its 10 year anniversary in September-October, 2013. As a part of the celebration, we are planning to hold an Anniversary Symposium on September 27, open to the computer science community. The speakers will include TTIC faculty, faculty alumni as well as prominent researchers from the U.S. and outside countries. We are also planning to publish a 10 Year Anniversary book, including messages, Institute history, commemorative photos, and historical documents.

As TTIC continues to mature as an institution, we are committed to the further pursuit of academic excellence and enhancement of the already strong relations with our academic partners. Long-term plans call for growing to 12-16 permanent faculty (tenured and tenure-track) with a total faculty of 30 (including research assistant professor positions). We will continue hiring the strongest faculty possible.

At the close of 2012-13, we have confidence in the continued strength of our faculty and the continued success of the institution.

Sadaoki Furui
President
NOTE FROM THE CHIEF ACADEMIC OFFICER

I recently saw an advertisement with a voice-over of Arthur C. Clark, recorded in 1964. Clark was talking about how unbelievable the future will be. 1964 was a long time ago and things have, of course, changed enormously since then. But technology has not just advanced. The rate of technological change has accelerated. Object detection (computer vision) seems to have exhibited exponential improvement over the last half-dozen years. Speech recognition has seen dramatic advances in the last few years alone, becoming widely used on phones and threatening to revolutionize the way in which we interact with machines. There has been enormous progress toward Robot taxis. The world economy is engaged in a revolution in the way products are marketed and purchased. The issues surrounding privacy and security, of both individuals and governments, are rapidly changing. There is a sense that future developments have become harder to predict. Perhaps the future is even more unbelievable than Arthur C. Clark had in mind in 1964.

In the current era of rapid change, the success of any particular academic institution will largely depend on its willingness to evolve rapidly. It will have to identify successful revolutions as well as outdated ideas. TTI-Chicago must face the challenge of rapid change and stay engaged in the ever-evolving cutting-edge. This is true both at the level of the institution and the level of individual researcher. We must, each one of us, do our best to understand what is really happening in computer science.

The 2012/2013 year was another eventful and successful year for TTIC.

Looking forward, we welcome the challenges of these exciting times.

David McAllester
Chief Academic Officer
# INSTITUTE OVERVIEW

## Faculty and Staff

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<th>Position</th>
<th>Number</th>
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<td>Professors</td>
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<tr>
<td>Associate Professors</td>
<td>3</td>
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<tr>
<td>Assistant Professors</td>
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<td>Research Assistant Professors</td>
<td>10</td>
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<td>Adjoint Faculty</td>
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<td>Administrative Office Staff and IT</td>
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## PhD Program

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
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<td>Students Enrolled for 2012-13</td>
<td>22</td>
</tr>
<tr>
<td>Master's within the PhD Program, Degrees Awarded</td>
<td>2</td>
</tr>
<tr>
<td>Ph.D. Degrees Awarded</td>
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</tr>
<tr>
<td>Applicants for 2013-14</td>
<td>66</td>
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<tr>
<td>Admitted</td>
<td>9</td>
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<tr>
<td>Enrolling</td>
<td>5</td>
</tr>
<tr>
<td>Exchange Students in 2012-13</td>
<td>2</td>
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TTIC’s Board of Trustees instituted a Presidential Search Committee in 2009, to begin the search for a new President when founding President, Dr. Mitsuru Nagasawa, who served from 2001 to 2010, announced that he planned to retire his position as President come the 2010 autumn board meeting.

During the presidential search, Dr. Stuart Rice was appointed Interim President by the Board. At that time, Dr. Rice was serving TTIC as Dean, since October 2006, and was a Frank P. Hixon Distinguished Service Professor Emeritus in Chemistry at the University of Chicago. He served the Institute with great leadership in advisement of academic and administrative affairs, best practices and policy. Dr. Rice was instrumental in the search for a new president, the efforts to improve TTIC’s financial resources and stability, the recruitment of highly qualified Board members, and building upon strong collaboration with both the Toyota Technological Institute in Japan and the University of Chicago. The Institute has named Dr. Rice and Honorary Interim President, and he will continue to serve as an institute consultant.

Effective April 1, 2013 the Board of Trustees appointed Dr. Sadaoki Furui to a three-year term as President. Dr. Furui is Professor Emeritus at the Academy for Global Leadership and University Contents Utilization Center at the Tokyo Institute of Technology. He is engaged in a wide range of research on speech analysis, speech recognition, speaker recognition, speech synthesis and multimedia processing, and has authored or coauthored over 900 published articles. His B.S., M.S., and Ph. D. degrees are all from the University of Tokyo.

The Institute celebrated the occasion on April 25, with a President’s Reception at the Institute. Founding President Mitsuru Nagasawa was in attendance, as well as Dr. Stuart Rice, (acting Interim President,) and new President, Sadaoki Furui. Wise words were spoken by the three leaders, and in attendance were faculty, staff, students, University of Chicago colleagues, and institute supporters.
AWARDS AND HONORS

2012 September  Karen Livescu

Co-author of a best student paper at Interspeech 2012

A paper co-authored by former TTIC summer student Preethi Jyothi, Prof. Eric Fosler-Lussier of Ohio State University, and Prof. Karen Livescu was awarded an ISCA Best Student Paper award at the Interspeech conference September 9-13, 2012. The paper is titled “Discriminatively learning factorized finite state pronunciation models from dynamic Bayesian networks.” The conference included about 700 papers, and 3 Best Student Paper awards were given.

2012 October  Julia Chuzhoy

Professor Julia Chuzhoy co-winner of FOCS 2012 Best Paper award

Julia Chuzhoy was a co-winner of the best-paper award at the 53rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2012) being held in New Brunswick, NJ, on October 21-23. She co-authored the paper with Shi Li, who was her summer intern in the summer of 2011. The paper was titled, “A Polylogarithmic Approximation Algorithm for Edge-Disjoint Paths with Congestion 2”.

2013 March  Sadaoki Furui

Dr. Sadaoki Furui awarded Okawa Prize

Dr. Sadaoki Furui, Professor Emeritus; Professor, Academy for Global Leadership; Director of the University Contents Utilization Center, Tokyo Institute of Technology; and President-Elect of TTIC, has been awarded the Okawa Prize by the Okawa Foundation in Japan.

He received the award on March 5, 2013, at an international symposium at Tokyo Technological Institute. His award was based on pioneering contributions to and leadership in the field of computer-based speech recognition and understanding. He received a certificate, a gold medal and a cash award of ten million yen.

The Okawa Prize is intended to pay tribute to and make public recognition of persons who have made outstanding contributions to the research, technological development and business in the information and telecommunications fields, internationally.

2013 February  Madhur Tulsiani

Professor Madhur Tulsiani awarded NSF CAREER grant

Professor Madhur Tulsiani is the recipient of the prestigious Faculty Early Career Development (CAREER) grant.

The grant is awarded by the National Science Foundation to support junior faculty in their research and educational activities. Quoting from the NSF website: “The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation’s most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations”.

Professor Tulsiani’s project is entitled “Understanding Polynomial Structure Analytically and Algorithmically.”

2013 May  Ben Moseley

Prof. Ben Moseley co-winner of SPAA’13 Best Paper Award

TTIC’s Benjamin Moseley is a co-winner of the Best Paper Award at the 25th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2013) being held in Montreal, Canada on July 23-25. He co-authored the paper with Ravi Kumar, Sergei Vassilvitskii and Andrea Vattani. The paper is titled, “Fast Greedy Algorithms in MapReduce and Streaming”.

