

BILAL A. SHAW

Communication Sciences Institute
Department of Electrical Engineering
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EDUCATION

University of Southern California Doctor of Philosophy in Computer Science, August 2010 Supervisor: Professor Todd A. Brun	Los Angeles, CA
University of Southern California Master of Science, Computer Science, May 2004 Supervisor: Professor Leonard M. Adleman	Los Angeles, CA
University of Southern California Bachelor of Science, Computer Science, May 2002 Supervisor: Professor Leonard M. Adleman	Los Angeles, CA
Whittier College Bachelor of Arts, Mathematics, May 2002	Whittier, CA

RESEARCH INTERESTS

- Quantum Computing
- Quantum Computational Complexity
- Quantum Shannon Theory
- Optimization/Combinatorics
- High Performance Computing
- Software Engineering
- Scientific Computing
- Algorithms

PROGRAMMING LANGUAGES

- C++
- JAVA
- Python
- Maple
- Matlab

RESEARCH EXPERIENCE

- Research Assistant** 2004 - 2010
Computer Science Department
University of Southern California Los Angeles
Supervisor: Professor Todd A. Brun
- Enhanced Dr. Todd Brun and Dr. Ruediger Schack's C++ library to simulate quantum information theoretic protocols and quantum error-correcting codes. Developed, and tested several thousand lines of code.
 - Wrote scripts in Maple for linear optimization and process tomography
 - Quantum steganography
 - Fault-tolerant quantum computing
- Research Assistant** 2000 - 2004
Computer Science Department
University of Southern California Los Angeles
Supervisor: Professor Leonard M. Adleman
- Built nanoscale biological components via self-assembly of DNA.
 - Visualized and characterized DNA nanocrystals via atomic force microscopy.
 - Developed the lab's website.
 - Studied and researched theoretical self-assembly.
 - Worked on developing ultra-sensitive molecule detection systems.
 - Wrote a paper entitled, "A Resource Aware Software Architecture Featuring Device Synchronization and Fault-Tolerance." The project was developed and tested in JAVA on a Compaq PDA for an embedded systems course. Wrote several thousand lines of JAVA code.
- Summer Student** 2002
Computing Beyond Silicon Summer School
California Institute of Technology Pasadena, CA
- Studied unconventional models of computing. Completed a project on algorithmic self-assembly of electrical circuits and published a paper that appeared in a Caltech report.
- Website Designer** 1999
Mathematics Department
Whittier College Whittier, CA

Research Assistant

Physics Department

Whittier College

Supervisor: Dr. Howard Lukefahr

1998

Whittier, CA

- Research assistant in NMR lab in the physics department.
- Designed and tested programs using LabView GPIB programming.

TEACHING EXPERIENCE

Teaching Assistant

Computer Science Department

University of Southern California

2001 – 2009

Los Angeles

- Engineering peer tutoring program: Tutored engineering students in calculus I, II, III, differential equations, linear algebra, physics, and C++, Spring 2001.
- Web Technologies, CS 351, Summer 2001 (Dr. Hadi Moradi).
- Freshman level C, CS 101, Fall 2005 (Massoud Ghyam-Khah).
- Discrete mathematics, CS 271, Spring 2006 (Dr. David Wilczynski).
- Web technologies, CS 571, Summer 2006 (Dr. Michael Crowley).
- Discrete mathematics, CS 271, Fall 2006 (Dr. David Wilczynski).
- Discrete mathematics, CS 271, Spring 2007 (Dr. Ming-deh Huang).
- Web technologies, CS 571, Summer 2007 (Dr. Michael Crowley).
- Discrete mathematics, CS 271, Fall 2007 (Dr. David Wilczynski).
- Discrete mathematics, CS 271, Spring 2008 (Dr. David Wilczynski).
- Design and analysis of algorithms, CS 303, Spring 2009 (Dr. Leonard Adleman).
 - Gave a lecture on quantum teleportation and quantum super-dense coding.
- Web technologies, CS 351, Fall 2009 (Dr. Michael Crowley).
 - Gave a lecture on the current state of quantum computing.
- Web technologies, CS 351, Spring 2010 (Dr. Michael Crowley).

Teaching Assistant

Whittier College

1997 – 1999

Whittier, CA

- Mathematics tutor and grader for calculus I and II.
- Tutored an autistic student in pre-calculus.
- Tutored/helped students with papers at the writing center.

