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 665 Commonwealth Ave.
 Boston, MA 02215

RESEARCH INTERESTS

Pattern Formation, Coherent Structures, Dynamical Systems, PDE, Mathematical Modeling

EDUCATION

- Ph.D. Mathematics** *June 2016*
 College of Science and Engineering, University of Minnesota-Twin Cities, Minneapolis, MN
 Thesis: Pattern formation in the wake of external mechanisms
 Advisor: Arnd Scheel
- M.Sc. Mathematics** *January 2014*
 College of Science and Engineering, University of Minnesota-Twin Cities, Minneapolis, MN
- B.S. Mathematics & B.A. Physics with High Honors** *May 2011*
 College of Natural Science, Michigan State University, East Lansing, MI

EMPLOYMENT

- Assistant Professor** *2019-Present*
 Boston University, Department of Mathematics and Statistics,
 ○ MA 561 - Methods in Applied Mathematics I *Fall '24*
 ○ MA 775 - Ordinary Differential Equations *Fall '23*
 ○ MA 573 - Qualitative theory of ODEs *Fall '22*
 ○ MA 776 - Partial Differential Equations *Spring '22*
 ○ MA226 - Differential Equations *Spring '24, Fall '23, Fall '21, Spring '20*
 ○ MA124 - Calculus II *Fall '21*
 ○ MA876 - Topics in PDE (“Mathematics of Pattern Formation”) *Spring '21*
 ○ MA771 - Introduction to Dynamical Systems *Fall '20*
 ○ MA573 - Qualitative theory of ODEs *Fall '19*
- NSF Postdoctoral Fellow** *2016 - 2019*
 Boston University, Department of Mathematics and Statistics,
 ○ MA226 - Differential Equations *Spring '19*
 ○ MA573 - Qualitative theory of ODEs *Fall '18*
 ○ MA124 - Calculus II *Spring '18*
 ○ MA775 - Ordinary Differential Equations *Fall '17*
- UMN Doctoral Dissertation Fellow** *2015 - 2016*
 University of Minnesota, School of Mathematics,
- NSF Graduate Fellow** *2012 - 2015*
 University of Minnesota, School of Mathematics,
 Pattern Formation from a Dynamical Systems Viewpoint
- Graduate Teaching Assistant**
 University of Minnesota, School of Mathematics,
 ○ MATH 3592H - 3593H - Honors Mathematics I & II *2013 - 2015*
 ○ MATH 1271 - Calculus I *2011 - 2012*

GRANT FUNDING

- NSF Applied Math - Research Grant with two year REU supplement (DMS-2307650) *2023 - 2026*
- NSF Applied Math - Research Grant with two year REU supplement (DMS-2006887) *2020 - 2024*

HONORS, AWARDS, AND SCHOLARSHIPS

- Outstanding Reviewer Award, Nonlinearity *March 24, 2021*
- Trusted Reviewer, IOP publishing *September 24, 2020*
- Outstanding Reviewer Award, Nonlinearity *February 3, 2017*
- SIAM Student Chapter Certificate of Recognition, University of Minnesota *May 6, 2016*
- 2014-2015 Outstanding TA Award, School of Mathematics, University of Minnesota *April 7, 2016*
- NSF Postdoctoral Fellowship *January 2016*
- Red Sock Award for best poster, SIAM Conference on Application of Dynamical Systems *May 21, 2015*
- Doctoral Dissertation Fellowship, University of Minnesota *April 2015*
- SIAM Student Travel Award, Conference on Application of Dynamical Systems *May 17 - 21, 2015*
- AMS Student Travel Award, AMS Central Sectional Meeting *March 13 - 15, 2015*
- SIAM Student Travel Award, Conference on Nonlinear Waves and Coherent Structures *August 11 - 14, 2014*
- Charles and Dorothy Andrew Bird Award, Sigma Xi Society, UMN Chapter *May 2013*
- National Science Foundation Graduate Research Fellowship *April 2012*
- MSU College of Natural Science Dean's List *2007 - 2011*
- Mathematical Endowed Scholarship, MSU Dept. of Mathematics *May 2011*
- L.C. Plant Award, MSU Dept. of Mathematics *May 2010*
- Member of Honors College, MSU *2007 - 2011*
- Distinguished Freshman Scholarship, MSU *2007 - 2011*