NEW FACULTY

Sanja Fidler
Research Assistant Professor
PhD - University of Ljubljana
Research Interests: Object detection, particularly scalable multi-class detection, 3D object recognition and detection, object and scene segmentation, and (3D) scene understanding

Kevin Gimpel
Research Assistant Professor
PhD - Carnegie Mellon University
Research Interests: Research Interests: machine translation, statistical natural language processing, structured prediction, computational semantics, and social media analysis.

Samory Kpotufe
Research Assistant Professor
PhD - University of California, San Diego
Research Interests: Machine Learning, Nonparametric Statistics.

Dahua Lin
Research Assistant Professor
PhD - MIT
Research Interests: Computer Vision, Scene Modeling and Understanding, Probabilistic Inference, Bayesian Nonparametrics

Benjamin Moseley
Research Assistant Professor
PhD - University of Illinois Urbana-Champaign
Research Interests: Algorithms, Online algorithms, Approximation algorithms, Scheduling, Large data analysis, Parallel computing and Algorithmic applications

Or Zuk
Visiting Assistant Professor
PhD - Weizmann Institute of Science
Research Interests: Computational biology, machine learning and applied statistics.
FACULTY BY AREA

**Algorithms and Complexity**

Chuzhoy, Julia  
Fortnow, Lance  
Makarychev, Yury  
Moseley, Benjamin  
Razborov, Alexander  
Tulsiani, Madhur

**Machine Learning**

Ben-David, Shai  
Kpotufe, Samory  
McAllester, David  
Mita, Seiichi  
Sarwate, Anand  
Sasaki, Yutaka  
Shakhnarovich, Greg  
Nathan Srebro

**Computational Biology**

Shen, Yang  
Xu, Jinbo

**Speech Technologies**

Gimpel, Kevin  
Livescu, Karen

**Computer Vision and Computational Photography**

Fidler, Sanja  
Maji, Subhransu  
Orabona, Francesco  
Urtasun, Raquel

**PostDocs**

Wang, Sheng  
Margaryan, Gohar  
Brubaker, Marcus
RESEARCH and RESPONSIBILITY
Research is the heart and soul of activity at the Toyota Technological Institute at Chicago. The Institute has an energetic and determined team of professors, visiting professors, assistant professors, research assistant professors and post docs encompassing many areas of research interests, from many countries, backgrounds, each bringing their own specialty to the Institute.

With a generous budget, distinguished professors, and an environment that promotes learning and sharing, there are ample opportunities for collaborative research. Being on the campus of the University of Chicago, there is the occasion for close and cooperative research with not only the University of Chicago Computer Science Department, but with the departments of Mathematics, Statistics, and most recently, the Booth Graduate School of Business. There are also many guests and visitors who come to give talks, participate in workshops, and share their research findings, all heightening the feeling of enthusiasm that pulses through the Institute.

The mission of TTIC includes “...achieving international impact through world-class research and education in fundamental computer science and information technology.” The research component of the mission is implemented through high quality research in high impact areas. Currently, there are active research programs in five areas: machine learning, algorithms and complexity, computer vision and computational photography, speech technologies, and computational biology. Each of these areas is reviewed, as follows, briefly describing the nature of the area and the strategy for achieving impact in that area. A key part of the strategy for achieving impact in all areas is to foster collaboration and communication between the areas.
Machine Learning

Machine Learning generally refers to an engineering or design paradigm where systems are built based on automatic training from examples, rather than detailed expert knowledge, much in the same way as humans learn how to perform many tasks, and how to interact with the world, mostly based on examples. Most of modern Machine Learning is statistical in nature, and builds on statistical and probabilistic tools, as well as on algorithmic and computational developments. Especially in recent years, as training data is becoming plentiful and massive computational and storage resources needed for handling the data are also becoming available, Machine Learning is playing a key role in many application areas. These include both classic Artificial Intelligence problems, such as computer vision, robotics, machine translation, question answering and dialogue systems, as well as a variety of “non-human” problems such as information retrieval, search, bio-informatics and stock market prediction.

Below is a list of the work done at TTIC this year in the area of Machine Learning.

Kpotufe, Samory
Research Assistant Professor
www.ttic.edu/kpotufe

PUBLISHED/Submitted Papers

McAllester, David
Professor, Chief Academic Officer
www.ttic.edu/mcallester

PUBLISHED/Submitted Papers

BOOK CHAPTERS

TECHNICAL REPORTS

CLASSES/SEMINARS
TTIC 31030 Mathematical Foundations. The course covers the foundations of mathematics from a classical (nonconstructive) type-theoretic perspective, the general notion of a mathematical structure, the general notion of isomorphism, and the role of axiomatizations and constructions in mathematical definitions. The course also covers the notion of definability in well-typed formalisms.

INvolvement
Program co-chair of the international conference on machine learning (ICML) June 2013.

Sarwate, Anand
Research Assistant Professor
www.ttic.edu/sarwate

PUBLISHED/Submitted Papers

IN PRESS & PREPRINT

TALKS
"Privacy-preserving algorithms for machine learning." University of Wisconsin, Rice University, University of Southern California, University of Texas at Austin, Texas A&M University, University of California, Los Angeles
"Learning from private data." Rutgers University
"Privacy-preserving dimension reduction." Information Theory and Applications Workshop (ITA), San Diego, CA, February 2013
"Algorithms for privacy-preserving machine learning (and signal processing?)" Bellairs Workshop on Signal Processing, March 2013

INVOLVEMENT
Technical Program Committee, Information Theory and Applications Workshop (ITA 2012)
Technical Program Committee, Sixth International Conference on Information-Theoretic Security (ICITS 2012)

Journal reviewing
IEEE Transactions on Information Theory
IEEE Transactions on Signal Processing
IEEE Signal Processing Letters
Journal of the American Statistical Association (JASA)
Random Structures and Algorithms
AMS Mathematical Reviews
IEEE Signal Processing Magazine

Grant reviewing: National Science Foundation, U.S.-Israel Binational Science Foundation

RESEARCH FUNDING AWARDS
National Science FOurndation : "CIF: Small: Collaborative Research: Inference by social sampling", 3 years, $208,426

CLASSES/ SEMINARS
Guest instructor, TTIC 31090 Signals, Systems and Random Processes, Spring Quarter 2013
Instructor at TTI (Nagoya, Japan)

MISCELLANEOUS
Panelist, IDASH Privacy Workshop, UC San Diego
Online Associate Editor, IEEE Information Theory Society

Shakhnarovich, Greg
Assistant Professor
www.ttic.edu/gregory

PUBLISHED/ SUBMITTED PAPERS
S. Maji, G. Shakhnarovich. "Part Discovery from Partial Correspondence." CVPR 2013.

