MATTHEW J LEINHAUSER

mattl@udel.edu | Matthew Leinhauser | techercise

Education

University of Delaware – Newark, DE (Fall 2019 - Present)
PhD Candidate, Computer and Information Sciences, Expected: May 2024
PhD Advisor: Prof. Sunita Chandrasekaran

University of Delaware – Newark, DE (Fall 2019 - May 2021)
Master of Science, Computer Science,
Cum. GPA: 3.849

West Chester University – West Chester, PA (Fall 2015 - Spring 2019)
Honors College XVII, Class of 2019
Bachelor of Science, Computer Science
Minors: Exercise Science, Communication Studies, and Civic and Professional Leadership
N.S.A. Computer Security Certificate
Cum. GPA: 3.781, *Summa Cum Laude*

Technical Skills

- Programming Languages: Java, HTML, CSS, JavaScript, SQL, Python, Dart
- Performance Tools: NVProf, NSight Compute, NSight Systems, ROCProfiler, ROCTracer
- Clusters/Platforms: Summit (OLCF), Spock (OLCF), Hemera (HZDR), Hypnos (HZDR), AMD Center of Excellence early access systems, JUWELS Booster (Jülich), CoriGPU (LBNL)
- Cloud Services: AWS – Lambda, CloudFormation, IAM, CloudWatch, S3

Certifications

- Product Management Nanodegree, **Udacity** (June 2020)
- CNSSI-4013: National Information Assurance Training Standard for System Administrators, **CNSS** (May 2019)
- NSTISSI-4011: National Training Standard for Information Systems Security Professionals, **CNSS** (May 2019)

Professional Experience (selected)

Intern, Lawrence Berkeley National Lab (LBNL), Berkeley, California (6/2021 - Present)

- Intern for Performance and Algorithms Research Group
- Primary Collaborators: Samuel Williams (LBNL), William Tang (PPPL), Lang Lao (General Atomics), Scott Kruger (Tech-X)
- Create a portable GPU version of the nuclear fusion equilibrium code EFIT-AI by converting the CPU version to OpenMP Target
- Port the PPPL deep learning application Fusion Recurrent Neural Network (FRNN) to run on AMD GPUs
- Profile and analyze both codes to identify areas for optimization to reduce runtime and improve computational throughput
- Languages, Libraries, and Tools used: Python, Fortran, DLProf, TensorFlow, Keras, PyTorch, Tensorboard

Visiting PhD Student, Center for Advanced Systems Understanding (CASUS), Görlitz, Germany (1/2020 - 1/2020)

- Primary Collaborators: Sunita Chandrasekaran (University of Delaware), Michael Bussman (HZDR, CASUS), Guido Juckeland (HZDR), Ronnie Chatterjee (ORNL), Nicholas Malaya (AMD), Timothy Mattox (HPE), David Rodgers (ORNL)
- Collaborate with Computational Radiation Physics Group on PIConGPU
- Create performance analysis report for PIConGPU
- Collaborate with Computational Radiational Physics Group on creating example codes for ALPAKA
- CASUS travel grant awarded

Graduate Research Assistant, University of Delaware, Newark, DE, USA (8/2019 - Present)
- Research Advisor: Prof. Sunita Chandrasekaran; Computational Research and Programming Lab (CRPL)
- Analyze performance bottlenecks and challenges in PIConGPU (Particle in Cell on GPU) using state-of-the-art profiling tools (NSight Systems, NSight Compute, NVProf, ROCProf, ROCTracer)
- Create roofline performance models and instruction roofline models using micro-kernel benchmark suites and state-of-the-art profiling tools to analyze application performance for NVIDIA and AMD GPUs
    - Developed equations and methodology to create instruction roofline model for AMD GPUs (Publication Pending)

