ALEX HAGEN
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EDUCATION

Jan. 2009 - May 2018 Purdue University
- ⇒ Doctorate of Philosophy in Nuclear Engineering, GPA 3.60, *May 2018*
- ⇒ Master of Science in Nuclear Engineering, GPA 3.73, Minor in Computational Science and Engineering, *August 2014*
- ⇒ Bachelor of Science in Nuclear Engineering, GPA 3.48, *May 2012*

Experience

May 2018 - Present Data Scientist - Pacific Northwest National Laboratory
- ⇒ Investigated techniques spanning the gap between data science techniques and nuclear detection
- ⇒ Developed custom machine learning techniques to guide design of detectors for treaty verification
- ⇒ Profiled and decreased computational cost of machine learning techniques for high energy physics analysis (related to uBooNE and BelleII experiments)
- ⇒ Simulated and analyzed data from germanium detectors for low activity isotope identification and quantification

Oct 2010 - Apr. 2018 Researcher - Metastable Fluid Research Laboratory
- ⇒ Performed successful proof of concepts for 4 new special nuclear material interdiction methods
- ⇒ Developed Tensioned Metastable Fluid Detectors for use in active interrogation for the DHS/DNDO
- ⇒ Developed validation method and multiphysics simulation of Acoustically Tensioned detector systems
- ⇒ Extended previous work on acoustics simulation of Acoustically Tensioned detector systems
- ⇒ Evaluated photon detection capabilities of Centrifugally Tensioned detector system

Dec. 2012 - Apr. 2018 Engineering Consultant - Sagamore Adams Laboratories, LLC.
- ⇒ Conceptualized, designed, and characterized 2 novel neutron detector systems that were released to market
- ⇒ Upgraded neutron detection systems per customer requirements for homeland security applications

May 2011 - Aug. 2011 Undergraduate Laboratory Intern - Argonne National Laboratory Nuclear Engineering Division
- ⇒ Validated multiphysics fission reactor simulation against legacy codes and experiment

Jan. 2009 - Jan. 2011 Industrial Design Assistant - Steiner Enterprises
- ⇒ Designed, drafted, and prototyped products as part of a small team for the education industry
- ⇒ Developed 6 products from concept to production for the marketplace
- ⇒ Sourced, revised, or formalized the machine drawings and designs of over 30 other products

SELECTED PUBLICATIONS AND CONFERENCE PRESENTATIONS

⇒ **A. Hagen**, E. Church, J. Strube, K. Bhattacharya, and V. Amatya. "Scaling the training of particle classification on simulated MicroBooNE events to multiple GPUs." In: *Proceedings of the 19th International Workshop on Advanced Computing and Analysis Techniques in Physics Research* (Sept. 2019)

⇒ E. J. Kautz, **A. Hagen**, J. M. Johns, and D. E. Burkes. "A machine learning approach to thermal conductivity modeling: A case study on irradiated uranium-molybdenum nuclear fuels." In: *Computational Materials Science* 161 (Apr. 2019), pp. 107–118

⇒ T. F. Grimes, A. Hagen, B. C. Archambault, and R. P. Taleyarkhan. "Enhancing the performance of a tensioned metastable fluid detector based active interrogation system for the detection of SNM in <1 m 3 containers using a D-D neutron interrogation source in moderated/reflected geometries." In: *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* (Dec. 2017)

⇒ B. C. Archambault, **A. Hagen**, K. Masuda, N. Yamakawa, and R. P. Taleyarkhan. "Threshold rejection mode active interrogation of SNMs using continuous beam DD neutrons with centrifugal and acoustic tensioned metastable fluid detectors." In: *Symposium on Radiation Measurements and Applications*. Berkeley, CA: IEEE, 2016

⇒ A. R. Hagen, T. F. Grimes, B. C. Archambault, T. N. Harris, and R. P. Taleyarkhan. "Characterization and Optimization of a Tensioned Metastable Fluid Nuclear Particle Sensor Using Laser-Based Profilometry." In: *Journal of Nuclear Engineering and Radiation Science* 1.4 (Sept. 2015), p. 41004

⇒ **A. Hagen**, T. F. Grimes, B. C. Archambault, T. N. Harris, and R. P. Taleyarkhan. "Characterization and Optimization of a Tensioned Metastable Fluid Nuclear Particle Sensor Using Laser Based Profilometry." In: *Proceedings of the International Conference on Nuclear Engineering*. Prague, Czech Republic: ASME, July 2014, V005T17A036–V005T17A036

⇒ R. P. Taleyarkhan, J. Lapinskas, B. Archambault, J. A. Webster, T. F. Grimes, A. Hagen, K. Fisher, S. McDeavitt, and W. Charlton. "Real-time monitoring of actinides in chemical nuclear fuel reprocessing plants." In: *Chemical Engineering Research and Design* 91.4 (Apr. 2013), pp. 688–702