TALKS
"Discriminative Metric Learning with Latent Structured Prediction." Brown University, June 2013

INVOLVEMENT
Area Chair: ICML 2013
Reviewer for: IEEE TPAMI, NIPS, CVPR, ICCV, AISTATS
Algorithms and Complexity

One of the central tasks in all areas of computer science is that of writing efficient software to perform required computation. In order to write such software, one must first design an efficient algorithm for the computational task at hand. The area of algorithms focuses on designing algorithms, and more generally developing powerful algorithmic tools, for solving fundamental computational problems, that frequently occur in different areas of computer science. Complexity theory is the study of the power and the limits of efficient computation. The central problem studied by the complexity theorists is: “which computational problems can, and which cannot, be solved efficiently?” The study of algorithms and complexity is often referred to as the ‘theory of computer science’, or just “theory”. The area of theory works on developing theoretical foundations for computer science, which lead to a deeper understanding of computation in general, and specific computational tasks in particular, and ultimately to better algorithms and faster software.

Below is a list of the work done at TTIC this year in the area of Algorithms & Complexity.

Chuzhoy, Julia
Associate Professor
www.ttic.edu/chuzhoy

PUBLISHED/ SUBMITTED PAPERS

TALKS
“Approximation Algorithms for Graph Routing Problems.” Invited talk at APPROX 2012, August 2012
“Approximation Algorithms for Graph Routing Problems.” Distinguished Invited Speaker at Maryland Theory Day, October 2012
“Approximation Algorithms for Graph Routing Problems.” Simons Symposium on New Directions in Approximation Algorithms, Virgin Islands, January 2013

IN Volvement
Member of the editorial board of Algorithmica
Programming Committee member: STOC 2013

RECOGNITION/ AWARDS
Best Paper Award at FOCS 2012 for the paper “A polylogarithmic Approximation Algorithm for Edge-Disjoint Paths with Congestion 2,” co-authored with Shi Li.
Invited to give a section talk at the International Congress of Mathematicians in 2014.

RESEARCH FUNDING AWARDS
CAREER grant - ongoing. Award Amount:$460,690.00. For 4 years, starting Jan 2009
Sloan Fellowship - ongoing. Award Amount. $50,000. For 2 years, starting Sept 2011
National Science Foundation- New. Award amount $464,136. For 3 years, starting Jan 2014

CLASSES/ SEMINARS
TTIC 31010/ CMSC 37000-1 Algorithms
This is a graduate level course on algorithms, with the emphasis on computational problems that are central to both theory and practice, and on developing techniques for the design and the rigorous analysis of algorithms and data structures for such problems.
Makarychev, Yury
Assistant Professor
www.ttic.edu/makarychev

PUBLISHED/ SUBMITTED PAPERS

TALKS
“Sorting Noisy Data with Partial Information.” UIUC, Urbana, IL, Theory Seminar. March 2013
“Sorting Noisy Data with Partial Information.” Purdue University, West Lafayette, IN, Theory Seminar. February 2012
“Approximation Algorithm for Non-Boolean Max k-CSP.” Schloss Dagstuhl, Germany, Workshop on Constraint Satisfaction Problems. November 2012

INVOLVEMENT
Served on the program committee of FOCS 2013
Served on an NSF panel
Served on the program committee of ICML 2013
Reviewed grant proposals for NSF

RESEARCH FUNDING AWARDS
Awarded NSF Grant IIS-1302662 (jointly with PI N. Srebro)
Was supported by NSF Career Award CCF-1150062

CLASSES/ SEMINARS
Taught Computational and Metric Geometry (TTIC 31100 / CMSC 37010-1). This a graduate level course on computational and metric geometry.
Taught CMSC 39800, Reading and Research class on Lift-and-Project Hierarchies.

MISCELLANEOUS
Programming Experience Czar at TTIC.

Moseley, Bejamin
Research Assistant Professor
www.ttic.edu/moseley

PUBLISHED/ SUBMITTED PAPERS
Bahman Bahmani, Andrea Vattani, Benjamin Moseley, Ravi Kumar and Sergei Vassilvitskii. “Scalable K-Means++.” International Conference on Very Large Data Bases (VLDB 2012). (Oral Presentation)

TALKS
"MapReduce and Distributed Scheduling." Invited presentation at the Dagstuhl seminar on scheduling. Dagstuhl, Germany. March 2013
"Online Scheduling to Minimize General Cost Functions." University of Chicago theory seminar. Chicago, IL. February 2013
"The Complexity of Scheduling for p-norms of Flow and Stretch". IPCO 2013. Valparaiso, Chile. March 2013

INVOLVEMENT
Reviewer for: FOCS, SODA, ICALP, ESA, APPROX, ITCS, WAOA, Euro-Par, ACM Transactions on Algorithms, Journal of Computer Science and Technology, Concurrency and Computation: Practice and Experience, Transactions on Knowledge and Data Engineering.
Razborov, Alexander  
Adjunct Professor  
www.cs.uchicago.edu/people/razborov

PUBLISHED/ SUBMITTED PAPERS


"On the Caccetta-Haggkvist Conjecture with Forbidden Subgraphs (Journal of Graph Theory)." Accepted.

"On Turan's (3,4)-Problem with Forbidden Configurations (Mathematical Notes, Russian Academy of Sciences)." Accepted.

"Real Advantage." joint with Emanuele Viola (ACM Transactions on Computation Theory). Accepted.

TALKS

"Flag Algebras: an Interim Report." Urbana-Champaign, March 2013 (www.math.uiuc.edu/excill2/)

"Flag Algebras." Institute for Defense Analysis, Princeton, March 2013 (Talk given in connection with David P. Robbins Prize, see below)

"Flag Algebras." Georgia Tech (November 2012) and Chicago Logic Day (April 2013)

INVOLVEMENT


RECOGNITION/ AWARDS


Tulsiani, Madhur  
Assistant Professor  
www.ttic.edu/tulsiani

PUBLISHED/ SUBMITTED PAPERS


TALKS

"Algorithms in Quadratic Fourier Analysis", Purdue CS Theory Seminar, November 2012

"Algorithms in Quadratic Fourier Analysis", UIUC Theory Seminar, December 2012

"Towards an Optimal Query-Efficient PCP", ITCS 2013 (Berkeley), January 2013

"Algorithms in Quadratic Fourier Analysis", UIC Combinatorics and TCS Seminar, January 2013

"The Complexity of Somewhat Approximation Resistant Predicates", ARC Colloquium at Georgia Tech, March 2013

INVOLVEMENT

Member of the Program Committee for APPROX 2013 and FSTTCS 2013

Member of the editorial board for the journal "Theory of Computing"

Reviewer for: FOCS, IPCO, STACS, SODA, ITCS, JACM, Combinatorica, ACM Transactions on ToC.

RESEARCH FUNDING AWARDS


CLASSES/ SEMINARS

Theory Reading Group - Fall/Winter 2013

Mathematical Toolkit (TTIC/CMSC 31150) Spring 2013. New course designed to cover basics of various mathematical techniques used in theoretical computer science. Contents included:

Discrete probability, tail bounds and load balancing

Gaussian distribution, tail bounds, dimension reduction and fast SVD

Spectral graph theory, Cheeger's inequality, expander constructions

Fourier analysis on the hypercube, epsilon-biased sets, Goldreich-Levin, learning decision trees

LP duality and applications, linear programming bound for codes

Multiplicative updates method for solving LPs
REU on Linear Algebra and Combinatorics (at UChicago) - Summer 2013 (co-taught with Laci Babai)
Summer course for advanced undergraduate students. Aimed at covering basics of linear algebra and applications to spectral graph theory and extremal combinatorics.

Computer Vision and Computational Photography

Computer vision involves getting computers to extract useful information from pictures and videos. It has applications in robotics, surveillance, autonomous vehicles, and automobile collision avoidance. Historically, this is a central research area of computer science.

