Shane Kosieradzki

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EDUCATION

Georgia Institute of Technology, Atlanta, GA   May 2024
Master of Science in Mechanical Engineering - M.S.M.E

St. Olaf College, Northfield, MN   May 2018
Bachelor of Arts, Physics and Mathematics

RELEVANT SKILLS:
Python, C/C++, Embedded C, Build-systems (CMake, MSVC, Clang, GCC, etc.), Software management & scalability, Parallel and distributed computing, Nonlinear control theory, mechatronics, System mechanics & modeling, CAD & FEA, Electronic circuit design, FPGA design (verilog), Homomorphic encryption, Lattice cryptography, Zero knowledge proof systems, Robotics

WORK EXPERIENCE

Research Manager, *Georgia Institute of Technology*, Atlanta, GA   Jul. 2021 – May 2024
- Mentoring between 4-8 students per semester to complete novel research in the Biorobotics and Human Modeling Lab
- Responsible for helping the students investigate an appropriate research question in the area of *encrypted robotics*
- Student research management was accomplished through weekly scrum meetings and initial Gantt planning

Firmware Engineer, *Starkey Hearing Technologies*, Eden Praire, MN   Jul. 2020 – Jul. 2021
- Created firmware to power a new line of innovative hearing aid chargers
- Designed firmware to respond to data collected from various detection circuits to appropriately react when hearing aids were added or removed from the charger, a certain battery level was reached, a communication fault occured, and more
- Collaborated with R&D, various engineering teams, and sales to ensure each part of the device worked in tandem

Developmental Operations Engineer, *Starkey Hearing Technologies*, Eden Praire, MN   Jan. 2019 – Jul. 2020
- Replaced the legacy firmware packaging system from the ground up, with a flexable plug-in based system, capable of supporting an arbitrary number of user configurations
- Constructed the packaging system to be able to prepare the environment, build the firmware, collect the compiled artifacts and log files into a package, zip and deliever the package to the specified location

Conversions Engineer, *Open Systems International (OSI)*, Medina, MN   Aug. 2018 – Jan. 2019
- Translated customer's electric-utility databases to conform with OSI's standards
- Managed and maintained legacy conversion code for previous clients

Undergraduate Physics TA, *St. Olaf College*, Northfield, MN   Sep. 2016 – Dec. 2017
- Assisted students during lab period to help them understand and perform lab work as well as grading their lab notebooks
- Tutored students to aid in their comprehension of course work and prepare for examinations

RESEARCH EXPERIENCES

Graduate Research Assistant, *Georgia Institute of Technology*, Atlanta, GA   Aug. 2021 – May 2024
- Study robotic security via homorphically encrypted control algorithms
- Explore algebraic properties of control expressions to optamize compatability with homomorphic ciphers
- Consider hardware architectures that fascilitate cryptographic procedure speedup

Undergraduate Quantum Information Research, *St. Olaf College*, Northfield, MN   Sep. 2017 – May. 2018
- Studied the applicability of quantum algorithms to the study of Quantum Field Theory
- Considered which systems would be best suited to realize certain quantum gates

Undergraduate Computational Physics Research, *St. Olaf College*, Northfield, MN   Sep. 2017 – Dec. 2017
- Explored the applicability of the novel *Divide & Concur* algorithm to highly constrained physical systems

Undergraduate Lie Symmetry Research, *St. Olaf College*, Northfield, MN   May 2017 – Aug. 2017
- Investigated intrinsic symmetries of particular differential equations to invariantize numerical schemes
- Analize which invariantized schemes yielded more accurate calculations
- Designed a software package to automate the invariantization process for a particular scheme (e.g. Euler's Method)

Undergraduate Engineering Physics Research, *Hamline University*, St. Paul   June 2016 – Aug. 2016
- Explored low-cost renewable energy sources that could be easily built and deployed to areas in need
- Created a plant-based fuel cell that would utilize the reduction potential of microbial resperation to produce clean electricity

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VOLUNTEER EXPERIENCES

Open-Source Author, *github.com/galapagos-devs/Galapagos*   Jul. 2019 – Present
- Created and currently manage *Galapagos*, an open-source C++-based genetic algorithm framework
- Designed *Galapagos* to abstract implementation details of genetic algorithms, allowing users to focus on discovery and exploration

Physics Instructor, *First Tech Challenge*, Lakeville, MN   Sept. 2017 – Jun. 2018
- Assisted highschool students with system dynamics, robot part selection and command generation for their competition robot.
- Mentored students on tehnical writing and scientific reports.

