GRAHAM NASBY, P.Eng., FS Eng., PMP, CAP, CISSP, CISM

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www.linkedin.com/in/grahamnasby

OT CYBER SECURITY LEADER

Graham Nasby is an industry-recognized leader in the OT (operational technology), SCADA and industrial automation sector for his efforts in cyber security best practices, standards development, alarm management, and operational efficiency. Through his work with ISA, CSA, ANSI and IEC, he has co-authored international standards on systems design, cyber security, industrial automation, alarm management, and HMI systems. Graham has multi-industry experience, ranging from technical to project/program management, in the pharmaceutical, water/wastewater, nanotechnology, process, and rail transport industries. His background includes operations, capital projects, construction, program development, and developing long-term technology roadmaps. As a technical and thought leader, Graham is a frequent author of industry articles and invited speaker at industry events.

CAREER HIGHLIGHTS

- Led the development of ISA112 SCADA Management Lifecycle workflow, now used by critical utilities across North America.
- Co-authored technical bulletin published by MECP clarifying Form 2 compliance requirements for Ontario drinking water systems.
- Wrote 25-year SCADA capital plan and roadmap for Guelph Water, based on condition assessments and industry best practices.
- Developed new Guelph Water SCADA design/code standards/templates/tools, driving a 75% labour savings on SCADA projects.
- Eight of the college/university co-op students who I mentored and supervised have gone onto operational technology careers.
- Fifteen years of experience managing capital projects from $30M to $20MM in multiple industries (W/WW, pharma, SCADA).

SPECIALTIES

strategy | long-term & master planning | program planning | resource planning | condition assessments | budgeting/scheduling capital projects | project management | construction sequencing | drawing/spec review | tendering | contract administration presentations | technical reports | meeting facilitation | supervision | training | managing in union & non-union environments

cybersecurity design and best practices | network/routing design | high performance HMI | safety instrumented systems technology roadmaps | needs analysis | new technology evaluation | risk analysis | budget justification/monitoring/control automated control system design | SCADA/HMI systems | alarm management | instrumentation | electrical design process systems | start-up/commissioning | water/wastewater treatment systems | on-site troubleshooting | negotiation

LICENSURE & CERTIFICATION

P.Eng., Professional Engineer – Professional Engineers Ontario (PEO) – since 2010
FS Eng., Functional Safety Engineer: Safety Instrumented Systems – TÜV Rheinland – since 2014
PMP, Project Management Professional – Project Management Institute (PMI) – since 2010
CAP, Certified Automation Professional – International Society of Automation (ISA) – since 2012
CISSP, Certified Information Systems Security Professional – ISC^2 – since 2022
CISM, Certified Information Systems Manager – ISACA – since 2022
Water Treatment and **Water Distribution and Supply** Operator Certificates – Ontario Water/Wastewater Certification Office
Wastewater Treatment and **Wastewater Collection** Operator Licenses – Ontario Water/Wastewater Certification Office
Management Freight Train Conductor, Rules-Qualified (CROR), Conductor Qualified – CN Rail – since 2023

INDUSTRY RECOGNITIONS

Standards Excellence Award (2021), International Society of Automation
For exceptional leadership and/or technical knowledge essential to the organization, development and/or administration of ISA standards to advance the mission of the Society. For contributions to the ISA112 SCADA management standard, and to the ISA18 / ISA101 series of standards.

Top Co-op Employer Award (2017), University of Guelph
Recognition of an annual SCADA co-op student program that I launched in 2017 provide 4-month SCADA programming/design co-op placements.

Mid-Career Achievement Award (2014), School of Engineering, University of Guelph (Guelph, Ontario, Canada)
Recognizes an alumnus who has graduated from the University of Guelph in the last 10 to 25 years, and who has earned respect within the profession and in the broader community, and one who has already attained significant achievement and gives promise to future contributions.

Volunteer Leader of the Year (2013) & Technical Division Leader of the Year (2013), International Society of Automation
The ISA has 30,000 members world-wide. One award is given out per year at the ISA Annual Awards Gala (Nashville, TN, USA in 2013). Recognized for revitalizing a struggling technical conference, committee work, and contributions to municipal water/wastewater sector.

Nominated for the 2012 Allen D Williams Award, Association of Consulting Engineering Companies – Canada (ACEC)
National award program in Canada for promising young professionals (under 35) in consulting engineering. One award is given out annually.

Keith Otto Award (2011), International Society of Automation
For best article of the year in ISA InTech magazine. "SCADA Standardization: Past, Present and Planning for the Future," May/June 2011.

Leaders Under 40: Class of 2011, Control Engineering magazine
Featured in the October 2011 issue of Control Engineering.

