MSCS Mess

Department of Mathematics, Statistics, and Computer Science
St. Olaf College, Northfield, MN 55057
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Colloquium

Title: **Still Working When the Warehouse Burns Down: Mathematics of Storing Data**
Speaker: Mckenzie West '11
Date: 2/27/23, 3:30pm
Place: 310

As we store more data and rely more on cloud servers, a fear of data corruption or loss becomes more prevalent for more people, companies, and government. In 2021, a warehouse fire in Paris caused millions of websites, government portals, and bank systems to shut down. Just last month, data corruption was blamed for the canceling of over 1000 flights. More regularly, servers need to be taken offline for maintenance. We ask how can data be stored so that we can still access our information despite interruptions like these. One way to solve this problem would be to simply have several servers that have the same exact data. However this method is very inefficient. Another method is to use polynomial interpolation: a degree n polynomial is determined by $n+1$ points. Specifically, if we have $n+2$ points, we can lose one and still have enough to recover the polynomial. Now that we have interpolation, we get to be creative about the polynomials and the points. That's where number theory comes in! In this talk, Mckenzie West will provide some examples of the work she has done in selecting just the right points to make recovering lost data possible while trying to be efficient.

Save the Date! *MSCS Talent Show!*

The MSCS Department is hosting a talent show on April 5th, at 6:30pm in Ytterboe Lounge. If you'd like to sign up to perform, please contact Prof. McKelvey at his email address, mckelvey@stolaf.edu.

Harvey Mudd REU Site: Exploring the Limits of Intelligent Systems

Harvey Mudd College's Department of Computer Science is pleased to continue to offer opportunities for undergraduate research in Summer 2023 as part of our NSF REU site. This year, our projects are themed around exploring the limits of intelligent systems. This REU focuses on understanding the boundaries in what intelligent systems can achieve both theoretically and in complex real-world scenarios with non-expert users. Students will work on cutting-edge subprojects in computer vision,

programming language analysis and synthesis, human-robot interaction, and information-theoretic understanding of machine learning systems. These research topics will give you valuable academic and industry skills that extend beyond current AI models and frameworks towards the broader reaches of what computing may achieve in the future.

Participating students will be housed at Harvey Mudd College, an undergraduate-only institution in Claremont California from May to July 2023. Participants will experience the most compelling aspects of a graduate school environment during a ten-week summer program. You will actively engage with the entire research process, from literature search, to articulating problems of interest, to investigations of specific pieces of these problems, and focusing results for presentation and publication. You'll also have a ton of fun working with other students, participating in social activities, building skills, and enjoying a southern California summer!

The application is due on March 7th. Eligibility for this program is restricted to current undergraduate students in good standing who are 18 years or older and who are a US citizen or permanent resident. Accepted students will receive a stipend, coverage of housing costs, and coverage of travel costs to and from Harvey Mudd at the start and end of the program. For more information and to submit your application, please visit our posting on the NSF ETAP portal.
For details on individual projects and our mentors, visit our departmental page!

Project NExT Fellows and Consultants

You are invited to apply to the Bridge to the Doctorate program at the University of Virginia, which is a two-year long program of courses, mentoring, and research intended for talented and motivated students from underserved communities. The program provides personalized training to help students on their path to pursuing careers in the mathematical sciences.

The application deadline is March 1. More information about the program can be found on the UVA Math Department Page and the general UVA page (general UVA page).

Save the Date! *Voting and Linear Algebra: Connections and Questions*

This RNS talk will be delivered by Prof. Michael Orrison on **March 13th** at 3:30pm in RNS 310. Voting is something we do in a variety of settings and in a variety of ways, but it can often be difficult to see nontrivial relationships between the different voting procedures we use. In this talk, I will discuss how simple ideas from linear algebra and discrete mathematics can sometimes be used to unify different voting procedures, and how doing so leads to new insights and new questions in voting theory.