Below is a list of the work done at TTIC this year in the area of Computer Vision and Computational Photography.

Fidler, Sanja
Research Assistant Professor
ttic.uchicago.edu/~fidler/

PUBLISHED/ SUBMITTED PAPERS


INVIOLVEMENT
Publication chair of CVPR’13
Reviewing for: TPAMI, IJCV, CVPR, ECCV, ICCV

RECOGNITION/ AWARDS
Best reviewer award at ECCV’12

CLASSES/ SEMINARS
Taught two lectures for TTIC 31040 Introduction to Computer Vision, at TTIC

Maji, Subhransu
Research Assistant Professor
www.ttic.edu/maji

PUBLISHED/ SUBMITTED PAPERS
Subhransu Maji, Greg Shakninarovich. “Part Discovery from Partial Correspondence.” CVPR 2013.

TALKS
“Discovering a Lexicon of Parts and Attributes.” CLSP Summer Workshop, Johns Hopkins University, July 2012
“Discovering a Lexicon of Parts and Attributes.” Midwest Vision Workshop, UIUC, 2012
“Rich Representations for Detailed Visual Recognition.” Departmental Talk, University of Maryland, College Park, April 2013
“Part Discovery from Partial Correspondence.” Midwest Vision Workshop, TTIC, 2013

INVIOLVEMENT
Co-organized a full day tutorial at ICVGIP 2012 at IIT Bombay.
Co-organized a half day tutorial on "additive kernels and explicit embeddings" at ECCV 2012.
Co-organized a six-week workshop at the JHU CLSP center on detailed image understanding. Reviewing for the Journals: IEEE PAMI, IJCV, CVIU, IEEE TIP Reviewing for the conferences: CVPR, ECCV, ICCV, ACCV, NIPS, AAAI Workshop reviewing/program committee member:

CLASSES/ SEMINARS
Co-taught a Machine Learning class at TTI (Nagoya, Japan)

Orabona, Francesco
Research Assistant Professor
www.ttic.edu/orabona

PUBLISHED/ SUBMITTED PAPERS

TALKS
"Selective sampling and ranking in the partial adversarial setting.” Max Planck Institute, Tübingen, Germany, March 2013 “Selective sampling and ranking in the partial adversarial setting.” Yahoo! Labs, Sunnyvale, CA, USA, December 2012 “Efficient and principled online algorithms for lifelong learning.” IROS Workshop on Lifelong Learning for Mobile Robotics Applications, Vilamoura, Portugal, October 2012

INVolVEMENT

Urtasun, Raquel
Assistant Professor
www.ttic.edu/urtasun

PUBLISHED/ SUBMITTED PAPERS

TALKS
Speech Technologies

This area is concerned with getting computers to analyze and extract information from spoken language, as well as to generate spoken audio. At TTIC, current speech research focuses mainly on the analysis side. For example, speech recognition is the problem of transcribing the words being spoken in an audio signal, such as that recorded from a microphone. Speech processing heavily relies on techniques from machine learning and statistics, as well as ideas from linguistics and speech science, and shares algorithms with computer vision and computational biology. This area has applications such as automated telephone information centers, dictation systems, machine translation, archiving and search of spoken documents, assistance for the visually or hearing-impaired, and other human-computer interface systems.

Below is a list of the work done at TTIC this year in the area of Speech Technologies.

Gimpel, Kevin
Research Assistant Professor
www.ttic.edu/gimpel

PUBLISHED/ SUBMITTED PAPERS

TALKS

INVOLVEMENT

Co-organized (with Karen Livescu) "Midwest Speech and Language Days" (http://ttic.uchicago.edu/~kgimpel/MSLD2013.html), a 2-day workshop at TTIC (May 2-3, 2013) attended by approximately 70 researchers from the Midwest.
RECOGNITION/ AWARDS
"Workshop on Statistical Machine Translation 5-year Retrospective Best Paper Award" for following paper:

Livescu, Karen
Assistant Professor
www.ttic.edu/livescu

PUBLISHED/ SUBMITTED PAPERS


TALKS

Machine Learning Seminar, Technion, Haifa, Israel, 2013
Computer Vision Seminar, Weizmann Institute of Science, Rehovot, Israel, 2013
Special Session Invited Speaker, APSIPA, Los Angeles, CA, 2012
ICSI Berkeley Speech group seminar, Berkeley, CA, 2012
USC SAIL group seminar, Los Angeles, CA, 2012
"Multi-view learning of speech features with linear and non-linear canonical correlation analysis" Machine Learning Seminar, Technion, Haifa, Israel, May 2013
"Low-resource spoken term detection with discriminative articulatory models" Midwest Speech and Language Days, TTIC, May 2013
"Multi-view learning of speech features using articulatory measurements" Machine Learning Seminar, IBM, Tel Aviv, Israel, January 2013
"Multi-view learning of speech features using articulatory measurements" Multimedia Group, IBM, Haifa, Israel, January 2013
"Multi-view learning of speech features using articulatory measurements" Computer Vision Seminar, Weizmann Institute of Science, January Rehovot, Israel, 2013
"Sub-word Modeling for Automatic Speech Recognition" Special Session Invited Speaker, APSIPA, Los Angeles, CA, December 2012
"Multi-view Learning of Speech Features Using Articulatory Measurements" ICSI Berkeley Speech group seminar, Berkeley, CA, December 2012
"Multi-view learning of speech features using articulatory measurements" USC SAIL group seminar, Los Angeles, CA, December 2012
"Graphical models of word pronunciation" Spoken Language Systems Group Seminar, MIT, Cambridge, MA, July 2012

INVOLVEMENT

Subject editor, Speech Communication journal
Associate editor (appointed June 2013, term starts July 2013), IEEE Transactions on Audio, Speech, and Language Processing Workshops chair, EMNLP 2013
Organizing committee member, Workshop on Speech Production in Automatic Speech Recognition, 2013
Co-organizer, Midwest Speech and Language Days, 2013
Member, IEEE Speech and Language Technical Committee
Organizing committee member, ISCA Symposium on Machine Learning in Speech and Language Processing, 2012
Reviewing for Computer Speech and Language, Interspeech, ICASSP, SLT, NIPS, ICML

RECOGNITION/ AWARDS

RESEARCH FUNDING AWARDS

CLASSES/ SEMINARS
TTIC 31090: Signals, Systems, and Random Processes. Introduction to analysis of signals, linear time-invariant systems, and random processes at a graduate level. Topics include: convolution; continuous and discrete-time Fourier transforms; linear filtering; sampling and aliasing; vector spaces of random variables and processes; interaction of random processes with linear systems;
power spectral densities; Karhunen-Loeve transforms/PCA; wavelets; applications in areas such as speech and image processing.

Speech Discussion Group, TTIC. Weekly discussion on a mix of papers and ongoing work in speech and language at TTIC.

MISCELLANEOUS

Thesis committees: Rohit Prabhavalkar (Ohio State), Preethi Jyothi (Ohio State), Arild Naess (NTNU, co-advisor), Line Adde (NTNU), Sravana Reddy (U. Chicago), Jonathan Keane (U. Chicago)

Computational Biology

Computational biology studies biological systems (e.g., cell, protein, DNA and RNA) through mathematical modeling and optimization. Machine learning methods (e.g., probabilistic graphical model) and optimization techniques (e.g., linear programming and convex optimization) will find significant applications in this field. Algorithm design and complexity analysis will also play an important role especially when we want to know if there is an efficient algorithm that can find an exact or approximate solution to a specific biological problem.

