

RECONNECT Workshop 2016

Mathematical and Computational Tools of Cybersecurity

Schedule

Sunday; 12 JUN 16

1800-1845 Welcome Huddle Zulu Time Lounge – Hotel Thayer Roof

Swing by the Zulu Time (roof open air lounge at Hotel Thayer) to receive information about the week's events. This will include maps, entry procedures to post, and your questions will be answered. Inclement weather plan will be to gather at Patton's Tavern on the first floor of the Hotel Thayer.

1900-2000 Dinner Hotel Thayer

Monday; 13 JUN 16

0730-0800 Travel to Thayer Hall

0800-0830 Breakfast Thayer Hall Rm 120

0830-0850 Welcome, Introductions, Plans for the week
Midge Cozzens, Rutgers University, CCICADA/DIMACS

0850-0910 Opening Remarks – COL Steven Horton, Head of the Department of Mathematical Sciences, USMA

0910-1015 Historical Encryption
Natalie Vanatta, Army Cyber Institute
Using the backdrop of historical encryption methods, we will demonstrate how basic mathematical concepts and techniques can be motivated within the classroom.

1015-1030 Break

1030-1200 Encryption Analysis
Natalie Vanatta
The morning continues with discussion on how to conduct analysis on encryption algorithms using mathematical and computer science techniques.

1200-1310	Lunch in the Math Library	Thayer Hall Rm 240
1310-1430	The Life and Times of Enigma <i>Natalie Vanatta</i> The Enigma machine is the first electro-mechanical implementation of an encryption algorithm. Its' story is full of math, betrayal, determination, and innovation. A captured German Army Enigma machine will be present at the discussion for participants to examine.	
1430-1445	Break	
1445-1630	Exciting Unsolved Ciphers <i>Natalie Vanatta</i> Even given today's understanding and immense computing power, there are still many unsolved ciphers in our world. We will discuss the most exciting ones that can be used to whet both faculty and student appetites for learning and research.	
1630	Wrap up; work in groups; start homework	
1900	Dinner	Hotel Thayer

Tuesday; 14 JUN 16

0730-0800	Travel to Thayer Hall	
0800-0830	Breakfast	Thayer Hall Rm 120
0830-0930	Presentation of homework solutions	
0930-1045	Cyber Operations and Social Media <i>Ian McCulloh, Applied Physics Laboratory Johns Hopkins University</i> Lecture to place social media within the context of broader cyber security and operations. Topics will include: 1) on-going research in cyber ethnography using mathematical anthropology; 2) social engineering; 3) definitions and descriptions of social media; 4) personality profiling via social media; and 5) overview of the Nestle-Greenpeace case study.	
1045-1100	Break	
1100-1200	An End-to-End Process for Social Media Analysis <i>Ian McCulloh</i>	

Using examples from USCENTCOM (United States Central Command) airstrikes, the process will be discussed; includes: platform error/bias, usage, data collection, legal issues, and analytics to include network analysis, machine learning, qualitative analysis, and statistical analysis.

- 1200-1310 Lunch in the Math Library Thayer Hall Rm 240
- 1315-1445 Analysis in R
Ian McCulloh
A tutorial on the use of R for data inject, social network analysis, and visualization. This will include some hands-on time with R. All data and sample code (ready for modification) will be provided. No prior R use is necessary.
- 1445-1500 Break
- 1500-1600 Current Research Efforts
Ian McCulloh
A brief discussion of active research being conducted in this area. Topics include: 1) Network Terrain Mapping and Visualization; 2) Clustering and Community Detection; 3) Firestorms; and 4) Neuro-influence and social media.
- 1600 Wrap up; work in groups
- 1900 Dinner Hotel Thayer

Wednesday; 15 JUN 16

- 0730-0800 Travel to Thayer Hall
- 0800-0830 Breakfast Thayer Hall Rm 120
- 0830-0930 Presentation of homework solutions
- 0945-1045 Fundamentals of Game Theory
Milind Tambe, University of Southern California, Teamcore
- 1045-1100 Break
- 1100-1200 Game Theory and Artificial Intelligence applied to Physical Security
Milind Tambe

- 1200-1310 Lunch in the Math Library Thayer Hall Rm 240
- 1315-1445 Game Theory applied to security (physical and cyber)
Milind Tambe
- 1445-1500 Break
- 1500-1700 Wrap up; work in groups
- 1730-1750 Board boat
- 1800-2000 Dinner Cruise on Hudson River in the USMA Supt's Boat

Thursday; 16 JUN 16

- 0730-0800 Travel to Thayer Hall
- 0800-0830 Breakfast Thayer Hall Rm 120
- 0830-0930 Presentation of homework solutions
- 0930-1045 Work in Groups
- 1045-1100 Break
- 1100-1200 Dark Web 101
Jim Twist / Erik Dean, Army Cyber Institute
An explanation of what the dark web really is and a tour through some of the more notorious aspects of it from current researchers.
- 1200-1310 Lunch in the Math Library Thayer Hall Rm 240
- 1315-1430 Walking tour of West Point (Math on the Plains)
Chris Arney, D/Math
A tour of historical West Point including locations not generally available to the public.
- 1430-1445 Break
- 1445-1600 You Can't Always Get What You Want: How Will Law Enforcement Get What it Needs in a Post-Snowden, Cybersecurity-Centric Encryption Era?
Stephanie Pell, JD, Army Cyber Institute
While the tension between encryption and surveillance is often framed as a contest between privacy and security, it is first and foremost a security

issue on both sides, with privacy equities integrated into the argument for enhanced encryption: “backdoors” placed in networks or mobile devices to sustain the existing regime of law enforcement access are readily exploitable by criminals and foreign governments; strong end-to-end encryption, however, defends against such predations. Reconciliation of the fundamental goals of these competing visions of security—of law enforcement’s traditional public safety mission with the emergent need for effective cybersecurity—will require law enforcement to employ both old and new kinds of investigative techniques. Such techniques may include collection and analysis of metadata generated through the ever-expanding Internet of Things (IoT), exploitation of new surveillance apertures provided by the IoT and the more widespread adoption of hacking by law enforcement.

1600 Wrap up; work in groups

1900 Dinner Hotel Thayer

Friday; 17 JUN 16

0730-0800 Travel to Thayer Hall

0800-0830 Breakfast Thayer Hall Rm 120

0830-0945 Social Media Analysis on Violent Extremist Organizations
Aaron Brantly, Army Cyber Institute
 A look at current research on how violent extremist organizations are using social media platforms to recruit, plan, organize, and execute missions. More importantly, how we can leverage big and small data and cyberspace to provide a counter-narrative, counter-propaganda, and targeting.

1000-1200 Module Presentations

1200-1310 Lunch in the Math Library Thayer Hall Rm 240

1300-1400 Module Presentations

1420 Depart for Brotherhood Winery
<http://www.brotherhood-winery.com/winery.html>

1500-1700 Private Tour and Tasting at Brotherhood Winery

1730 Return to Hotel Thayer; work in groups

1900 Dinner Hotel Thayer

Saturday

0730-0800 Check out of Hotel Thayer and travel to Spellman Hall

0800-0830 Breakfast Spellman Hall; ZOO Room

0845-1145 Module Presentations Spellman Hall; 5th floor

1200 Box Lunches and Departure