RECENT PUBLICATIONS

Presentations

Nasby, G. (2023). "**Securing Critical OT Systems in a Railroad – Pitfalls and Best Practices**." Rail Cyber Senate. May 23, 2023. Chicago IL USA.

Nasby, G. (2022). "**Introducing ISA62443/IEC62443 Series of Cybersecurity Standards & Applying them to Municipal Water SCADA Systems**." 2022 Canadian National Water/Wastewater Conference. Jan 2022. Invited speaker.

Nasby, G. (2021). "**Permissives, Interlocks, Control Schemes, and Alarms: Using Better Terminology to Make SCADA Systems Easier to Design, Build, Understand and Use**." 2021 Ontario Water Conference. Ontario Water Works Association. Apr-May 2021.

Nasby, G. (2019). "**Operational Dashboards to monitor watermain flow patterns, towers, and real-time pumping electricity costs per m3**." 2019 OWWA Automation Workshop. Ontario Water Works Association. Nov 6, 2019. Mississauga, Ontario, Canada

Nasby, G. (2017) "**Current Trends in SCADA Systems: Situational Awareness, Alarm Management, Data Availability and System Redundancy.**" OWWA Source to Tap Workshop. Ontario Waterworks Association. Oct 2, 2017. Timmins, Ontario. Invited Speaker.

Articles

Nasby, G. (2022) "**Cybersecurity and our Municipal Water Infrastructure: Identifying and Mitigating Threats**." Water Source. Spring 2022. pp.6-7.

Nasby, G. (2018) "**ISA112 Committee Releases SCADA System Workflows & Architectures**." ISA W/WW newsletter. Winter 2019. pp. 8-10.

Nasby, G. (2014) "**Workforce Development: It's a Team Effort**." ISA InTech magazine. Aug/Sept 2014. p. 46.

Nasby, G. (2012) "**Using Process Flow Sheets as Communication Tools.**" Chemical Engineering Progress (AIChE). Oct 2012. pp. 36-44.

Technical Reports / Standards

CSA/ANSI-T200-2022 "**Evaluation of software development and cybersecurity programs.**"

ANSI/ISA-84.91.01-2021 **"Identification and Mechanical Integrity of Process Safety Controls, Alarms, and Interlocks in the Process Industry Sector."**

ISA-TR18.2.2-2018 "**Alarm Identification and Rationalization**."

ANSI/ISA-18.2-2016 & IEC-62682 "**Alarm Management for the Process Industries**."

ANSI/ISA-101.1-2015 "**Human Machine Interfaces**."

A full list of publications is available on www.grahamnasby.com under Publications.

PROFESSIONAL CONTRIBUTIONS

Committees:

Co-Chair, ISA112 SCADA Systems Management standards committee (2016 - present)
Leading a committee of 250+ industry experts to develop a new SCADA systems management standard. Expected publication in early 2024.

Managing Director & Voting Member, ISA18 Alarm Management standards committee (2010 - present), voting member since 2012
Responsible for maintenance of ISA-18.2 alarm management standard, facilitating the adoption of ISA-18.2 to the IEC-62682 standard.

Voting Member, ISA101 HMI Systems Management standards committee (2011 - present), voting member since 2017
Co-author of the recently released ANSI/ISA-101 HMI Design standard, facilitating the adoption of ISA101 to the IEC-63303 standard.

Voting Member, CSA P125 Operational Technology Functional Safety and Security, Canadian Standards Association (since 2019)
Bi-National committee, SCC/ANSI, focused on best practices and minimum requirements for OT system design, products, and operations.

Information Member, ISA99 Industrial Automation and Control Systems Security standards committee (since 2014)
Standards committee which develops and maintains the ISA/IEC-62443 series of industrial cybers security standards.

SCC/IEC-TC65/65A "Industrial Process Measurement, Control, and Automation" standards committee (since 2017)
Member of Canadian committee and IEC working groups for cybersecurity, HMI, and alarms, appointed by Standards Council of Canada (SCC)

ISA Hamilton Section, International Society of Automation, President 2014, 2022-2023, Secretary 2015-21, VP 2012-13

Enhanced Train Control (ETC) – Security Sub-Committee, Railway Association of Canada (RAC), (2022 – present)

Interoperable Train Control (ITC) – Security Sub-Committee, Association of American of Railroads (AAR), (2022 – present)

Formerly held positions:

Vice-President – Industries and Sciences, International Society of Automation (2016-2017 VP-elect, 2018-2019 VP)
Oversaw 10 of the ISA's global technical divisions, including technical divisions and conferences for seven different industry sectors.