Below is a list of the work done at TTIC this year in the area of Computational Biology:

Xu, Jinbo
Associate Professor
www.ttic.edu/xu

PUBLISHED/Submitted Papers

Zhiyong Wang and Jinbo Xu. “Predicting protein contact map using evolutionary and physical constraints by integer programming.” ISMB 2013. Also appears in Bioinformatics. (accepted for oral presentation)
Jianzhu Ma, Sheng Wang, Feng Zhao and Jinbo Xu. “Protein threading using context-specific alignment potential.” ISMB 2013. Also appears in Bioinformatics. (accepted for oral presentation)

Talks

“Statistical machine learning for protein structure prediction.” Department of Computer Science, Arizona State University, April 2013 (invited talk)
“Statistical machine learning for protein structure prediction.” NSF EPSCoR Bioinformatics Workshop to Foster Collaborative Research, March 2013 (keynote talk).
“A context-specific alignment potential for protein threading.” CASP10, December 2012 (invited talk)
“A probabilistic graphical model for protein template-free modeling.” CASP10, December 2012 (invited short talk)
AISTATS 2012 conference paper presentation by student Jianzhu Ma.

Involvement

Systems biology session chair of ACM BCB 2012
PC member: ISMB 2013, ACM BCB 2013, ICML 2013, BioKDD 2013 and others
Panelist: NIH K99 program
Reviewer for the following journals and conferences: PNAS, IEEE/ACM TCBB, Bioinformatics, BMC Bioinformatics, Journal of Computational Biology, PROTEINS and Proteome.

Recognition/Awards

Our protein modeling method was voted by the CASP10 participants as the most interesting and I was invited to give two talks at CASP10 and join the protein ab initio folding discussion panel.

Research Funding Awards


Jinbo Xu. Sloan Fellowship. 2013-2014, $50k in total.

Jinbo Xu. (NSF-sponsored) TeraGrid TG-MCB100062 (1M CPU hours for 2012)

CLASSES/ SEMINARS
Bioinformatics group reading.

Shen, Yang
Research Assistant Professor
www.ttic.edu/shen

PUBLISHED/ SUBMITTED PAPERS


Weiyi toy, Yang Shen, Helen Won, Bradley Green, Rita A. Sakr, Marie Will, Zhiqiang Li, Kinisha Gala, Sean Fanning, Tari A. King, Clifford Hudis, David Chen, Tetiana Taran, Gabriel Hortobagyi, Geoffrey L. Greene, Michael Berger, José Baselga, and Sarat Chandarlapaty. "ESR1 Ligand-binding Domain Mutations in Hormone-resistant Breast Cancer." Submitted.


TALKS
"Predicting and Designing Protein Interactions Through Optimization.” Key Laboratory of Systems Biology, Chinese Academy of Science, Shanghai, China, August 2012.

INVESTIGATION

RECOGNITION/ AWARDS
Director's Discretionary Award, 3 million CPU hours, Argonne Leadership Computing Facility (supported by DOE), Argonne National Laboratory, October 2012 - August 2013.

Ranked 5th among 64 groups of international participants for the 5th CAPRI (2010-2012), the most important community-wide critical assessment of protein-docking methods.

MISCELLANEOUS
This year, TTIC continued its collaboration with Toyota Central Research and Development (TCRD). In particular, Dr. Koichiro Yamaguchi of TCRD worked closely with Raquel Urtasun and David McAllester of TTIC on stereo and motion algorithms in computer vision with applications to autonomous cars.

Collaborative work on autonomous cars also continued between David McAllester of TTIC and Prof. Seiichi Mita’s group at TTI in Nagoya. Nati Srebro of TTIC and Prof. Yutaka Sasaki’s group at TTI collaborated on computational linguistics for medical applications.

Collaborative efforts with the University of Chicago continues with strong ties in the area of theoretical computer science and with Prof. Alexander Razborov being a part of both faculties. These collaborations are expected to continue and further-strengthen in the coming years.
SEMINARS and WORKSHOPS

Seminars are an important part of any academic institution. They are both a way for researchers to promote their research, and keep abreast of recent developments. They also play an important role in establishing the level of intellectual activity and influx of innovative ideas at an organization: research is more likely to be productive in an active environment with significant interaction between researchers.

The table below lists seminars given at TTIC, many of which are given by speakers from other universities and research institutions. Some speakers may be part of research reading groups: people presenting papers that are of interest to a particular group, such as the theory group or the programming languages group. Many seminars are advertised outside of TTIC and are intended to be for a broad audience in computer science. In the spring quarter there are a large number of recruiting seminars which are talks given by candidates for faculty positions. The TTIC Event Calendar can be found on the TTIC home page: www.ttic.edu

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<td>Dhruv Batra</td>
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<td>Gilad Lerman</td>
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<td>Martin Takáč</td>
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<td>Anand Sarwate</td>
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<td>Francesco Orabona</td>
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<td>Shi Yu</td>
<td>Institute for Genomics and Systems Biology, University of Chicago</td>
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<td>Sivan Sabato</td>
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<td>Jinbo Xu</td>
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<td>Some expeditions in enabling systems biology through data mining</td>
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<td>Gaurav Pandey</td>
<td>Mount Sinai School of Medicine</td>
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<td>Aren Jansen</td>
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<tr>
<td>Yury Makarychev</td>
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<td>Approximation Algorithms for Semi-random Graph Partitioning Problems</td>
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<td>Raman Arora</td>
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<td>Online learning against adaptive adversaries</td>
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<td>Lev Reyzin</td>
<td>University of Illinois at Chicago</td>
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<td>Bonnie Kirkpatrick</td>
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<td>George Papandreou</td>
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<td>Hyun Soo Park</td>
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<td>Andy Cotter</td>
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<td>Distributed Hessian-free Optimization for Deep Neural Network Acoustic Models</td>
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<td>Larry Birnbaum</td>
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<td>Alan Ritter</td>
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<td>Carnegie Mellon University</td>
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<td>Julia Chuzhoy</td>
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<td>Yang Shen</td>
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<td>Claudio Castellini</td>
<td>DLR German Aerospace Center</td>
<td>Non-invasive Human-Machine Interfaces for the disabled: rehabilitation, phantom pain and more</td>
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Midwest Speech and Language Days

May 2013

Midwest Speech and Language Days was held at TTIC on May 2-3, 2013, expanding upon the tradition of the annual Illinois Speech Day to include more research in natural language processing and linguistics. The workshop included more than 60 participants from TTIC, University of Chicago, University of Illinois, Northwestern University, Rush University, Ohio State University, University of Michigan, University of Wisconsin, and others. As in previous years, it provided a forum for interaction among researchers from nearby speech and language research communities, featuring several sessions of talks and posters. Keynote presentations were given by Jim Glass from MIT, Yotaro Kubo from Nippon Telegraph and Telephone Corporation, and TTIC’s new president, Sadaoki Furui. The full program can be found here (http://ttic.uchicago.edu/~kgimpel/MSLD2013.html). The next workshop is planned for Spring 2014.

