Michael Holm

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Department of Energy Q-Level (Top Secret Equivalent) Security Clearance

Education

Iowa State University, Ames, IA

- **B.S. Mechanical Engineering** (GPA: **3.97**)
- **M.S. Mechanical Engineering and Computer Engineering** (GPA: **4.00**)

Purdue University, West Lafayette, IN

- **Ph.D. Mechanical Engineering** (GPA: **4.00**)
    - *Focus on Scientific Machine Learning*

Work History

Purdue University, West Lafayette, IN

- Graduate Research Assistant *(Fall 2024 – Present)*
    - Collaborated with a multi-disciplinary team to apply scientific machine learning techniques towards prediction of material degradation in nuclear fusion-reactor-like environments
        - Explored the use of diffusion models for the prediction of this material degradation
        - Studied the efficacy of differential equation discovery for the prediction of this degradation
    - Investigated the application of neural operators and equation discovery techniques towards the creation of noise-tolerant scientific machine learning methods

Sandia National Lab, Albuquerque, NM

- Technical Internship to Advance National Security (*Summer 2023 – Present*)
    - Employed machine learning and data science to solve problems that were unsolvable using conventional techniques
        - Further project details restricted under Executive Order 13556
    - Won the Sandia National Lab Deep Learning Hackathon by creating a highly accurate conditional GAN for the MNIST dataset as part of a competing team
    - Presented a tutorial at the annual Sandia National Labs Machine Learning/Deep Learning workshop concerning dimensional reduction techniques for time series data
    - Deployed a containerized Python environment for use as a standard development environment

Iowa State University, Ames, IA

- Virtual Reality Applications Center Graduate Research Assistant *(Spring 2022 – Spring 2024)*
    - Utilized point clouds, Python, and unsupervised learning techniques to create digital twins of real-world objects
    - Employed the Unity Game Engine to create a digital twin of a large manufacturing floor, which was demonstrated to project managers in a virtual environment
    - Led in the creation of a virtual reality experience of an aircraft carrier, including animated aircraft and sounds, using the Unity Game Engine, for us use as a demo to public and private tour groups
    - Led many public and private tours of our lab, to spread interest in STEM and VR applications
    - Operated in a multidisciplinary team environment, learning how to effectively communicate technical topics to those without subject matter knowledge

Iowa State University, Ames, IA

- Virtual Reality Applications Center Undergrad Research Assistant *(Spring 2019 - Fall 2021)*
    - Implemented Arduino and breadboard prototyping to create a rig that could translate the physical movements of a road bike into a virtual environment
    - Used Eagle PCB to create production grade PCBs used in the final product of this road bike rig
    - Gathered and evaluated data for the training of a convolutional neural network used to power a virtual self-driving car in the Unity Game Engine

- Created and textured 3D models of real-world traffic conditions in Blender to use in a virtual environment

Danfoss, Ames, IA

- Additive Manufacturing Engineering Intern *(Summer 2021 - Fall 2021)*
  - Operated 3D printers of technologies including SLA and composite, metal, plastic, and large format FDM
  - Employed generative design software to optimize parts for 3D printing processes

Activities

Volunteer Mentor, FIRST Robotics Team Neutrino *(Spring 2022 – Spring 2024)*

- Supported high school robotics team members in basic mechanical analysis and safe engineering practices

Human-Computer Interaction (HCI) Student Group, Treasurer and Graduate Professional Student Senate representative *(Fall 2022 – Spring 2023)*

- Managed a several hundred-dollar budget for the HCI student group, helping to plan socials and orientation events
- Represented the HCI department for Iowa State's Graduate Professional Student Senate, presenting issues and concerns that my HCI constituents came to me with

Vice-President and President, Team PrISUm Solar Car *(Spring 2019 - Fall 2021)*

- Led a team of 40+ engineers in designing and manufacturing our team's fifteenth solar car, Eliana
- Managed the 50+ companies and individuals that sponsor the team
- Planned and maintained a budget of $500,000+
- Competed in the Formula Sun Grand Prix, in which we placed third after not competing for 3 years

Awards & Honors

Frederick N. Andrews Ph.D. Fellowship *(2024)*
Presidential Excellence Ph.D. Award *(2024)*
Iowa State University Research Excellence Award *(2024)*
Summa Cum Laude Graduation from Iowa State *(2022 & 2024)*
NASA ISGC Undergraduate Merit Scholar *(2021)*
Iowa State College of Engineering Outstanding Club Leader of the Year *(2021)*
Eagle Scout *(2017)*

Known Software, Languages, & Skills

Languages: Python, MATLAB, C++, C#
Development Platforms and IDEs: Git, Unity Game Engine, Oculus Quest, Visual Studio, PyCharm
CAD Software: Inventor, Fusion 360, Siemens NX, Eagle PCB, Cura, Generative Design, Netfabb, Blender
Simulation: Star CCM, Ansys Workbench, Altair VWT
Manufacturing: CNC Milling, Soldering, 3D Printing, Metal Lathe Machining, Welding, Carbon-fiber layups

Publications

1. **Holm, M.**, Winer, E. *(2024)*. Two Automated Point Cloud Filtration Approaches using Principal Component Variance and Nearest Neighbor Distance - Journal of Imaging Science and Technology
2. **Holm, M.**, Winer, E. *(2024)*. Automated Point Cloud Filtration Through Minimization of Point Cloud Metrics - The London Imaging Meeting
3. **Holm, M.**, Miller, J., Kohl, A., & Winer, E. *(2022)*. - Streamlining Point Cloud Post-Processing Using Principal Component Variance, Distribution Evaluation, and Other Statistical Metrics - The Interservice/Industry Training, Simulation and Education Conference
4. Miller, J., Kalivarapu, V., **Holm, M.,** Finseth, T., Williams, J., & Winer, E. *(2020)*. - A Flexible Multi-Modal Multi-User Traffic Simulation for Studying Complex Road Design - ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference