SCOTT EMMONS

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EDUCATION

University of North Carolina at Chapel Hill
Bachelor of Science, *Mathematics and Computer Science*, GPA 4.0/4.0 Expected May 2019

RESEARCH INTERESTS

Machine learning * AI safety * robotics * motion planning * network analysis * complex systems * community detection * information theory * scalable algorithms * information visualization * online learning dynamics

RESEARCH EXPERIENCE

Intelligent Motion Laboratory, *Duke University* Durham, NC
Undergraduate Researcher August 2016 - Present

- Developed method for the efficient, continuous pseudoinversion of a multivariate function, which has implications for robot motion planning and applications such as teleoperation and surgical robotics
- Optimized runtime of pseudoinversion algorithm for average of 25x speed increase, enabling the computation of order-of-magnitude greater problem definitions
- Implemented custom cached database and parallelized, cache-aware algorithms to facilitate analysis at a scale unprecedented for its kind in the existing literature

Cyberinfrastructure for Network Science Center, *Indiana University* Bloomington, IN
Research Intern September 2013 - Present

- Collaborated on international research project to map scientific publication
- Analyzed massively open online course data to empower students, teachers, researchers, and platform developers of massively open online courses
- Designed studies using statistical computing and visual analytics to advance the fields of network science and online learning dynamics
- Wrote up published results of experiments to communicate key findings to the scientific community
- Optimized computational experiments on supercomputer via parallel programming for 100x speed increase
- Led independent research project to map consumer purchasing behavior
- Developed interactive visualizations for users to explore data and make new discoveries
- Reviewed MIT Press books *Visual Insights: A Practical Guide to Making Sense of Data* and *Atlas of Knowledge: Anyone Can Map* to teach sophisticated visual analytics to a general audience
- Created geospatial map to showcase the research center's worldwide impact

Carolina Center for Applied Mathematics, *Mucha Group, UNC* Chapel Hill, NC
Undergraduate Researcher November 2015 - Present

- Developed post-processing methods for community detection in networks to gain insight from large, complex network datasets
- Presented research ideas to foster group collaboration
- Studied graduate-level network science coursework in reading group to build the group's collective, foundational knowledge

Arnosti Laboratory, *Department of Marine Sciences, UNC* Chapel Hill, NC
Research Assistant October 2015 - February 2016

- Developed interactive software for the hierarchical visualization of microbial community composition data used in making oceanography discoveries
- Programmed scripts that automated supercomputing workflows for DNA sequencing to increase the research lab's operational efficiency

Graph and Map Algorithms Group, *University of Arizona* Tucson, AZ
Visiting Scholar December 2014 - January 2015

- Collaborated directly with Dr. Stephen Kobourov to design study answering previously unresolved questions in the field of network science
- Implemented computational experiments on 4 algorithms and 6 metrics that can be applied to research in disciplines ranging from the social sciences to the biological sciences

PROFESSIONAL EXPERIENCE

Information Technology Services, *University of North Carolina at Chapel Hill* Chapel Hill, NC
Residential Computing Consultant August 2017 - Present

- Supported on-site information technology needs of 70 university students to ensure a high-quality residential experience
- Solved issues independently and autonomously to provide fast, reliable service to clients

Robertson Community Coordinators, *Robertson Scholars Leadership Program* Chapel Hill, NC
Service Committee Member August 2015 - May 2017

- Organized volunteer opportunities that drove civic engagement amongst Robertson Scholars
- Oversaw logistics and funding for 4 community service projects that improved living conditions in Durham and Chapel Hill

Sparq Creative Solutions, LLC Bloomington, IN
Cofounder and Owner December 2013 - December 2015

- Created strategic plans, brand identities, logos, and websites to grow local businesses
- Consulted with clients to identify needs and plan projects to meet business objectives
- Formulated contracts and closed sales deals aligning with client goals
- Identified independent contractors with relevant expertise to exceed client expectations
- Executed internal business operations by keeping the books, filing taxes, and coding company website to continue efficiently offering high-quality services

TEACHING AND MENTORING EXPERIENCE

Shanti Bhavan Children's Project Tamil Nadu, India
Volunteer Teacher July 2017 - August 2017