Software Developer, Quantitative Risk and Analytical Systems Vanguard, Malvern, PA (6/2019 - 5/2021)
- Assist in the team effort of creating an index fund data lake hosted on the AWS Cloud
- Created an AVRO file conversion tool that is used across multiple divisions
- Create custom AWS CloudWatch Alerts that trigger from a failure in an AWS Lambda ingestion function
- Establish an Ad Hoc SFTP connection between Vanguard and a third-party vendor to serve as a temporary means to ingest files
- Created and modified IAM roles to allow use of AWS Athena and AWS S3 Replication in cloud architecture
- Modified our team's existing S3 Replication process to transition from single bucket destination replication to multi-bucket destination replication
- Developed a Python program to validate and verify raw vendor data against standardized/normalized data
- Languages, Libraries, and Tools used: Python, AWS S3, AWS IAM, AWS CloudFormation, Tkinter, Troposphere, JSON, FastAvro, Cucumber, AWS Lambda, AWS CloudWatch, Git, BitBucket, Bamboo

Software Developer, **Global Investment Data Systems** Vanguard, Malvern, PA (8/2018 - 6/2020)
- Automate the entire financial index onboarding process. This process previously took three months to complete. Now, it takes fifteen minutes in real-time on the application.
- Train members of Global Investment Data Management teams from the USA, UK, and Australia on the automated process
- Create technical solutions within NeoXam based on the needs of Global Investment Data Management
- Assist in the creation of documentation on best coding practices for the Global Investment Data Systems department
- Create JUnit tests for Index Onboarding Regression Test Suite
- Languages used: NeoXam scripting language, SQL

Software Application Developer Intern, Vanguard, Malvern, PA, USA (6/2018 - 8/2018)
- Interned on NeoXam Data Solutions Team within the Global Investment Data Systems Department
- Automated the parent index creation process, using NeoXam's scripting language and SQL, to eliminate all IT intervention
- Presented work in front of over 100 people which included department managers, team technical leads, and project managers
- Languages used: NeoXam scripting language, SQL

Publications

Peer-Reviewed Publications

- **Matthew Leinhauser**, Richard Burns. Physical Exercise Instructions: Unlocking the Key to Injury-Free Workouts using Natural Language Processing. Proceedings of the 34th Annual Conference of the Pennsylvania Association of Computer and Information Science Educators (PACISE '19), pp. 91 - 97, 2019.

Technical Reports

- **Leinhauser, Matthew**, Young, Jeffrey, Bastrakov, Sergei, Widera, Rene, Chatterjee, Ronnie, & Chandrasekaran, Sunita. *Performance Analysis of PIConGPU: Particle-in-Cellon GPUs using NVIDIA's NSight Systems and NSight Compute*. United States. Link to PDF on DOE OSTI
- **Leinhauser, M.**, Young, J., Bastrakov, S., Widera, R., Debus, A., Bussmann, M., … Chandrasekaran, S. (2020). CAAR for Frontier -An ORNL Project Analysis of PIConGPU's Three Most Intensive Kernels from NSight Systems and NSight Compute on Summit. Unpublished. https://doi.org/10.13140/RG.2.2.28095.33448
- **Leinhauser, M.**, Bastrakov, S., Widera, R., Debus, A., Bussmann, M., Juckeland, G., Arghya Chatterjee, & Chandrasekaran, S. (2020). CAAR for Frontier -An ORNL Project Jan 2020 TECHNICAL REPORT Analysis of PIConGPU's Three Most Intensive Kernels from NVProf on Summit. University of Delaware. https://doi.org/10.13140/RG.2.2.30951.80802

Research Projects

PIConGPU Frontier Center for Accelerated Application Readiness (CAAR) (8/2019 – Present)

- PIConGPU is an open-source simulation framework for plasma and laser-plasma physics used to develop advanced particle accelerators for radiation therapy of cancer, high energy physics, and photon science.
- Project in collaboration with Oak Ridge National Laboratory (ORNL), University of Delaware, and Helmholtz-Zentrum Dresden-Rossendorf (HZDR)
- PIConGPU is an open-source simulation framework for plasma and laser-plasma physics used to develop advanced particle accelerators for radiation therapy of cancer, high energy physics, and photon science.

One Rep Max Calculator (1/2017 – 3/2017)

- Android Application that calculates a projected one rep maximum of a weighted lift
- The projected one rep maximum is given by taking the average of the results of seven different formulas
- Available on the Google Play Store

Posters and Invited Talks and Presentations

- (Invited Talk) "Designing an Instruction Roofline Model for AMD GPUs", CASUS Institute Seminar Series, July 2021.
- (Invited Presentation) "Nansen's Nobel Expedition", (guest honors class talk), West Chester University, August 2020.
- (Invited Presentation) "Nansen's Nobel Expedition", (guest honors class talk), West Chester University, August 2019.
- (Poster) "Unlocking the Key to Injury-Free Workouts Using Natural Language Processing", West Chester University Research and Creative Activities Day 2019, April 2019.