JOURNAL PUBLICATIONS

- R. Goh, T. Kaper, T. Vo. **Delayed Hopf bifurcations in reaction-diffusion systems in two space dimensions**, submitted.
- S. Dodson, R. Goh, B. Sandstede. **Efficient numerical computation of spiral spectra with exponentially-weighted preconditioners**, submitted.
- S. Dunn, R. Goh, B. Krewson. **Transverse modulational dynamics of quenched patterns**, Chaos 34, 063104 2024.
- R. Goh, T. Kaper, A. Scheel, **Pitchfork bifurcation along a slow parameter ramp: coherent structures in the critical scaling**, Studies in Applied Mathematics, 153:e1270, 2024.
- R. Goh, A. Scheel **Growing patterns**, Nonlinearity, 36 R1, 2023.
- R. Goh, T. Kaper, A. Scheel, T. Vo. **Fronts in the wake of a parameter ramp: slow passage through pitchfork and fold bifurcations**, SIAM J. Appl. Dyn. Sys., 22 (3), 2023, 2312-2356.
- R. Goh, B. Hosek. **Oblique and Checkerboard Patterns in the Quenched Cahn–Hilliard Model**, J. Dyn. Diff. Eqn., 2023,1–27.
- R. Goh, C.E. Wayne, R. Welter. **Asymptotic approximation of a modified compressible Navier Stokes system**, Indiana Univ. Math. J. 72 No. 3 (2023), 1175–1237.
- R. Goh, T. J. Kaper, T. Vo. **Delayed Hopf bifurcation and space-time buffer curves in the Complex Ginzburg-Landau equation**, IMA Journal of Applied Mathematics, 87, (2022), 131-186.
- R. Goh, B. de Rijk. **Spectral stability of pattern-forming fronts in the complex Ginzburg-Landau equation with a quenching mechanism**, Nonlinearity 35 (1), 170 (2021).
- K. Chen, Z. Deiman, R. Goh, S. Jankovic, and A. Scheel. **Strain and defects in oblique stripe growth**, Multiscale Model. Simul., 19(3), (2021), 1236–1260.
- S. Chhabra, L. Liu, R. Goh, A. Warmflash, Aryeh **The timing of signaling events in the BMP, WNT, and Nodal cascade determines self-organized fate patterning in human gastruloids**, PLOS Biology 17(10): e3000498, (2021).
- M. Avery, R. Goh, O. Goodloe, A. Milewski, A. Scheel, **Growing stripes, with and without wrinkles**, SIAM J. Appl. Dyn. Sys., 18 (2019), 1078 – 1117.

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- R. Goh, C.E. Wayne. **Vortices in stably-stratified rapidly rotating Boussinesq convection**, Nonlinearity, 32, (2019), R1-R52.
 - R. Goh, A. Scheel. **Pattern-forming fronts in a Swift-Hohenberg equation with directional quenching - parallel and oblique stripes**, J. London Math. Soc, 98 (2018), 104-128.
 - Z. Wang, R. Goh, K. Bazargan, A. Scheel, N. Saraf. **Stochastic implementation and analysis of dynamical system similar to the logistic Map**, IEEE Transactions on Very Large Scale Integration Systems 99, (2016), 1-13..
 - R. Goh, R. Beekie, D. Matthias, J. Nunley, A. Scheel. **Universal wavenumber selection laws in apical growth**, Phys. Rev. E. 94, (2016), 022219.
 - R. Goh, A. Scheel. **Pattern formation in the wake of triggered pushed fronts**, Nonlinearity 29 (2016), 2196. (a 2016 highlighted paper)
 - R. Goh, A. Scheel. **Hopf bifurcation from fronts in the Cahn-Hilliard equation**, Arch. Ration. Mech. An. 3 (2015), 1219-1263.
 - R. Goh, A. Scheel. **Triggered fronts in the complex Ginzburg Landau equation**, J. of Nonlinear Science 24 (2014), 117-144.
 - R. Goh, S. Mesuro, A. Scheel. **Spatial wavenumber selection in recurrent precipitation**, SIAM J. Appl. Dyn. Sys. 10 (2011), 360-402.

