## COLIN UNGER

interests	distributed machine learning, high-performance computing, superoptimization, systems, program analysis, compilers			
education	<b>Stanford University</b> (Ph.D. in Computer Science) Advisor: Alex Aiken Research: Hardware-aware optimization of deep learning workloads	Septe	mber 2020 – current	
	Supported by National Science Foundation Graduate Research Fellowship (NSF GRFP)			
	<b>UC Santa Barbara, College of Creative Studies</b> (B.S. in Computing, Minor in Physi GPA: 4.0 Regents Scholar Computer Science Student of the Year (2020)	i <b>cs)</b> Septem	ber 2016 – June 2020	
	Graduate courses (12 total) in static analysis, type systems, formal logic, compilers, formal verification, software engineering, information flow, systems security, cryptography, runtime systems, and numerical computing (x2).			
past research	<b>UC Santa Barbara Security Lab</b> Advisors: Profs. Giovanni Vigna and Chris Kruegel	July 20	17 – September 2020	
	<ul> <li>Design novel type inference techniques for robustly recovering accurate type information from binary code.</li> <li>Core developer on the angr binary analysis platform. Design static analyses and decompiler components.</li> <li>Develop domain specific language for specifying architecture instruction encoding and semantics, allowing angr to statically and symbolically analyze a broader array of architectures.</li> </ul>			
	<ul> <li>Research Intern at GrammaTech June 2019 – September 2019 &amp; June 2020 – September 2020</li> <li>Project: Binary Function Matching with Machine Learning</li> <li>Advisor: Dr. Vineeth Kashyap</li> <li>Develop and evaluate models for efficient and accurate binary code similarity.</li> <li>Identify new data set sources, build distributed data collection system. Combined, increased dataset size by more than 10x.</li> <li>Design and evaluate the effectiveness of new features for capturing semantic elements of binary functions.</li> <li>Implement rigorous property-based testing, create unified framework for combining complex data validation and serialization with testcase generation.</li> </ul>			
	Xu Du Group (SUNY Stony Brook – Physics)       June 2015 – August 2015			
	Develop a process for nanofabricating suspended black-phosphorus field-effect transistors.			
	Kovnir Group (UC Davis – Chemistry)	September 2014 – September 2016		
	Synthesize and characterize novel superconducting iron chalcogenides, copper iridates, and formates.			
	teaching	CMPSC 595G W20 "Topics in Automated Binary Analysis" January 2020 – March 2020 Design and lead graduate seminar on research techniques in automated binary analysis. Topics covered include disassembly, constraint solvers, symbolic execution, and decompilers.		
<ul> <li>CMPSC 595G F19 "Advanced Reverse Engineering and Binary Exploitation" September 2019 – December 2019</li> <li>Design and lead graduate seminar on modern techniques in binary reverse engineering and exploitation.</li> <li>Topics covered include obfuscation, shellcoding, ROP, and heap exploitation.</li> </ul>				
presentations	Don't Roll Your Own Crypto: A Tour of Crypto Exploitation — WomynHacks 20	20	January 2020	
and talks	Automated Reverse Engineering of VM-based Obfuscation with angr — Gramma	ıTech	September 2018	

	Development of a Solvothermal Reaction Pathway for the Synthesis of Various Transition May 2010				
	Metal Chloride Formate Compounds — Larock Undergraduate Research Conference				
industry	Microsoft Intern (Cortana "My Updates")       June 2018 – September 2018         Experience in modern software engineering practices and methodologies (TDD, Agile, CI/CD, etc.)				
misc projects	<b>reconSTRUCTion</b> IDA Pro plugin harnessing type inference techniques and the Hex-Rays decompiler to automatically recover complex data structures in binary code.				
	Semantyx         Using statistical learning and targeted syntactic elements in decompilation for semantic clone detection in binary code.         Heated Symbolism         Applying the symbolic analogs of dynamic compilation techniques (trace compilation, function inlining) to improve the performance of symbolic execution engines.         kuin         Web-based network monitoring and analysis system for CTFs. Allows performant and intuitive traffic analysis in environments with unreliable network access, as well as partial exploit replay capabilities.				
					iCTF 2019 Lead Organizer October 2018 – March 2019 Lead coordination of challenges and infrastructure development for the 2019 iCTF cybersecurity competition More than 400 teams from around the world registered for the event.
					iCTF 2020 Lead Organizer September 2019 – March 2020 Lead coordination of challenges and infrastructure development for the 2020 iCTF cybersecurity competition More than 300 teams from around the world registered for the event.
	Shellphish Capture the Flag (CTF) Team       October 2016 - curren         Core member of the Shellphish CTF hacking team, consistently ranked one of the top teams in the world.				
	honors and awards	National Science Foundation Graduate Research Fellowship (NSF GRFP) National Defense Science and Engineeering Graduate Fellowship (declined in favor of NSF GRFP) UC Santa Barbara 2019-2020 Computer Science Student of the Year First place in CSAW 2019 Embedded Security Challenge First place at 2017 0CTF international "capture-the-flag" security competition in Shenzhen, China UC Santa Barbara Regents Scholar Best Undergraduate Research Award, 2016 UC Davis Richard Larock Undergraduate Research Conference			
	publications	C. Spensky, A. Machiry, N. Redini, <b>C. Unger</b> , G. Foster, E. Blasband, H. Okhravi, C. Kruegel, G. Vigna. Conware: Automated Modeling of Hardware Peripherals. <i>Asia CCS 2021: ACM ASIA Conference on Computer and Communications Security</i> .			
E. Gamage, J. Greenfield, <b>C. Unger</b> , S. Kamali, J. Clark, C. Harmer, L. Luo, J. Wang, M. Shatruk, K. Kovnir. Tuning Fe-Se Tetrahedral Frameworks by Combination of [Fe(en) <sub>3</sub> ] <sup>2+</sup> Cations and Cl <sup>-</sup> Anions. <i>Inorganic Chemistory</i> . 59(18): 13353-13363, 2020.					
J. Greenfield, <b>C. Unger</b> , M. Chen, N. Izquierdo, K. Woo, O. Garlea, S. Kamali, K. Kovnir. A series of chiral, polar, homospin topological ferrimagnets: M <sub>3</sub> (OOCH) <sub>5</sub> Cl(OH <sub>2</sub> ) (M = Fe, Co, Ni). <i>Chemistry of Materials</i> . 29(18): 7716-7724, 2017.					