Awards & Recognition

2020 – 2021 Distinguished Graduate Student Award (Spring 2021)

- Award given to a CIS graduate student in recognition of a contribution to the CIS department and/or in recognition of academic success in the past year.

2020 George W. Laird Fellowship Finalist (Spring 2020)

- Named one of 10 finalists across the College of Engineeringat the University of Delaware

2018 – 2019 Senior Leader Award (Spring 2019)

- Award given to a senior student who has shown the most capable leadership ability throughout his/her years at WCU.

Edythe M. Trapnell '41 Honors Scholarship (Spring 2019)

- Award given to an Honors College student based on the student's and family's financial need, as well as the student's demonstrated academic performance

West Chester University 1871 Award (Spring 2019)
- Inaugural award winner given to student leaders who demonstrate strong academics, leadership skills, community engagement, and career readiness

2017 – 2018 Diane DeVestern Ethical Leadership Award (Spring 2018)
- Award given to a student leader who demonstrates strong ethical principles in service to others.

West Chester Off Campus Housing Scholarship (Spring 2018)
- Award based on GPA and service to the West Chester campus and community

Grow with Google Scholarship (Winter 2018)
- Scholarship awarded to learn front end web development (HTML, CSS, JavaScript, and JQuery)

Honors International Study Scholarship (Spring 2018, Spring 2019)
- Scholarship financially supporting students engaging in ethnographic research teams that studied strategies to improve services and activities offered at a community center in South Africa

Level I Tutor (Spring 2017)
- Certified by Collegiate Reading and Learning Association

Donna Carney Service Leader Scholar (Spring 2017, Fall 2017)
- Completion of a minimum of 30 hours of community service each semester

Board of Governors Scholarship (Fall 2017 – Spring 2019)
- Full tuition scholarship awarded for academic excellence, leadership, and service

Phillip Fuchs Scholarship (Spring 2017)
- Award based on passion, creativity, and problem-solving skills for computer science while succeeding academically and also overcoming obstacles

Dean's List - College of Interdisciplinary and Graduate Studies (Fall 2017, Spring 2018)
- Maintaining minimum 3.67 semester GPA

Dean's List - College of Science and Mathematics (Fall 2015, Spring 2017, Fall 2017, Spring 2018, Spring 2019)
- Maintaining minimum 3.67 semester GPA

Honors College Dean's List (Fall 2015, Fall 2017, Spring 2019)
- Maintaining minimum 3.75 semester GPA

Teaching Experience

- **HON353 Guest Facilitator, West Chester University** (8/2020 – Present)
- **HON310 Teaching Assistant, West Chester University** (1/2019 – 5/2019)
- **HON355 Teaching Assistant, West Chester University** (8/2018 – 8/2020)
- **CSC110 Teaching Assistant, West Chester University** (8/2017 – 12/2017)
- **CSC110 Curriculum Development, West Chester University** (2/2017 – 8/2018)
- **Tutor, Learning Assistance and Resource Center, West Chester University** (1/2017 – 11/2017)

Professional Services

Board Member, Parish Hall Kitchen (6/2019 – Present)
- Parish Hall Kitchen is a 501c3 organization in Chester County, PA, USA that provides weekly meals every Friday night for the less fortunate and homeless in the West Chester borough
- Emcee virtual events and handle technical logistics
- Coordinate logistics for the annual silent auction and wine tasting held at the Church of the Holy Trinity in West Chester, PA
- Member of events and technologies sub-committees

West Chester University Nobel Peace Prize Nomination Co-Coordinator (11/2016 – Present)
- **2021 Prize**
  - Served as a guest facilitator for HON353: Norway's Nobel Idea for Promoting Peace and Developing Leaders
  - Served as co-director of the Nobel Peace Leadership Series