BOOK CHAPTERS, MAGAZINE ARTICLES, AND REVIEWS

- D. Lloyd, R. Goh, J. Rademacher **Numerical Continuation and Bifurcation in Nonlinear PDEs: Stability, invasion and wavetrains in the Swift-Hohenberg**, chapter in "Handbook on Nonlinear Dynamics. Volume 2 Numerical Method", World Scientific, in preparation.
- R. Goh, **Quenched Stripes: Wavenumber Selection and Dynamics**, DSWeb online magazine, July 2021.
- R. Goh, S. Mesuro, A. Scheel. **Coherent structures in reaction-diffusion models for precipitation**, Special volume on "Precipitation patterns in reaction-diffusion systems", Research Signpost (2010), 73-93.

SPECIAL ISSUES AND BOOKS EDITED

- P. Carter, R. Goh, B. de Rijk, Q. Wu. **Special issue on advances in the mathematical study of pattern formation**, Discrete and Continuous and Dynamical Systems-S, 15(5) (2022).

TALKS AND POSTERS

- **Fronts and patterns with parameter ramps**,
 - (Invited talk) Nonlinear Waves and Coherent Structures Online Colloquium, November 2024
 - (Invited talk) Workshop on Multiple Scales: Theory and Applications, Lorentz Center, Leiden University, Netherlands, July 2024
- **Growing stripes and quasi-patterns**,
 - (Minisymposium talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Baltimore, ME, June 2024.
- **Growing patterns**,
 - (Seminar talk) Physical Mathematics Seminar, MIT, Oct 2024
 - (Seminar talk) Seminar, Ohio University, April 2024
 - (Seminar talk) PDE Seminar, Michigan State University, March 2024

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- **Fronts in the wake of a parameter ramp: slow passage through pitchfork and fold bifurcations,**
 - (Minisymposium talk) BU-KEIO Workshop, Boston, MA, May 2024
 - (Minisymposium talk) ICIAM, Tokyo, Japan, August, 2023
 - (Minisymposium talk) SIAM Conf. on Applications of Dynamical Systems, Portland, OR, May, 2023
 - (Minisymposium talk) AMS Southeast Sectional, Atlanta, GA, Mar 2023
 - (Minisymposium talk) JMM, Boston, MA, Jan 2023
 - **Stability and dynamics of quenched stripes,**
 - (Minisymposium talk) IMACS Nonlinear Evolution Equations and Wave Phenomena, Athens, GA, Mar, 2022.
 - (Seminar talk) Brown Univ. LCDS Seminar, Nov 2021.
 - **Quenched stripes: wavenumber selection and dynamics,**
 - (Workshop talk) Oberwolfach Workshop on Dynamics of Waves and Patterns, Aug 2021.
 - **Growing oblique stripes,**
 - (Minisymposium talk) SIAM Conf. on Applications of Dynamical Systems, May 2021
 - (Seminar talk) Univ. of Sydney Applied Math Seminar, May 2021.
 - (Seminar talk) Univ. of Tennessee, Knoxville PDE seminar, Feb 2021
 - (Seminar talk) BU Dynamics Seminar, Feb 2021.
 - **Dynamics and PDE applications of Matrix Riccati Equations,**
 - (Seminar talk) BU Dynamics Seminar, Sept 2020.
 - **Stability of growing stripes in the complex Ginzburg-Landau equation,**
 - (Minisymposium talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Bremen, Germany, Jul 2020 (canceled)
 - (Minisymposium talk) SIAM Conf. on Analysis of PDE, La Quinta, CA, Dec, 2019
 - (Minisymposium talk) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May, 2019