⇒ R. P. Taleyarkhan, B. C. Archambault, A. Sansone, and A. Hagen. "Femto- to Macro- Scale Interdisciplinary Sensing with Tensioned Metastable Fluid Detectors." In: *IEEE Sensors Demonstrations*. Orlando, FL: IEEE, 2016

⇒ B. Archambault, T. F. Grimes, J. A. Webster, N. W. Wilson, A. Hagen, K. Fischer, and R. P. Taleyarkhan. "Development of a 4π directional fast neutron detector using tensioned metastable fluids." In: *2012 IEEE Conference on Technologies for Homeland Security (HST)*. IEEE, Nov. 2012, pp. 423–428

⇒ N. Hume, J. A. Webster, T. F. Grimes, A. Hagen, R. P. Taleyarkhan, and B. C. Archambault. "The MAC-TMFD: Novel multi-armed Centrifugally Tensioned Metastable Fluid Detector (Gamma-Blind) & Neutron-alpha recoil spectrometer." In: *2013 IEEE International Conference on Technologies for Homeland Security (HST)*. IEEE, Nov. 2013, pp. 435–440

⇒ J. A. Webster, A. Hagen, B. C. Archambault, N. Hume, and R. P. Taleyarkhan. "High Efficiency Gamma Beta Blind Alpha Spectrometry for Nuclear Energy Applications." In: *Proceedings of the International Conference on Nuclear Engineering*. ASME, July 2014, V005T17A054–V005T17A054

⇒ A. Bakken, N. Boyle, B. Archambault, A. Hagen, N. Kostry, K. Fischer, and R. Taleyarkhan. "Thermal and ionizing radiation induced degradation and resulting formulation and performance of tailored poly(lactic acid) based hot melt adhesives." In: *International Journal of Adhesion and Adhesives* 71 (2016)

PATENTS

⇒ Taleyarkhan, Bakken, Fisher, **Hagen**, Kostry. Polylactic acid adhesive compositions and methods for their preparation and use. *World Patent # WO2014078720A1*, 2014

LEADERSHIP AND COMMUNITY ROLES

⇒ *Aug. 2018 - May 2020* Member of PNNL's Scientist and Engineer Development Program
⇒ *Aug. 2012 - May 2017* President of NEGO (Nuclear Engineering Graduate Organization)
⇒ *Aug. 2014 - May 2016* Chair of Purdue Graduate Student Government (PGSG) Advancment Committee
⇒ *Aug. 2015 - May 2016* Clerk of Purdue Graduate Student Government
⇒ *Aug. 2013 - May 2016* Senator representing Nuclear Engineering to Purdue Graduate Senate
⇒ *May. 2011 - May 2012* President and Captain of Purdue Men's Club Soccer

HONORS AND AWARDS

⇒ *April 2019* Outstanding Performance Award for Modeling Hydrogen Radiolysis from Fukushima Fuel Debris Canisters
⇒ *July 2017* Received Best Paper Award at Intl. Conference on Nuclear Engineering 25
⇒ *May 2017* Department of Energy Innovation in Nuclear Technology R&D Award
⇒ *Nov. 2016* ANS Young Member's Group Best Paper Award
⇒ *Oct. 2016* IEEE Sensors Conference Demonstration 1st Prize
⇒ *Apr. 2016* Purdue Engineering Outstanding Service Award
⇒ *July 2014* Received Best Poster Award and Best Paper Award at Intl. Conference on Nuclear Engineering 22
⇒ *Dec. 2014* Nominated and received most votes for Magoon Teaching Excellence Teaching Assistant Award
⇒ *Dec. 2013* Nominated for Magoon Teaching Excellence Teaching Assistant Award
⇒ *May 2007* National Merit Scholar
⇒ *May 2006, May 2007* Indiana Delegate for International Science and Engineering Fair

AFFILIATIONS

⇒ American Nuclear Society
⇒ Health Physics Society
⇒ American Society of Mechanical Engineers

SKILLS

Scientific Programming
- C++ — 5 Years
- Python — 7 Years
- MATLAB — 10 Years

Deep Learning
- Keras — 2 Years
- Pytorch — 2 Years

Physical Simulation
- Geant4 — 2 Years
- MCNP — 3 Years
- COMSOL — 6 Years

Software Development
- Java — 3 Years
- Git — 4 Years
- C++ — 4 Years

Electronic and Firmware Development
- KiCAD — 2 Years
- Eagle — 2 Years
- Arduino — 3 Years

3d CAD
- Blender — 5 Years
- Solidworks — 8 Years