AWARDS & HONORS

- Best student presentation/paper in quantum information theory (theory track). American Physical Society, March Meeting, New Orleans, 2008.
- Upsilon Pi Epsilon computer science honor society, USC, 2001.
- Fredericka Gordon scholarship, USC, 2000.
- W. V. T. Rusch undergraduate honors program, USC, 2000.

- Presidential scholarship, USC, 2000 – 2002.
- John Greenleaf Whittier scholarship, Whittier College, 1997 – 1999.
- Sigma Pi Sigma physics honor society, Whittier College, 1998.
- Dean’s list, Whittier College, 1997 – 1999.

ACTIVITIES

- Yoga
- Poetry
- Charcoal sketching
- Music
- Hiking
- Ultimate frisbee

CONFERENCES & PRESENTATIONS

Centre for Quantum Technologies, Singapore, July 2010

Gave a talk entitled, “Quantum Steganography.”

Crash Space, Culver City, California, May 2010

Gave a talk entitled, “What the Heck is a Quantum Computer?”

Perimeter Institute, Waterloo, Canada, Summer 2008

Invited to give a talk on how to encode one logical qubit into six physical qubits.

American Physical Society’s March Meeting, New Orleans, LA, Spring 2008

Gave a talk on my paper entitled, “Encoding One Logical Qubit Into Six Physical Qubits.” It won the best student paper/presentation award.

First International Conference on Quantum Error-Correction, USC, CA, Fall 2007

Presented a poster entitled, “Encoding One Logical Qubit Into Six Physical Qubits.”

Southwest Quantum Information Technology Workshop, USC, CA, Summer 2005

Organized SQUINT – 2005 with my advisor Dr. Todd A. Brun.

Computing Beyond Silicon Summer School, Caltech, Pasadena, CA, Summer 2004

Organized CBSSS-2004. I was the student coordinator for the summer school. My work included getting in touch with researchers, organizing lecture notes, the schedules, and interacting and brainstorming with students on various projects.

PUBLICATIONS

- Shaw, Bilal A. **Quantum Steganography and Quantum Error-Correction.** <http://arxiv.org/abs/1008.0425>, 2010.
- Shaw, Bilal A., Brun, Todd A. **Quantum Steganography.** <http://arxiv.org/abs/1006.1934>, 2010.
- Shaw, Bilal A., Brun, Todd A. **Hiding Quantum Information in the Perfect Code.** <http://arxiv.org/abs/1007.0793>, 2010.
- Shaw, Bilal A., Brun, Todd A. **Simulating Fault-Tolerant Universal Quantum Gates.** (In preparation)
- Shaw, Bilal A. **A Recipe for Constructing Entanglement-Assisted Codes from Classical Linear Codes.** USC technical report.
- Shaw, Bilal A., Wilde, Mark M., Oreshkov, O., Kremsky, I., Lidar, D. **Encoding One Logical Qubit Into Six Physical Qubits.** *Physical Review A*, 78, 2008.
- Reishus, D., Shaw, B., Brun, Y., Chelyapov, N., Adleman, L. **Self-Assembly of DNA Double-Double Crossover Complexes into High Density, Doubly-Connected, Planar Structures.** *Journal of American Chemical Society*, 2005.
- Chelyapov, N., Brun, Y., Gopalkrishnan, M., Reishus, D., Shaw, B., Adleman, L. **DNA Triangles and Self-Assembled Hexagonal Tilings.** *Journal of American Chemical Society*, 2004.
- Brun, Y., Gopalkrishnan, M., Reishus, D., Shaw, B., Chelyapov, N., Adleman, L. **Building Blocks for DNA Self-Assembly.** In *FNANO 2004, Foundations of Nanoscience: Self-Assembled Architectures and Devices*, (Snowbird UT), April 21-23, 2004.
- Mattmann, C., Shaw, B. **A Resource Aware Software Architecture Featuring Device Synchronization and Fault Tolerance.** In *Proceedings of the 2nd LADIS International Conference on WWW/Internet, Algarve, Portugal, November 5-8, 2003*.
- deLorimier, M., Mathy, A., Reishus, D., Schmidt, R., Shaw, B., Wong, L. C. **Algorithmic Self-Assembly of Circuits.** In *CBSSS-2002 final report, California Institute of Technology*.

REFERENCES

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Institute for Quantum Information
California Institute of Technology
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