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- **Patterns in growing domains/Pattern formation in the wake of growth mechanisms,**
 - (Seminar Talk) Brandeis University Anytopic Seminar, Waltham, MA, Dec. 5th, 2019.
 - (Minisymposium talk) IMACS Nonlinear Evolution Equations and Wave Phenomena, Athens, GA, Apr. 19, 2019.
 - (Seminar Talk) Tufts University Dynamics Seminar, Boston, MA, Oct. 19th, 2018.
 - (Minisymposium talk) Conference on Mathematics of Wave Phenomena, Karlsruhe, Germany, Jul. 24, 2018.
 - (Minisymposium talk) SIAM Annual Meeting, Portland, OR, July 12, 2018.
 - (Seminar Talk) Brown University Dynamics seminar, Providence, RI, Feb. 26, 2018.
 - (Invited talk) SIAM central sectional meeting, Fort Collins, CO, Oct. 1, 2017.
 - (Seminar Talk) U. of Arizona Analysis seminar, Tuscon, AZ, Oct. 10, 2017.
 - (Seminar Talk) U. Mass. Boston Physics Colloquium, Boston, MA, Sept. 21, 2017.
 - (Seminar Talk) Knobloch Research Group, Berkeley, CA, Jul. 6, 2016.
 - **Vortices in rapidly rotating Boussinesq convection,**
 - (Seminar talk) Analysis and Modeling Oberseminar, Institut für Analysis, Dynamik und Modellierung, Stuttgart, Germany, July 2018.
 - (Poster) SIAM Conf. on Nonlinear Waves and Coherent Structures, Anaheim, CA, June, 2018.
 - (Minisymposium talk) SIAM Conf. on Analysis of PDE, Baltimore, MD, Dec., 2017.
 - (Seminar talk) MIT seminar on numerical methods for PDE , Cambridge, MA, Nov. 15, 2017.
 - **Oblique stripes in a triggered Swift-Hohenberg equation,**
 - (Seminar talk) BU-KEIO Workshop, Boston, MA, Jun 26 2017.
 - (Poster) FIDDS17-Llavest, Barcelona, Spain, Jun. 14, 2017.
 - (Mini-symposium talk) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May 24, 2017.
 - (Seminar talk) Knobloch Research Group, Berkeley, CA , May 18, 2017.
 - (Seminar talk) Analysis and Modeling Oberseminar, Institut für Analysis, Dynamik und Modellierung, Stuttgart, Germany, Apr. 3, 2017.
 - **Hopf bifurcation from fronts in the Cahn-Hilliard equation,**
 - (Invited Talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Philadelphia, Aug. 7-11, 2016.
 - (Invited Talk) SIAM Conf. on Analysis of PDE, Scottsdale, AZ, Dec. 7-10, 2015.
 - (Invited Talk) Applied Math Seminar, Michigan State Univ., East Lansing, MI, Dec. 4, 2015.
 - (Invited Talk) Special Session on Nonlinear waves, AMS central sectional meeting, East Lansing, MI, Mar. 14, 2015.
 - (Contributed Talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Cambridge, England, Aug. 12, 2014.
 - **Front-dynamics and pattern selection in the wake of triggered instabilities,**
 - (Poster) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May 19, 2015.
 - (Poster) KUMU Conf. in PDE, Dynamical Systems and Applications, Lawrence, KS, Apr. 18, 2015.

- **Pattern formation in the wake of external mechanisms,**
 - (Poster) BU Conf. on Analysis of Partial Differential Equations using Dynamical Systems Techniques, Boston, MA, Jun. 1-3, 2016.
 - (Poster) KUMU Conf. in PDE, Dynamical Systems and Applications, Columbia, MS, Apr. 23, 2016.
 - (Poster) UMN Doctoral Research Showcase, Minneapolis, MN, Apr. 6, 2016.
 - (Invited Talk) UMN School of Math Open House, Minneapolis, MN. Apr. 2, 2015.
 - (Seminar Talk) Junior Colloquium, Department of Mathematics, University of Minnesota, Nov. 11, 2015.
- **Front-dynamics and pattern selection in semi-bounded domains,** (Contributed Talk) SIAM Conf. on Analysis of PDE, Lake Buena Vista, Florida, Dec. 10, 2013.
- **Shear band formation in bulk metallic glasses,** IMA Workshop on Mathematical Modeling in Industry, Minneapolis, MN, Aug. 16, 2013.
- **Triggered fronts in the complex Ginzburg Landau equation,** (Poster) IMA Special Workshop on Interactions among Localized Patterns in Dissipative Systems, Minneapolis, MN, Jun. 4, 2013
- **Coherent triggered fronts in complex Ginzburg Landau,** (Poster) Sigma Xi Chapter meeting, Minneapolis, MN, May 5, 2013
- **Nature's art: pattern formation in the world around us,** Junior Colloquium, Department of Mathematics, University of Minnesota, Oct. 17, 2012.
- **Liesegang patterns: phase-field dynamics,** Summer Workshop on Analysis, Topology and Applications, Department of Mathematics, University of Wisconsin-Eau Claire, Jul. 10, 2009.