Midwest Vision Workshop

May 2013

On May 9, TTIC again hosted the Midwest Vision Workshop. This is a regular regional meeting of computer vision researchers, providing a forum for presenting recent work, informal discussion and exchange of ideas. The meeting, which included oral presentations and poster sessions, drew more than 40 attendees from TTIC, University of Chicago, University of Illinois at Urbana-Champaign, University of Michigan at Ann Arbor, and other institutions. The next Midwest Vision Workshop is expected to be held in the Autumn 2013.
THE PH.D. PROGRAM

The TTIC Ph.D. Program is designed to prepare students for academic or research careers. To complete the program a student must make an original and significant contribution to the field of computer science and this contribution must be described in a doctoral thesis. In addition to the thesis, there are course and examination requirements to complete the program. The main component of the program is the process by which the student learns to do research and becomes a part of the academic community.

As part of the associated partnership between TTIC and the University of Chicago, students of TTIC can take and receive credit for courses through the University of Chicago, and University of Chicago students can take advantage of classes TTIC offers as well. Students have taken full advantage of this opportunity. Students also have full access to the University of Chicago library system, athletic facilities, the student health center and transportation on campus. The Institute’s meaningfully engagement with the University of Chicago allows TTIC students to share in the great rewards of the intimate learning, sharing and research of a smaller, specialized institute, while enjoying the opportunities that come with a large university.
Former student Karthik Sridharan, who completed his PhD degree in 2012, received his diploma in TTIC’s Diploma Ceremony in September 2012, along with Master’s diploma recipients Hao Tang and Zhiyong Wang. Karthik has a position as a post-doc at the Wharton School, University of Pennsylvania.

STUDENT PROGRESS

TTIC students Jian Peng, studying under Professor Jinbo Xu, and Andrew Cotter, studying under Professor Nati Srebro, both successfully defended their theses and will receive their diplomas in a ceremony in September of 2013, the fourth and fifth doctoral diplomas to be awarded to date.

Jian Peng’s research interest is in bioinformatics. He is currently employed as a postdoctoral researcher in the Department of Mathematics and the Computation and Biology Group in CSAIL at MIT.

Andrew Cotter’s research interest is in machine learning. He is currently employed at Google Research, Mountain View.

TTIC has two more students working on their theses and expects more graduates in the next year.

Students Heejin Choi, Somaye Hashemifar, Jianzhu Ma, Siqi Sun, Behnam Tavakoli Neyshabur and Jian Yao successfully completed all requirements to complete the Master’s portion of the Ph.D. Program, and will receive masters’ diplomas from the Institute.


Jianzhu Ma, Jian Peng, Sheng Wang, Jinbo Xu, "Estimating the Partition Function of Graphical..."
Models Using Langevin Importance Sampling”, accepted by AI & statistics 2013

**Jianzhu Ma**, Sheng Wang, Jinbo Xu, "MRFalign: Protein Homology Detection through Alignment of Markov Random Fields” accepted by RECOMB 2014, also accepted as a poster of the 2nd Zing Conference on Protein and RNA Structure Prediction.

**Jianzhu Ma**, Sheng Wang, Jinbo Xu, "Protein Threading Using Context-Specific Alignment Potential", accepted by ISMB 2013


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**FINANCIAL SUPPORT**

Full financial support is offered to all enrolled students in good standing. The tuition for an academic year is $30,000 and all students at TTIC may expect to receive financial support that covers tuition, health services, and a scholarship to assist with living expenses, provided they remain full-time and in good academic standing.
In the fall of 2004, TTIC matriculated its first three students. Nine years later, we began the 2012-13 academic year with twenty-two students. TTIC matriculated eight students who began in the fall. This is a 36% increase in the size of the student body, an exciting number. The Institute plans to enroll five more students for the 2013-14 year.

As a result of moving to a larger new facility in the winter of 2009, TTIC can accommodate this large growth in student numbers, and with a larger number of students graduating, more students may be accepted as well.

![Bar chart showing student body growth]

This year TTIC welcomed two exchange students from the Toyota Technological Institute (TTI) located in Nagoya, Japan. Masatoshi Kimura and Shuya Sugimura arrived in September 2012, took TTIC and University of Chicago courses, and returned to TTI in late December.

TTIC remains pleased with the exchange program with TTI, as the experience continues to be a positive success for all involved. It has been determined that one TTI student is scheduled to enroll at TTIC for autumn quarter 2013.
NEAR-TERM GOALS

TTIC is operating under a hub and spoke model with the hub areas being “fundamental” and the spoke areas being “applied.” We currently have two hub areas: theoretical computer science and machine learning. The current application areas (spoke areas) are computational biology, computer vision, speech processing and natural language processing. At present, we have only one permanent faculty member, Nati Srebro, engaged in fundamental machine learning as his primary research area. We have no permanent faculty in the area of natural language processing. The primary hiring objective for 2013/14 is to hire permanent faculty members in machine learning and natural language processing.

Senior faculty hiring remains a near-term goal and, as always, presents challenges. Our endowment situation continues to be an issue for senior hires. However, we will continue to pursue various senior candidates in our hub and spoke areas.

Another near-term goal is to continue to maintain an appropriate level of grant funding per faculty member. Long-term budgets assume approximately $250,000 in grant income per faculty per year. In 2012/13 the total dollar value of new grants awarded was over $400,000 per faculty member.

As always, TTIC will pursue research excellence, as witnessed by our publication record and academic awards.

LONG-TERM GOALS

The Institute’s mission is, “To achieve international impact through world-class research and education in fundamental computer science and information technology.” As with any academic department or institution, the primary method of achieving this mission is to hire faculty who themselves have international impact. Long-term plans call for growing to 12-16 permanent faculty (tenured and tenure-track) with a total faculty of 30 (including research assistant professor positions).

TTIC plans to continue the hub and spoke model with the spokes being application areas of the fundamental hub areas. In the long-term, TTIC has the goal of adding more application areas. Which areas are added depends to some extent on the areas in which TTIC is able to hire strong faculty members. Possible additional application areas include Robotics, Electronic Commerce and Computer Security.
INVESTMENT PROGRESS

Financial stability and independent oversight of the Institute’s endowment and investments is TTIC’s utmost priority. TTIC’s management team has been working in cooperation with Toyota Motor Corporation (TMC) and TTI (in Japan) to negotiate a path forward, resulting in the following scenarios:

- TMC removal of the endowment restrictions and approval of Institute investment with the University of Chicago, Office of Investment’s Total Return Investment Pool (TRIP.)
- Additional substantial infusion of funding to TTIC, maintaining the current investment restrictions of the endowment.

The TTIC management team anticipates resolving the matter in early 2014.

GROWTH OF THE BOARD

TTIC is pleased to have concluded the search for the new Institute President, and is looking forward to Dr. Furui’s leadership.

In October 2012, Ms. Alexis Herman agreed to serve as a board member. Ms. Herman served as the 23rd U.S. Secretary of Labor, serving under President Bill Clinton. Prior to her appointment, she was Assistant to the President and Director of the White House Office of Public Engagement. She founded her own consulting firm, A.M. Herman & Associates while remaining active in Democratic politics, serving as Vice Chair for the Democratic National Committee and organized the 1992 Democratic National Convention. She still serves as co-chairperson of the Democratic National Committee’s Rules and Bylaws Committee. She serves on the boards of several major companies, including The Coca-Cola Company’s Human Resources Task Force, Toyota’s Diversity Advisory Board, Cummins, MGM Resorts International, Entergy, and Prudential and is the chairman and CEO of New Ventures, Inc.

