



## Michael Holm

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Department of Energy Security Clearance

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### Education

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#### 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*

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### Work History

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#### 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*)
  - Received a Department of Energy security clearance
  - 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 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

**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

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## Activities

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**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

**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

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## Awards & Honors

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**RADM Fred Lewis I/ITSEC Postgraduate Scholarship** (*2025*)

**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*)

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## Known Software, Languages, & Skills

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**Languages:** Python, MATLAB, C++, C#, JavaScript

**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

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## Publications

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1. Matthews, N., **Holm, M.**, Gali, A., Renner, A., Winer, E. (2025). Automated Camera Calibration (ACC): A Python GUI Application for Automatically Calculating Camera Intrinsics with Arri Camera Systems - SoftwareX
2. **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
3. **Holm, M.**, Winer, E. (2024). Automated Point Cloud Filtration Through Minimization of Point Cloud Metrics - The London Imaging Meeting
4. **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
5. 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