

## RESEARCH INTERESTS

I am broadly interested in systems that extend data analysis capabilities to non-expert users. Relevant fields include data mangament and optimization, data provenance, and interface design.

## EDUCATION

- Expected 2014 **Massachusetts Institute of Technology**, Cambridge, MA  
Ph.D., Electrical Engineering and Computer Science  
Advisor: Samuel Madden  
Dissertation: Implementation and Applications of High Performance Provenance Systems for Data Analysis
- May 2012 **Massachusetts Institute of Technology**, Cambridge, MA  
M.S., Electrical Engineering and Computer Science  
Advisor: Samuel Madden  
Dissertation: Shinobi: Insert-aware Partitioning and Indexing Techniques For Skewed Database Workloads
- Spring 2007 **UC Berkeley**, Berkeley, CA  
B.S., Electrical Engineering and Computer Science

## PROFESSIONAL EXPERIENCE

- 2007–2012 **Massachusetts Institute of Technology**, Cambridge, MA  
*Ph.D. Student – CSAIL*

### *MIT Big Data Challenge*

Designed and ran MIT's largest Big Data prediction and visualization challenge.

### *"Why" Queries on Aggregate Queries*

Designed and implemented an analysis framework to explain outliers in the results aggregation queries by constructing predicates on the input data. I formalized the concept of predicate influence and identified several operator properties to enable higher performance on common statistical aggregates.

### *Efficient, Low Overhead Provenance*

Designed, prototyped, and evaluated a low overhead provenance system for large-scale scientific workflow applications that process gigabytes of data per second.

### *Query Processing with Humans*

This project pioneered the use of human computation platforms such as Mechanical Turk within a database query execution engine.

### *Index and Partitioning Techniques*

I investigated the application of indexing and partitioning techniques for time-varying and skewed query workloads. Shinobi incrementally re-partitions and indexes database tables based on recent query access patterns. Our no-bits paper proposed the use of unused space in B-tree index pages as a cache for heavily accessed tuples. This could improve the performance skewed query workloads by up to three orders of magnitude.

#### *Trajectory Optimized Storage*

Implemented core storage system for TrajStore, a high performance data management system for storing and querying vehicle trajectory data by location and time. The system incrementally optimizes the storage layout as the query workload changes over time.

#### 2007-2008 **Google Inc., Mountain View, CA**

##### *Intern – Data Management Research*

I worked in Alon Halevy's data management group on the WebTables project to mine the Google web corpus for tabular data. I developed the table extraction pipeline and extracted more than 125 million tables. In addition, I built a table search engine that allows users to query over the structured data and automatically visualizes attributes in graphs or maps.

#### Summer 2005 **Microsoft., Redmond, WA**

##### *Engineering Intern*

Worked on internals of Exchange Server

#### Spring 2005 **IBM Extreme Blue., Almaden, CA**

##### *Engineering Intern*

Developed a new software patch service for DB2 for z/OS team that reduced patch application times from the order of months to a few minutes.

#### 2004–2006 **UC Berkeley, Berkeley, CA**

##### *Undergraduate Researcher – Computer Science Department*

##### *High Performance Stream Processing*

Designed and implemented one of the first high performance complex event processing systems for detecting high level events (e.g., shoplifting occurred) from streams of raw sensor events (e.g., RFID tag XXX detected). Results were published at SIGMOD, the premier database conference.

##### *The HiFi Project*

Implemented the RFID reader interface for extracting raw events from early RFID readers and the interactive dashboard for the VLDB demonstration. HiFi is a research project around cascading stream architectures for large-scale receptor-based networks.

## TEACHING EXPERIENCE

#### Fall 2013 *Instructor, Big Data Systems (MIT 6.885)*

Co-developed and instructed MIT's first course focused on large scale data analysis tools and techniques. Topics ranged from data cleaning and integration, large-scale systems like Hadoop, to scalable visualization techniques. Developed eight labs to give students hands-on experience with the systems covered in class. The course is online at <http://github.com/mitdbg/asciiclass>

#### Spring 2012 *Instructor, Introduction to Data Analysis*

Co-developed and taught an Introduction to Data Analysis course to approximately 20 students during MIT's Independent Activities Period in January. The course is online at [dataiap.github.io](http://dataiap.github.io)

- 2011 – 2012    *Head of Curriculum, MEET*  
 MEET is a 3-year technology program and peace initiative that teaches Israeli and Palestinian high school students. I organized curriculum preparation for each year's incoming instructors. I also successfully migrated the organization from a Java-based curriculum to a Python-oriented one and developed the lesson plans for the transition.
- Fall 2010    *TA, Database Systems (MIT 6.830)*  
 Assisted in writing and grading the assignments and projects.
- Summer 2010    *Instructor, MEET*  
 Mentored a group of 30 Israeli and Palestinian high school students as part of the MIT MEET program, a peace initiative in the Middle East centered around teaching computer science.
- Spring 2010, 2011    *Instructor, Introduction to Java Course (MIT 6.S092)*  
 Instructed a class of 50 students in an introduction to the Java programming language. This course is taken by MIT undergraduates to prepare them for 6.004, a core course that assumes proficiency in Java.
- Fall 2006    *TA, Database Systems (UCB CS186)*  
 Taught approximately 30 students in weekly discussion sections. Assisted in writing and grading the assignments and projects.

## LEADERSHIP EXPERIENCE

- 2013    Organizer for the Pre and Post-doctorate Tea  
 2010    Head of the CSAIL Student Committee

## PERSONAL

I love drawing and designing T-shirts and posters. I have created over 20 designs that have been printed and my shirts have been worn by thousands of people. The following link lists some of my designs. [www.mit.edu/~eugenewu/gallery.html](http://www.mit.edu/~eugenewu/gallery.html)

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# References

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