When Dr. Furui became acting president, former Interim President Dr. Stuart Rice agreed to remain a member of the Board. Dr. Neal Lane, who served on the Board from September 2008, stepped down in April of 2013. Their service to the Institute has been extraordinary.

The complexion of the Board of Trustees will change once again this coming fall 2013, as several new members will be added, and two long-time members, founding Chairman Tatsuro Toyoda, and founding President (now President Emeritus) Mitsuru Nagasawa, have indicated that they will be retiring. Both gentlemen committed amazing service to the Institute, and will be recognized at TTIC’s 10 year anniversary event next autumn.
TTIC maintains a steady number of interns and visiting scholars who engage in study and research on the premises. There were eighteen visiting scholars from other institutions in the US and abroad who will came to the Institute to work with TTIC faculty. These short term scholars bring interest, energy, and enthusiasm to our academic community, and allow TTIC students access to a broad range of specialties that outside researchers bring with them, along with ideas and culture that the visitors bring from their home institutions.

### Interns and Visiting Scholars

<table>
<thead>
<tr>
<th>Visitor</th>
<th>Home Institution</th>
<th>TTIC Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aayush Bansal</td>
<td>Carnegie Mellon University</td>
<td>Devi Parikh</td>
</tr>
<tr>
<td>Hadas Ben Esti</td>
<td>Technion</td>
<td>Karen Livescu</td>
</tr>
<tr>
<td>Kan Chen</td>
<td>Tsinghua University</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Liang-Chieh Chen</td>
<td>University of California, Los Angeles</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Soham De</td>
<td>Jadavpur University</td>
<td>Karen Livescu</td>
</tr>
<tr>
<td>Aline Ene</td>
<td>University of Illinois at Urbana-Champaign</td>
<td>Julia Chuzhoy</td>
</tr>
<tr>
<td>Victoria Evelkin</td>
<td>Technion</td>
<td>Karen Livescu</td>
</tr>
<tr>
<td>Dimitri Hanukaev</td>
<td>Hebrew University</td>
<td>Greg Shakhnarovich</td>
</tr>
<tr>
<td>Philip Lenz</td>
<td>Karlsruhe Institute of Technology</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Anand Louis</td>
<td>Georgia Institute of Technology</td>
<td>Madhur Tulsiani</td>
</tr>
<tr>
<td>Roozbeh Mottaghi</td>
<td>University of California, Los Angeles</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Masataka Ono</td>
<td>Toyota Technological Institute</td>
<td>David McAllester</td>
</tr>
<tr>
<td>Zhile Ren</td>
<td>Zhejiang University</td>
<td>Greg Shakhnarovich</td>
</tr>
<tr>
<td>Sushant Sachdeva</td>
<td>Princeton University</td>
<td>Yury Makarychev</td>
</tr>
<tr>
<td>Alexander Schwing</td>
<td>ETH Zurich</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Catherine Wah</td>
<td>University of California, San Diego</td>
<td>Subhransu Maji</td>
</tr>
<tr>
<td>Jiuling Wang</td>
<td>Zhejiang University</td>
<td>Devi Parikh</td>
</tr>
<tr>
<td>Hongyi Zhang</td>
<td>Peking University</td>
<td>Raquel Urtasun</td>
</tr>
<tr>
<td>Jian Zhang</td>
<td>Tsinghua University</td>
<td>Raquel Urtasun</td>
</tr>
</tbody>
</table>
Toyota Technological Institute at Chicago  
Statements of Financial Position  
As of June 30, 2013 and 2012

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>$ 6,774,369</td>
<td>$ 5,687,619</td>
</tr>
<tr>
<td>Grants receivable</td>
<td>183,116</td>
<td>136,744</td>
</tr>
<tr>
<td>Due from TTI</td>
<td>3,667</td>
<td>-</td>
</tr>
<tr>
<td>Prepaid expenses and other current assets</td>
<td>30,903</td>
<td>31,926</td>
</tr>
<tr>
<td>Interest receivable</td>
<td>714,361</td>
<td>803,778</td>
</tr>
<tr>
<td>Furniture and equipment, net</td>
<td>766,127</td>
<td>885,379</td>
</tr>
<tr>
<td>Investments</td>
<td>108,561,906</td>
<td>110,047,389</td>
</tr>
<tr>
<td>Contributions receivable from TMC, net</td>
<td>-</td>
<td>5,950,226</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td>$ 117,034,449</td>
<td>$ 123,543,061</td>
</tr>
</tbody>
</table>

| **Liabilities and Net assets** |            |            |
| Liabilities            |            |            |
| Accounts payable       | $ 66,955   | $ 191,277  |
| Due to TTI             | 16,694     | -          |
| Accrued expenses       | 149,208    | 182,913    |
| Deferred revenue       | 198,004    | 193,004    |
| Accrued lease liability | 310,436    | 260,915    |
| **Total liabilities**  | 741,297    | 828,109    |

| Net assets             |            |            |
| Unrestricted           | 7,892,492  | 11,192,983 |
| Temporarily restricted | 1,006,288  | 1,040,247  |
| Permanently restricted | 107,394,372 | 110,481,722 |
| **Total net assets**   | 116,293,152 | 122,714,952 |

<p>| <strong>Total liabilities and net assets</strong> | $ 117,034,449 | $ 123,543,061 |</p>
<table>
<thead>
<tr>
<th>Unrestricted</th>
<th>Temporarily Restricted</th>
<th>Permanent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temporarily Permanently</strong></td>
<td><strong>Unrestricted</strong></td>
<td><strong>Restricted</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>Revenues and gains</td>
<td>Contribution (-$)</td>
<td>Tuition and fees (660,000)</td>
<td>Grants (898,787)</td>
</tr>
<tr>
<td>Expenses and losses</td>
<td>Education and research (5,529,936)</td>
<td>Management and general (1,425,930)</td>
<td>Total expenses (6,955,866)</td>
</tr>
<tr>
<td>Realized and unrealized gains</td>
<td>Change in net assets (-3,300,491)</td>
<td>Total revenues and gains (4,260,483)</td>
<td>Total expenses and losses (6,971,134)</td>
</tr>
<tr>
<td>Net assets</td>
<td>Beginning of year (11,192,983)</td>
<td>End of year (7,892,492)</td>
<td>Beginning of year (11,192,983)</td>
</tr>
</tbody>
</table>
GOVERNANCE

Board of Trustees

**Tatsuro Toyoda**  
*Chairman of the Board of Trustees*

Senior Advisor, Toyota Motor Corporation  
Former President and Vice Chairman, Toyota Motor Corporation  
Former Chairman, Japan Automobile Manufacturers Association  
Former President, NUMMI

**Mitsuru Nagasawa**  
*Founding President, Toyota Technological Institute at Chicago; President Emeritus, TTI and TTIC*

Postdoctoral Research Associate, University of Chicago, 1959-1961 (Fulbright Program)  
President Emeritus, Toyota Technological Institute, Nagoya Japan  
Professor Emeritus & Former Dean of Faculty of Engineering, Nagoya University

**Robert Barnett**  
*Partner, Williams & Connolly LLP*

Ranked Number One, Washingtonian Magazine’s list of “Washington’s Best Lawyers.”  
Executive Committee Member, Williams & Connelly LLP  
Senior Counsel, Board of Trustees of the John F. Kennedy Center for the Performing Arts. (President-appointed member.)