SERVICE

◦ Referee

DCDS, Nonlinearity, Physica D, SIAM J. Appl. Dyn. Sys., ZAMP, SIAM J. Math. Anal., J. of Chem. Phys., J. Math. Anal. and Appl., J. Dyn. and Diff. Eq., DCDS-S, J. of Diff. Eq., Adv. in Math. Fl. Mech., J. Euro. Math. Soc., Int. J. Bif. Ch., PDE and Applications, SciPostPhysicsCore, SIAM App. Math.

◦ BU Committees

Industrial career committee	<i>Summer 2024-Present</i>
Graduate studies committee	<i>Fall 2019-Present</i>
Stats hiring committee	<i>Fall 2021-Spring 2022</i>
Dynamics postdoc hiring committee	<i>Fall 2019-Spring 2020, Fall 2023 - Spring 2024</i>
Made recommendations for undergraduate applied math curriculum	<i>Fall 2019-Fall 2021</i>

◦ Conference/Workshop Organizer

Gene Golub SIAM Summer School on Multidimensional Pattern Formation, (Co-Organizer)	<i>August 2025</i>
SIAM Conf. App. of Dyn. Systems, (Conf. Co-Chair)	<i>May 2025</i>
BU-Keio-Tsinghua Workshop (Co-Organizer), Boston University	<i>May 2024</i>

◦ Seminar Organizer/Co-organizer

Freedman Memorial Colloquium Lecture, Boston University	<i>Fall 2023 - Present</i>
Department Colloquium, Boston University	<i>Fall 2024 - Present</i>
Dynamics Seminar, Boston University	<i>Fall 2017 - Present</i>
Brown-BU PDE seminar, Boston University	<i>Fall 2017 - Spring 2021</i>
School of Mathematics Junior Colloquium, University of Minnesota	<i>Fall 2012 - Spring 2014</i>

◦ Mini-symposium Organizer

SIAM Conf. on Nonlinear Waves and Coherent Structures	<i>June 2024</i>
Joint Mathematics Meetings	<i>January 2023</i>
SIAM Conf. on Applications of Dynamical Systems	<i>May 2021</i>
SIAM Conf. on Nonlinear Waves and Coherent Structures (Canceled)	<i>July 2020</i>
SIAM Annual Meeting	<i>July 2018</i>
SIAM Conf. on Nonlinear Waves and Coherent Structures	<i>June 2018</i>
SIAM Conf. on Applications of Dynamical Systems	<i>May 2017</i>

◦ **Doctoral Students**

Lauren Forbes (co-advised), Department of Mathematics and Statistics, Boston University	<i>Current</i>
Benjamin Krewson, Department of Mathematics and Statistics, Boston University	<i>Current</i>
Benjamin Hosek, Department of Mathematics and Statistics, Boston University	<i>Current</i>
Vanny Khon, Department of Mathematics and Statistics, Boston University	<i>Current</i>

◦ **Ph.D. committees served on**

Jialin Zhang, Reader, Department of Mathematics and Statistics, Boston University	<i>Spring 2024</i>
Hannah Pieper, Reader, Department of Mathematics and Statistics, Boston University	<i>Fall 2023</i>
Trevor Norton, Reader, Department of Mathematics and Statistics, Boston University	<i>Spring 2023</i>
Max Heldman, Committee member, Department of Mathematics and Statistics, Boston University	<i>Fall 2022</i>
Ioannis Gasteratos, Reader, Department of Mathematics and Statistics, Boston University	<i>Spring 2022</i>
Siemer, Lars, External Reader, Applied Mathematics, University of Bremen	<i>TBD</i>
Ma, Jingwei, Reader, Department of Mathematics and Statistics, Boston University	<i>Spring 2021</i>
Welter, Roland; Reader, Department of Mathematics and Statistics, Boston University	<i>Spring 2021</i>
Zhang, Ying; Reader, Department of Mathematics and Statistics, Boston University	<i>April 2020</i>
Parker, Ross; External Reader, Division of Applied Mathematics, Brown University	<i>December 2019</i>

