

# Kenneth Brezinski, PhD, EIT, CTech, CIT, PMP

*Industrial Controls and Data Science*

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kbrezinski.github.io

## Key Qualifications

- Engineer In Training (EIT), Certified Technician (CTech), and Chemist In Training (CIT) industrial controls specialist focusing on water and wastewater systems.
- Hands-on experience with IO lists, loop drawings, graphic standards, control narratives, process control applications, alarm management, FAT/SAT, control cabinet design.
- Experience in programming Allen Bradley (1769 and 5069) and Schneider (M340, M580 and SCADAPack) PLCs; SCADA development with VTScada and Ignition 8.1.
- Advanced knowledge of networking concepts (Network+ and CCNA topics) for IT and OT network deployment and cybersecurity assessments (per IEC 62443), including intrusion prevention and endpoint products.
- PhD graduate in applied deep learning for enterprise malware threat detection, with experience programming big data, and large scalable graph, transformer, image and DNN frameworks.

## Work Experience

**Systems Designer, Water & Wastewater**, *WSP Canada, Winnipeg, Canada* 05/23-present

- Work with the Water & Wastewater Industrial Controls and Automation Group on developing water and wastewater solutions for the prairie region of Canada.
- Design requirements and equipment selection for control panels (120-480VAC), including main and marshalling panel enclosures, UPS (inc. bypass), power supplies, networking (firewalls, switches), fuses, terminal blocks, relays; grounding, cable scheduling.
- Equipment selection (4-20mA and 0-10V loops) for pumps, flow, pressure, temperature, transmitters, building alarms; VFD and MCC selection and requirements.
- Participate and lead SCADA workshops, PCN discussions; author SCADA masterplans and Division 13 and 16 Specifications.
- Carrying out water treatment plant assessments, investigations, and process design & system optimization; including carrying out aqueous modelling of complex systems in the water, wastewater, mining, and oil and gas sector using Geochemist Workbench.
- Lead proposal efforts and respond to request for proposals for new contracts with industrial and municipal clients.

**Visiting Researcher**, *National Institute for Informatics, Tokyo, Japan* 09/22-12/22

- Develop a graph autoencoder to detect network anomalies from backbone network traffic connecting Japanese Academic institutions to North America.
- Automate firewall rule generation using node embeddings, GNNExplainer and explainable AI (SHAP and LIME) and scale the application to billions of network packets daily using Pytorch Geometric.
- Generated an internal code library that can autonomously track scanners, DDoS and other type of anomalous networking behavior based on PCAP files.

**Impact:** Scaled the application to billions of incoming network packets daily which can be interpretable by Security Operators to follow up on network anomalies. Currently publishing the findings.

**Data Scientist Intern, Microsoft, Redmond, WA**

05/22-08/22

- Worked with the Windows Defender for Endpoint Team on developing a supervised ML detector to alert customers in the early stages of an exfiltration or ransomware attack
- Used PySpark and cross-product telemetry from the M365 product suite to amplify the feature set and tested several ML models based on tradeoffs in True Positive and False Positive coverage based on customer pain points
- Coordinated with Data Scientists, Security Engineers and Threat Researchers on establishing the best feature set available at run-time based on latency considerations

**Impact:** Worked to improve the signal-noise-ratio of a detector to 80% and to scale to billions of live customer events; authored documentation and presented to sister Windows Defender security teams

**Applied Research Scientist II Intern, Amazon Web Services, New York, NY**

05/21-08/21

- Worked with the Amazon GuardDuty threat detection research team on developing a novel meta-learner to apply weak labels to Linux binaries
- Developed internal tools to be leveraged by the research team to apply fuzzy labels to ELF binaries collected by an AWS honeypot

**Impact:** The completed work allows for the training of large models with a fraction of the available labeled data required, thereby leading to faster validation and monitoring of existing model endpoints.

**Research Intern Lead, Canadian Tire Corp., Winnipeg, MB**

10/19-10/22

- First authored six publications over a 3-year period in close collaboration with Canadian Tire executives with a focus on Malware detection of enterprise security threats.
- Worked on projects including but not limited to: Heterogenous graph and Graph-Attention Networks for the classification of malicious Windows OS and kernel API calls using Torch Geometric; Custom tokenizer and Transformer model for detecting malicious stack traces using HuggingFace and PyTorch. Incorporated Kolmogorov Fractal Dimension in a Convolutional Neural Network architecture for the categorical classification of 9300+ malicious binaries into 25 Malware families with Tensorflow.

**Impact:** Met quarterly with the CIO of Canadian Tire and other executives, and established the long term needs of their next generation of security deployments through the published research

	Technical Skills
Programming	Python (Pytorch, Tensorflow, Geometric PySpark, Git, JAX, Flax, AWS-EMR), Java, Matlab, LaTeX, MLOps (Docker, Streamlit, Plotly, MLFlow, Kinesis)
PLC / SCADA	RSLogix 500, Designer 5000, SCADAPack workbench, AB Architecture Builder, Ignition 8, ControlExpert
Malware Analysis	Static analysis tools such as PE View, Bintext, Dependency Walker, PEiD, OllyDBG, IDAPro; Dynamic tools such as Procmon, BurpSuite, Wireshark, API monitor; Splunk
Other	AutoCAD Electrical

**Professional Memberships**

ISA	<b>Member</b> , Industrial Society for Automation
EngGeoMB	<b>Engineer In-Training (EIT)</b> , Engineers Geoscientists Manitoba
CTTAM	<b>Certified Technician (C.Tech.)</b> , Certified Technicians & Technologists Association of

PMI **Project Management Professional (PMP)**, Project Management Institute  
ACPA **Chemist in Training (C.I.T.)**, Association of the Chemical Profession of Alberta  
WCW **Member**, Western Canada Water  
WEF **Member**, Water Environment Foundation

## Education

08/18-08-24 **Doctor of Philosophy**, *University of Manitoba*, Winnipeg, MB.  
Electrical and Computer Engineering

01/16-09/18 **Master of Science**, *University of Manitoba*, Winnipeg, MB.  
Civil Engineering

08/10-08/15 **Bachelor of Science**, *University of Winnipeg*, Winnipeg, MB.  
Chemistry

## Publications

A full list of my publications can be found on my [personal site](#).