**Rita Colwell**  
*Chairman, Canon US Life Sciences, Inc. Distinguished Professor, University of Maryland College Park and Johns Hopkins University*

11th Director of the National Science Foundation, 1998-2004  
Author or co-authored 16 books and more than 700 scientific publications  
A geological site in Antarctica, Colwell Massif, has been named in recognition of her work in the Polar Regions

**Sharon Darling**  
*President & Founder, National Center for Family Literacy*

Frequent keynote speaker to the Business Week Fortune 500 Forum and the National Governors Association  
Recipient of the 2002 National Humanities Medal awarded by President and Mrs. George W. Bush, and the Albert Schweitzer Prize for Humanitarianism from Johns Hopkins University  
Serves on the boards of: the Barbara Bush Foundation for Family Literacy, the National Fund for Excellence in American Indian Education, Corporation for Public Broadcasting’s Ready to Learn, and the Heart of America Foundation

**Robert A. Fefferman**  
*Dean and Max Mason Distinguished Service Professor, Division of the Physical Sciences, University of Chicago*

Former Chairman, Department of Mathematics, University of Chicago  
Recipient, Quantrell Award for Excellence in Undergraduate Teaching, University of Chicago Sloan Foundation Fellow

**Sadaoki Furui** (from April 2013)  
*President, Toyota Technological Institute at Chicago*

Professor Emeritus, Tokyo Institute of Technology  
Professor, Academy for Global Leadership, Tokyo Institute of Technology  
Former Director of University Library, Tokyo Institute of Technology  
Former Dean of Graduate School of Information Science and Engineering, Tokyo Institute of Technology  
Former Director of Furui Research Laboratory, NTT Human Interface Laboratories, Japan  
Former Director of Speech and Acoustics Laboratory, NTT Human Interface Laboratories, Japan
Alexis Herman  
*Chair and Chief Executive Officer, New Ventures, LLC*

Appointed by President Jimmy Carter, became the youngest director of the Women's Bureau in the history of the Labor Department.  
U.S. 23rd Secretary of Labor, first African American to lead the U.S. Department of Labor.  
Former member of the National Economic Council.  
Serves on the boards of: Cummins Inc., Entergy Inc., MGM Mirage, Coca-Cola Company  
Former chairwoman of the Coca-Cola Company’s Human Resources Task Force  
Board member of the Clinton Bush Haiti Fund

Masanori Kashiwara  
*Senior Managing Director, Toyota Technological Institute*

Member of the Board of Directors, Toyota School Foundation  
Former Chief Administrative Officer, Toyota Technological Institute  
Former Vice President, Toyota Motor North America, Inc.  
Former Secretary and Treasurer, Toyota Motor Corporate Services of North America, Inc.

Neal Lane  
*Malcolm Gillis University Professor, Rice University*

Senior Fellow of the James A. Baker III Institute for Public Policy  
Served as Assistant to the President for Science and Technology and Director of the White House Office of Science and Technology Policy, from August 1998 to January 2001  
Chancellor of the University of Colorado at Colorado Springs, 1984-86

David W. Oxtoby  
*President, Pomona College*

Former Dean, Division of Physical Sciences, University of Chicago  
Former member, Argonne National Laboratory, Board of Governors Trustee, Bryn Mawr College  
John Simon Guggenheim Foundation Fellow

Stuart Rice  
*Honorary Interim President, Toyota Technological Institute at Chicago*

*University of Chicago faculty member, 1957–present*

Awarded the National Medal of Science, 1999  
Former Director, James Franck Institute, 1961-1967; Chairman, Department of Chemistry, 1971-1976; Dean, Physical Sciences Division, 1981-1995, University of Chicago  
Fellow of the National Academy of Sciences, the American Academy of Arts and Sciences, the Royal Danish Academy of Sciences, and the Royal Irish Academy of Sciences  
Academies Fellow of the American Philosophical Society  
Mentored over 100 doctoral students throughout his career  
Recipient of the 2011 Wolf Prize in chemistry

Hiroyuki Sakaki  
*President, Toyota Technological Institute*

Appointed as an associate professor in 1973 at the Institute of Industrial Science, University of Tokyo, promoted to full professor in 1987, and engaged in R&D and education in the area of semi-conductor electronics.  
Professor emeritus in 2007  
Vice President of Toyota Technological Institute (Japan) in 2007 and promoted to President in 2010  
Awarded the National Recognition as a Person of Cultural Merit, Japan Academy Award, Leo Esaki Award, Heinrich Welker Award, Medal of Purple Ribbon from the Emperor of Japan, IEEE David Sarnoff Award, Fujiwara Prize, Japan IBM Science Award, and the Hattori-Hoko Award

Toshiaki Taguchi  
*Advisor, Toyota Motor Corporation*

Former President & CEO, Toyota Motor North America, Inc.  
Former Executive Vice President, Toyota Motor Corporation  
Former Board of Directors of Japan Society, the Japanese Chamber of Commerce and Industry of New York and The Nippon Club

Masatami Takimoto  
*CEO, Toyota Central R&D Labs., INC.*

Chairman of the Board of Directors & the Board of Trustees, Toyota School Foundation  
Former Executive Vice President and Director, Toyota Motor Corporation
**Leadership**

Dr. Sadaoki Furui, President (from April 2013)
Dr. Stuart Rice, Interim President (until April 2013)
Mr. Masashi Hisamoto, Treasurer/Secretary to the Board
Dr. David McAllester, Chief Academic Officer
Mr. Gary Hamburg, Chief Administrator

**Administration**

Adam Bohlander, Director of Information Technology
Liv Leader, Director of Human Resources and International Affairs
Chrissy M. Novak, Administrative Director of Graduate Studies, Publications
Anna Ruffolo, Controller
Dawn Ellis, Administrative Coordinator and Bookkeeper

**Equal Opportunity Statement**

TTIC, in admissions, employment and access to programs, considers all faculty, staff and students on the basis of individual merit and without regard to race, color, religion, sex, sexual orientation, national or ethnic origin, age, disability, or any other legally protected status.

**SPECIAL THANKS**

The Toyota Technological Institute at Chicago would like to extend a heartfelt thank you to the many people, organizations and efforts that assisted us through 2012-13, and continue to lend us their assistance, support and services. We appreciate it very much. Special thanks to:

**The External Advisory Committee**
Eric Grimson, Dept. Head of Electrical Engineering and Computer Science, MIT
Takeo Kanade, Director of Robotics, Carnegie Mellon University
Richard Karp, Research Scientist, International Computer Science Institute, University of California, Berkeley
Eva Tardos, Computer Science Department, Cornell University

Dr. Robert Appleson and Dr. Sunil Ahuja of the Higher Learning Commission
The Toyota Central R & D Labs, Inc.
The Toyota Technological Institute (Nagoya, Japan)

**The University of Chicago greater community**
Administration at the Division of Physical Sciences
Computation Institute
Department of Computer Science
Department of Mathematics
Department of Statistics
International House
Office of the Bursar
Physical Science Division-Local Business Center
PSD Graphic Arts
Registrar’s Office
Staff of the Regenstein and Eckhart Libraries
University Research Administration
University IT Services
The professionals at the 6045 S. Kenwood Avenue building