# Ian Sotnek

*Curriculum Vitae*

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## Education

2019–2020 **Master of International Policy & Practice**, *Elliott School of International Relations, George Washington University*, Washington, D.C., Advisor: Matthew Levinger.
Concentration in Artificial Intelligence Policy & Governance. **GPA: 3.59 / 4**

2017–2019 **Doctor of Philosophy (Dropout)**, *University of Delaware*, Newark, DE, Advisor: Dr. John Jeka.
Voluntarily withdrew after passing qualifying exam. **GPA: 3.73 / 4**

2016–2017 : **Master of Science, Exercise & Sport Science**, *Merrimack College*, North Andover, MA.
**GPA: 3.89 / 4**

2012–2016 : **Bachelor of Science, Exercise Science**, *University of Connecticut*, Storrs, CT).
**GPA: 3.43 / 4**

## Publications

### Journal Articles

2022 Jacob Renn, **Ian Sotnek**, Benjamin Harvey, and Brian Caffo. The multiple subnetwork hypothesis: enabling multidomain learning by isolating task-specific subnetworks in feedforward neural networks. *arXiv preprint arXiv:2207.08821*, 2022.

2018 Fernando Santos, Jaclyn B Caccese, Mariana Gongora, **Ian Sotnek**, Elizabeth Kaye, Felipe Yamaguchi, and John Jeka. Greater exposure to repetitive subconcussive head impacts is associated with vestibular dysfunction and balance impairments during walking. *Neurology*, volume 91, pages S27–S27. AAN Enterprises, 2018.

2018 Jaclyn B Caccese, Fernando Vanderlinde Santos, Mariana Gongora, **Ian Sotnek**, Elizabeth Kaye, Felipe Yamaguchi, and John Jeka. History of undiagnosed concussion is associated with concussion-like symptoms following subconcussive head impacts. *Neurology*, volume 91, pages S26–S27. AAN Enterprises, 2018.

### In Conference Proceedings

2018 Fernando Vanderlinde Santos, Jaclyn Caccese, Mariana Gongora, **Ian Sotnek**, Felipe Yamaguchi, and John Jeka. The effects of subconcussive head impacts on vestibular processing and balance during walking. Society for Neuroscience, 2018.

2018 Michael P Corcoran, **Ian Sotnek**, Jonathan Lashyn, Jordan Vetter, and Domenic DiSisto. The effect of two low-dose strength/balance programs on the physical function of mobility-limited older adults. American College of Sports Medicine, 2018.

## Research Experience

2021 – Present ***Establishing Trustworthiness for Performance Maximization in Human-Machine Teams***.
Working under a Cooperative Research and Development Agreement between AI Squared, inc. and the National Security Agency's Research and Cybersecurity Directorates to create conceptual models of human-machine teams (HMTs) in order to understand where trust in such a system can break down and opportunities for providing human team members information (e.g. the internal state of a model) in order to enhance the performance of HMTs.

2020 – Present ***Testing the Multiple Subnetwork Hypothesis***.
Contributing to the experimental evaluation of a novel technique for developing sparse & multi-task/multidomain artificial neural networks (ANNs). Created custom Keras and PyTorch layers to allow developers to utilize this technique as part of the BeyondML open-source project. Explored the implications of this approach for improving ANNs' robustness to adversarial inputs and performance in resource-constrained environments.
Advisor : **Dr. Jacob Renn**, *CTO, AI Squared*

2017 – 2019 ***Balance Control During Walking in Children with Cerebral Palsy***.
Investigated the degree to which proprioceptive deficits in children with cerebral palsy (CP) affect control of balance during locomotion. Utilized motion capture (including calculation of inverse kinematics and dynamics), ground reaction forces, and electromyography to study the activation of balance control mechanisms in children with CP in response to sensory perturbation (glavanic vestibular stimulation & visual scene rotation) while subjects walked within a custom-built virtual reality environment on an instrumented treadmill.
Advisor : **Dr. John Jeka**, *Professor, College of Health Sciences*, University of Delaware

2017 – 2018 ***Activation of Compensatory Balance Mechanisms while Walking on Compliant Surfaces***.
Examined the degree to which walking across a compliant surface downweights proprioceptive inputs. Utilized galvanic vestibular stimulation, motion capture (including calculation of inverse kinematics and dynamics), ground reaction forces, and electromyography to study the utilization of balance control mechanisms in healthy subjects while they walked on a compliant surface.
Advisor : **Dr. John Jeka**, *Professor, College of Health Sciences*, University of Delaware

2016 – 2017 ***Improving Physical and Cognitive Performance of Older Adults with Physical Activity***.
Designed and implemented physical activity programme for mobility-limited older adults to establish the dose-response relationship between physical activity frequency, duration, and intensity and measures of physical fitness and cognitive acuity.
Advisor : **Dr. Michael Corcoran**, *Associate Professor, School of Nursing & Health Sciences*, Merrimack College

## Awards & Fellowships

2020 ***National Science Foundation Innovation Corps Grant*** of $50,000 to develop and explore the commercialization of a technology to provide object provenance within the machine learning life cycle

2018 ***Summer Doctoral Award*** of $3,300 USD from the University of Delaware to fund proposal: *Balance Control Deficits During Walking in Children with Cerebral Palsy*.

## Teaching Experience

Spring, 2019 **KAAP 428: Motor Control & Learning**, University of Delaware.
Student Evaluation: 4.71 / 5

Fall, 2018 **KAAP 428: Motor Control & Learning**, University of Delaware.
Student Evaluation: 4.71 / 5

Spring, 2018 **KAAP 428: Motor Control & Learning**, University of Delaware.
Student Evaluation: 4.44 / 5

Fall, 2017 **KAAP 428: Motor Control & Learning**, University of Delaware.
Student Evaluation: 4.09 / 5

Spring, 2017 **HSC 2300: Introduction to Nutritional Science**, Merrimack College.

Fall, 2016 **HSC 2300: Introduction to Nutritional Science**, Merrimack College.

Fall, 2016 **HSC 1122: Anatomy & Physiology I**, Merrimack College.

## Employment History

2020–Present **AI Squared, inc.**, *Co-Founder & Director of Product*.
Co-Founded a startup backed by blue-chip venture capitalists. Designed & oversaw the creation of a flexible, extensible product to make AI more accessible to knowledge workers in large organizations. Communicated about the product to technical & non-technical audiences in podcasts, written articles, and live presentations at industry conferences.

2021 **Maxar Technologies**, *Data Science Intern*.
Applied computer vision and advanced mapping techniques to COVID-19 risk modelling.

## Projects

2020–Present **BeyondML**, *Co-Creator & Contributor*.
Co-Created open-source software project, BeyondML, which was adopted as a Sandbox project by the Linux Foundation. BeyondML is a framework to reduce the computational overhead of AI through quantization and pruning, while applying the algorithms identified through the *Multiple Subnetwork Hypothesis* project to allow users to train multitask, multi-domain neural networks in TensorFlow and PyTorch. We are currently exploring sparse activation functions and applying our methodologies to neuromorphic software.

## Skills

Programming Languages: Python (Pandas, NumPy, TensorFlow, PyTorch, etc.), LabVIEW, MATLAB

Technologies: Linux, LaTeX, Microsoft Office, Git

## Mentorship

Nov. 2022 **Industry Mentor**, National Security Agency University Showcase.
Mentored a team of graduate and undergraduate computer science students from Bowie State University and Fayetteville State University as they prepared a presentation & technical demonstration of Human-AI teaming for NSA leadership and industry sponsors.