◦ **BU Ph.D. preliminary write-up/examinations supervised**

Benjamin Krewson, Perturbation of linear operators	<i>Summer 2024</i>
Lauren Forbes, GSPT and the Fitzhugh-Nagumo pulse	<i>Summer 2024</i>

◦ **REU mentoring**

(organizer and mentor) NSF REU: Dynamic bifurcations of patterns, Boston University	<i>Summer 2024</i>
(organizer and mentor) NSF REU: Patterns, Growth, and Dynamics, Boston University	<i>Summer 2023</i>
(organizer and mentor) NSF REU: Patterns, Growth, and Dynamics, Boston University	<i>Summer 2021</i>
(co-mentor) Complex Systems, School of Mathematics, University of Minnesota	<i>Summer 2015</i>
(co-mentor) Pattern Formation in Chemotaxis, School of Mathematics, University of Minnesota	<i>Summer 2012</i>

◦ **BU undergraduate research projects, independent study, and reading group supervision**

GSPT Graduate Reading Group	<i>Spring 2024</i>
PDE Stability Theory Graduate Reading Group	<i>Spring 2024</i>
Moshe, Rivkah, Honors Thesis, Pulse dynamics in a saturated NLS equation	<i>Fall 2022-Spring 2023</i>
Plzak, Zoe, and Klappenbach, Zachary, UROP, Simple models for patterns on growing domains	<i>Fall 2022-Spring 2023</i>
Numerical methods for PDE Graduate Reading Group	<i>Spring 2022</i>
Plzak, Zoe, and Remler, Ava, UROP, Simple models for patterns on growing domains	<i>Fall 2021-Spring 2022</i>
Nonlinear Functional Analysis Graduate Reading Group	<i>Fall 2021</i>
Conley Index Graduate Reading Group	<i>Fall 2020</i>
Mussi, Jacob, UROP, Interaction of coherent structures in a saturated NLS equation	<i>Summer 2020 - Spring 2021</i>
Evdaev, Khai, UROP, Simple PDE models of early stage gastrulation in mammals.	<i>Fall 2020-Spring 2021</i>
Evdaev, Khai, Independent study in chaotic dynamical systems.	<i>Spring 2020</i>

◦ **Faculty Advisor**

BU SIAM Student Chapter	<i>Fall 2022 - Present</i>
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◦ **Seminar/Panel talk**

BU M.A.A. seminar talk on patterns in nature and life as a mathematician	<i>October 2024</i>
BU M.A.A. seminar talk on patterns in nature and life as a mathematician	<i>November 19, 2019</i>
BU graduate student workshop on NSFGRP applications	<i>September 30, 2019</i>
Applying to Postdocs, Boston University AMS student chapter	<i>April 20, 2017</i>
Math Postdoc Panel, Brown University SIAM Student Chapter	<i>March 23rd, 2016</i>
Graduate School Panel Discussion, Macalester College	<i>July 23, 2015</i>
Graduate School Panel Discussion, IMA Applied Math REU	<i>July 16, 2013</i>

◦ **President; Vice President**

SIAM Student Chapter, University of Minnesota	<i>2013 - 2014; 2014-2016</i>
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- **Graduate Student Peer-Mentor**

School of Mathematics, University of Minnesota

2013-2015

- **Organizer/Judge**

Mathematical Contest in Modeling, University of Minnesota

Fall 2012- Fall 2015

- **Volunteer and Exhibit Organizer**

Mathematical Toys, Math and Science Family Fun Fair, University of Minnesota

November 22 2014

Fun with Fibonacci, Math and Science Family Fun Fair, University of Minnesota

November 15 2013

- **Volunteer**

CSE Expo, MathCEP exhibit, University of Minnesota

Spring 2014

- **Judge**

Undergraduate Poster Symposium, University of Minnesota

April 16 2014

COMPUTER LANGUAGES

Programs: MATLAB, Mathematica, AUTO,

Languages: L^AT_EX, Python

Operating Systems: UNIX, Windows