Programming Instructor, *Girls Who Code*, Lakeville, MN   Sept. 2015 – May 2016
- Led an introductory Javascript course to a group of middle and high school students
- Worked one-on-one with students who were struggling resulting in a 100% course completion from all participants

PEER-REVIEWED CONFERENCE AND JOURNAL PAPERS

- Shane Kosieradzki, Yingxin Qiu, Kiminao Kogiso, Jun Ueda, Rewrite Rules for Automated Depth Reduction of Encrypted Control Expressions with Somewhat Homomorphic Encryption, *Proceedings of the 2022 IEEE/ASME International Conference on Advanced Intelligent Mechatronics* (AIM 2022) , pp. 804-809, July 2022.
- Shane Kosieradzki, Xiaofeng Zhao, Hiroaki Kawase, Kiminao Kogiso, Jun Ueda, Secure Teleoperation Control Using Somewhat Homomorphic Encryption, *IFAC 2022 Modeling, Estimation, and Control Conference* (MECC 2022). MECC 2022.
- Xiaofeng Zhao, Shane Kosieradzki, Jun Ueda, Distributed Simulation of Encrypted Dynamics via Functional Mockup Units, *2023 IEEE/SICE International Symposium on System Integrations*.
- Bin Kwon, Shane Kosieradzki, Jacob Blevins, Jun Ueda, Encrypted Coordinate Transformation via Parallelized Somewhat Homomorphic Encryption for Robotic Teleoperation, *2023 IEEE/ASME International Conference on Advanced Intelligent Mechatronics* (AIM 2023), Seattle, WA, July 2023.
- Shane Kosieradzki, Saahas Yechuri, Jun Ueda, Encrypted Sensor and Actuator Interface for Encrypted Control Signals via Embedded FPGA Key Generation, *2024 IEEE/SICE International Symposium on System Integrations*.

ACADEMIC PRESENTATIONS

- Shane Kosieradzki, Jun Ueda, Encrypted Sensor and Actuator Interface for Encrypted Control Signals via Embedded FPGA Key Generation, *International Symposium on System Integration*, Vinpearl Convention Center, Ha Long, Vietnam, Jan. 2024
- Shane Kosieradzki, Jun Ueda, Encrypted Teleoperated Robotic Control, *Savannah River National Laboratory University Student Poster Session*, Savannah River National Laboratory University, Aiken County, SC, Nov. 2022.
- Shane Kosieradzki, Jun Ueda, Encrypted Teleoperated Robotic Control, *ME graduate student recruiting events*, Georgia Institute of Technology, Atlanta, GA, Oct. 2021.
- Shane Kosieradzki, Amy Kolan, Algorithmic Optimization of Highly Constrained Problems, *St. Olaf College colloquium*, St. Olaf College, Northfield, MN, Mar. 2018.
- Shane Kosieradzki, Bruce Bolon, Low Cost Energy Harvesting via Microbial Fuel Cells, *Winchell Symposium*, Macalester College, St. Paul, MN, Apr. 2017.
- Shane Kosieradzki, Joseph Benson, Invariantized Difference Schemes Utilizing Problem Specific Lie Symmetries, *Midstates Consortium*, University of Chicago, Chicago, IL, Nov. 2017.
- Shane Kosieradzki, Joseph Benson, Invariantized Difference Schemes Utilizing Problem Specific Lie Symmetries, *Northfield Undergraduate Mathematics Symposium*, St. Olaf College, Northfield, MN, Sep. 2017.