    - Collaborated with undergraduate student John McSweeney, Dr. Charles Hardy, Professor of History and Dr. Kevin Dean, Professor and Director of the Honors College, in final nomination letter submitted to the Norwegian Nobel Peace Institute, January 2021
    - Co-facilitate events between the Nobel Peace Leadership Series and Nobel Peace Prize Committee Vice-Chair, Dr. Henrik Syse
- **2020 Prize**
    - Served as a volunteer Teaching Assistant for HON353: Norway's Nobel Idea for Promoting Peace and Developing Leaders
    - Served as co-director of the Nobel Peace Leadership Series
    - Collaborated with Dr. Charles Hardy and Dr. Kevin Dean in final nomination letter submitted to the Norwegian Nobel Peace Institute, January 2020
- **2019 Prize**
    - Served as a Teaching Assistant for HON355: Norway's Nobel Idea for Promoting Peace and Developing Leaders)
    - Served as co-director of the Nobel Peace Leadership Series
    - Managed logistics for the 2019 Nobel Peace Leadership Series for the Office of Student Leadership and Involvement and the Honors College
    - Attended the 2019 Nobel Peace Prize Award Ceremony in Oslo, Norway as a special guest of the Vice-Chair of the Norwegian Nobel Committee
    - Collaborated with Dr. Charles Hardy and Dr. Kevin Dean in final nomination letter submitted to the Norwegian Nobel Peace Institute, January 2019
- **2018 Prize**
    - Member of the five student delegation to Oslo, Norway in December 2018 as a special guest of the Norwegian Nobel Institute
    - Created the Nobel Peace Leadership Series, in collaboration with an Honors Class (HON355: Norway's Nobel Idea for Promoting Peace and Developing Leaders) to engage the campus in learning about the history of both the prize, its laureates, Alfred Nobel, and ethical leadership
    - Revised the Nominee Selection Process to give Honor Societies the ability to nominate potential candidates, participants of the Nobel Peace Leadership Series to narrow down the initial list to a final three, and students in HON355 to act as the Nobel committee and come to a consensus on West Chester University's 2018 prize nominee
    - Created first draft and collaborated with Dr. Charles Hardy and Dr. Kevin Dean in final nomination letter submitted to the Norwegian Nobel Peace Institute, December 2017
    - Met one-on-one with Dr. Henrik Syse, Vice Chair of the Nobel Peace Prize Selection Committee, to better promote the Nobel Peace Leadership Series and further develop the partnership between the West Chester University Honors College and Norwegian Nobel Peace Institute
- **2017 Prize**
    - Championed the first nomination for the Nobel Peace Prize on behalf of collegiate students in history
    - Led vetting process, among over 200 honors students, in identifying and narrowing candidates to a final three, subsequently voted on by members of the Honors Student Association
    - Created first draft and collaborated with Dr. Charles Hardy, Professor of History and Dr. Kevin Dean in final nomination letter submitted to the Norwegian Nobel Peace Institute, December 2016

Campus Engagement Request for Proposal Committee (4/2018 – 8/2018)
- Committee tasked with choosing the next Campus Engagement platform for West Chester University's 285+ clubs and organizations
- Only student to serve on committee

West Chester University Conduct Board Student Member (8/2016 – 8/2018)
- Responsible for hearing cases of crimes occurring on campus and of crimes committed by WCU students in the borough of West Chester

Professional Memberships

Association of Computing Machinery (ACM) (3/2021 – Present)

Omicron Delta Kappa (11/2020 – Present)

- Inducted November 2020 as the West Chester University's 2020 Honoris Causa (Honorary Member) for unprecedented vision, sustained leadership, and dedication to bringing West Chester University international recognition through the establishment of the Nobel Peace Leadership Series and for building a strong connection between the university and the Norwegian Nobel Institute

Lambda Pi Eta (5/2019 – Present)

- Inducted Spring 2019 for ranking within the top 35% of class and holding a minimum Communication Studies GPA of 3.25

Upsilon Pi Epsilon (3/2018 – Present)

- Student founder of West Chester University's Chapter
- Authored chapter by-laws and constitution
- President (3/2018 – 5/2019)
- Inducted Spring 2018 for holding a minimum 3.50 Computer Science GPA and 3.25 overall GPA