- Taught approximately 80 students from families who make less than $2 / day in subjects ranging from English literature to physics to provide an educational foundation towards eliminating the cycle of poverty
- Mentored 10 students in quantitative subjects such as mathematics and computer science in preparation for national examinations
- Coached students in preparation for public speaking to an audience of 50 members to develop students' confidence and communication skill
- Instructed 20 students in resume writing for a Goldman Sachs workshop preparing them to seek and attain high-impact careers
- Collaborated with school's founder to draft detailed budget proposal requesting hundreds of thousands of dollars per year in funding for new initiative

Sunflower County Freedom Project Sunflower, MS
Volunteer Teacher May 2016 - July 2016

- Developed standard-aligned 8^{th}- and 9^{th}-grade math curriculum designed for under-performing middle school students who sought over the summer to enrich their education
- Taught two math classes that saw an average increase in performance of 9% on state standard test
- Developed a three-day coding seminar for middle school students that used active learning with puzzles to introduce the fundamentals of computer science
- Created spreadsheet framework that will form the basis of future data analytics at the Freedom Project to measure courses' academic impact
- Led fitness group in dieting and exercise that resulted in average mile time decrease of over 60 seconds
- Coordinated with videographer to film short documentary used in grant proposals for continued funding

Life Skills Academy Bloomington, IN
Cofounder January 2014 - May 2015

- Negotiated terms with school principal to run program 3 times a week during the school day and help students at risk of failing to pass core, academic classes required to earn a high school diploma
- Oversaw development of "life skills" in 25 mentor-mentee pairs to support classroom achievement

Information Visualization Massively Open Online Course Bloomington IN
Student Liaison Spring 2014, Spring 2015

- Facilitated online discussion of nearly 2,000 enrolled students from over 50 different countries to augment the material taught during lectures
- Reviewed student-facing materials such as examinations to ensure that online coursework maintained the high quality of an in-person university class

PUBLICATIONS AND PRESENTATIONS

Publications

- Kris Hauser & **Scott Emmons**: "Global Redundancy Resolution via Continuous Pseudoinversion of the Forward Kinematic Map." *IEEE Transactions on Automation Science and Engineering, 2018*.
- **Scott Emmons**, Robert Light, & Katy Börner: "MOOC Visual Analytics: Empowering Students, Teachers, Researchers, and Platform Developers of Massively Open Online Courses." *Journal of the Association for Information Science and Technology (JASIST), 2017*.
- William H. Weir, **Scott Emmons**, Ryan Gibson, Dane Taylor, & Peter J. Mucha: "Post-Processing Partitions to Identify Domains of Modularity Optimization." *Algorithms, 2017*.
- **Scott Emmons**, Mike Gallant, Stephen Kobourov, & Katy Börner: "Analysis of Network Clustering Algorithms and Cluster Quality Metrics at Scale." *PLoS ONE, 2016*.

Oral Presentations

- **Scott Emmons**, Robert Light, & Katy Börner: "MOOC Visual Analytics: Empowering Students, Teachers, Researchers, and Platform Developers of Massively Open Online Courses." Interactive Intelligent Systems Open House. Bloomington, IN, 2015. **Best Presentation Award**
- **Scott Emmons**, Robert Light, & Katy Börner: "MOOC Visual Analytics." Cyberinfrastructure for Network Science Center Open House. Bloomington, IN, 2014.
- **Scott Emmons**: "Mapping the Consumer Product Space." Cyberinfrastructure for Network Science Center Open House. Bloomington, IN, 2013.

AWARDS AND HONORS

Academic

- Alfred Brauer Award, granted by UNC's Department of Mathematics "to the undergraduate who… ha[s] demonstrated the greatest ability and shown the greatest promise for achievement in the fields of algebra or number theory," 2018
- Goldwater Scholar, nationally competitive, research-focused scholarship for undergraduates in the natural sciences, mathematics, and engineering, 2017-2019
- Robertson Scholars Leadership Program, highly selective undergraduate merit scholarship providing unique "dual citizenship" at UNC and Duke University, leadership development workshops, and funding for three summers, 2015-2019, $250,000
- National Merit Scholar, chosen among top 0.6% of PSAT test takers, 2015, $2,500
- Honors Carolina, selected as top 10% of incoming UNC class, 2015-2019
- Honorable Mention Paper, M^3 Math Modelling Challenge of the Society for Industrial and Applied Mathematics, among top 6% of submitted papers, 2015

Competition

- 4^{th} in nation and 2x state champion in case competition, Business Professionals of America, 2013-2014
- 10^{th} in nation, computer programming concepts, Business Professionals of America, 2013
- 2x state champion, financial math and analysis, Business Professionals of America, 2013-2014