Michael Orrison is a Professor of Mathematics at Harvey Mudd College. He received his A.B. from Wabash College in 1995, and his Ph.D. from Dartmouth College in 2001. His teaching interests include linear algebra, abstract algebra, discrete mathematics, and representation theory. His research interests include voting theory and harmonic analysis on finite groups. He particularly enjoys finding, exploring, and describing novel applications of the representation theory of finite groups with the help of his talented and energetic undergraduate research students.

Zoom
Title: **Communicating Your Research to the Public**
Speaker: Prof. Sheldon Jacobson
Date: 2/28/23, 3:30pm
Zoom: Link

In collaboration with the chapters at West Texas A&M and West Point, the student chapter for the Society of Industrial and Applied

Mathematics (SIAM) at St. Olaf has arranged for Dr. Sheldon Jacobson from the University of Illinois Urbana-Champaign to give a talk over Zoom on Wednesday, February 22nd, from 3:30 to 4:15 pm. We encourage anyone with an interest in data science to attend.

Communicating scientific research to a broad audience has become a prerequisite for success in today's academic environment. This presentation discusses numerous facets of academic communication, with a focus on hands-on application of various techniques and principles to enhance your ability to reach a broad and diverse audience. Examples are provided to illustrate various techniques and principles of communication. By using communication as a branding tool, engineers, mathematicians, and computer scientists can create both a media presence for themselves, but also promulgate the value of data science to the general population.

Dr. Jacobson is the Founder Professor of Engineering in the Department of Computer Science at UIUC. His work includes applying operations research to aviation security, public health, forecasting presidential elections, and NCAA basketball. Dr. Jacobson is a fellow of the Institute for Operations Research and Management Sciences, the Institute of Industrial and Systems Engineers, and the American Association for the Advancement of Science. He is also the recipient of a Guggenheim Fellowship, two IISE Awards for Technical Innovation in Industrial Engineering, two Awards of Excellence from the Communicator Awards, a Media Relations Award for Communications & Marketing Excellence from the University of Illinois Office of Public Affairs, an IISE David F. Baker Distinguished Research Award, and an INFORMS Impact Prize. More information is available on Dr. Jacobson's homepage and wikipedia page.

Volunteer/Experience Opportunities

REUs: Summer Research in MSCS

If you are interested in being paid to collaborate on a research project with students from around the country off campus this summer, keep reading! To look through the programs available for Research Experiences for Undergraduates (REU's), check out this link! Most of them are done over the course of 8 – 10 weeks during the summer and include stipends around $4,000. Applications will open in November and most will be due between late January and early March.
Read the eligibility for each because many are restricted to certain years in school, certain majors, or US citizenship. The website has a variety of tabs at the top to help you find programs that apply to you! In particular, there are lots available for international as well as domestic students!
Most applications require a personal statement about why you would like to participate in the REU as well as letters of recommendation, so start looking into these sooner rather than later.

Make sure to reach out to us (mercur1@stolaf.edu and mainel1@stolaf.edu) if you have any questions!

CS Undergraduate Research

St. Olaf CS invites applicants for undergraduate research student work during Spring '23, for work on projects involving cloud computing or Raspberry Pi units, as part of the CSinParallel research group. Specifically, the work

relates to (1) "Runestone Backend", an automated containerized parallel/cluster computations on Google Cloud using Kubernetes, and (2) the Self-Organizing Cluster system for the Raspberry Pi, including system image development. Qualifications depend on the particular project, as described in the application details. Both are ongoing projects with flexible expectations for hours per week, and strong applicants who may have partial qualifications are encouraged to apply for one or both projects. **Please apply here, applications will be accepted and considered until further notice.**

To submit an article, event, or anything else for publication in the Mess, email hilst1@stolaf.edu; to receive the Mess digitally each Friday, email habero1@stolaf.edu; visit http://wp.stolaf.edu/mscs/mscs-mess/ for a digital archive of previous MSCS Mess issues.

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