Co-Chair, ISA18 WG7 "Alarm Management for Packaged Systems" standards working group (2012 - 2017)

Director, ISA Water/Wastewater Technical Division (2013-2015), Director-elect (2011-2012), Marketing Chair (2010)

General Symposium Chair – 2012 & 2013 ISA Water/Wastewater and Automatic Controls Symposiums (2011-2013)

AWWA Cybersecurity Sub-committee, American Water Works Association (2017 - 2022)

WEF Automation and Information Technology Committee, Water Environment Federation (2012 - 2022)

OWWA Automation Committee, Ontario Waterworks Association (2015 - 2022)

Newsletter Editor, ISA Water/Wastewater Technical Division, International Society of Automation (2013 - 2022)

MEMBERSHIPS

PMI - Project Management Institute | ISA - International Society of Automation – Senior Member | IEEE Control Systems Society
IEEE - Institute of Electrical and Electronic Engineers – Sr. Member | ACM - Association for Computing Machinery – Sr. Member
WEF - Water Environment Federation | WEAO - Water Environment Assoc. of Ontario | AWWA - American Water Works Assoc.
OWWA - Ontario Waterworks Association | AIChE - American Institute of Chemical Engineers | MEA - Municipal Engineers Assoc.

WORK EXPERIENCE

Senior Manager – OT Security Architecture (June 2022 – present)

CANADIAN NATIONAL RAILWAY COMPANY (CN Rail) – Guelph/Toronto, Ontario, Canada. *Head Office: Montreal*

CN operates a rail network of 20,000 route-miles of spanning Canada and the USA. Each year, CN's 25,000 railroaders transport more than $250 billion worth of goods. CN is one of the largest Class 1 Railroad companies in North America with more than 13,000 route pairings.

Responsible for leading the OT Security Architecture team to develop and maintain corporate OT security architecture design standards, policies, and best-practices to ensure both the security of critical systems and meeting business objectives.

Sessional Instructor, Evenings (2017 – present)

McMASTER UNIVERSITY, Faculty of Engineering – Hamilton, Ontario, Canada

I teach a 14-week evening course on engineering law and ethics. As of 2023, I have taught this evening course eleven times.

Water SCADA & Security Specialist (2015 – 2022)

CITY OF GUELPH, ENVIRONMENTAL SERVICES – Guelph, Ontario, Canada

Environmental Services provides Guelph's 140,000 residents and businesses clean, safe, and high-quality drinking water from a distributed ground water system that encompasses some 22 production wells, 35 water facilities, and over 600 km of distribution piping.

Responsible for leading the Water SCADA team that operates, designs, and maintains the automatic control systems that ensure Guelph continues to have a high-quality, and robust drinking water system. This includes process control systems, instrumentation, historical data collection, reporting systems, cyber security, and physical security. The role also encompasses developing and maintaining the long-term SCADA capital plan; SCADA asset lifecycle planning; SCADA condition assessments; prioritizing SCADA investments; overseeing and planning SCADA capital upgrades; managing consultants and contractors; managing support contracts, warranties, and spare parts strategies; and coordination with other functional groups including operations, compliance, capital projects, health/safety, IT, and corporate security.

Sessional College Instructor, Evenings (2017 – 2022)

FLEMING COLLEGE, School of Environmental & Natural Resource Sciences (Frost Campus) – Lindsay, Ontario, Canada

I have taught as a guest instructor for their Advanced Water Systems Operations and Management (AWSOM) program.

CONESTOGA COLLEGE, Applied Electrical Motion and Control Management Program – Kitchener, Ontario, Canada

As part of their technical programs, I have taught evening courses on electrical theory and PLC programming (ControlLogix).

MOHAWK COLLEGE, Marshall School of Skilled Trades & Apprenticeship – Stoney Creek, Ontario, Canada

As part of 847 Fluid Power trade school program, I have taught evening courses on pneumatic controls and Siemens PLCs.

Instrumentation & Controls Lead (2012 – 2015)
System Integrator (2010 – 2011)

ERAMOSA ENGINEERING INC. – Guelph, Ontario, Canada

Eramosa is a consulting engineering firm that provides system integration, electrical engineering, and SCADA master planning services.

Began role as a system integrator, focusing on PLC/RTU programming, HMI development, and plant start-ups. Soon moved into I&C design, electrical design, and preparing tender specifications/drawings for large SCADA retrofit projects. Oversaw junior designers and acted as a reviewer. Developed I&C, electrical and integration scopes of work and SCADA designs for sewage lift stations, water plants, water towers, and pumping stations. Managed Projects. Tenders. Contract Administration.
Sample Projects:

➢ **Region of York Alarm Management Implementation** – Facilitated implementation of the ISA-18.2 alarm management standard, including developing an alarm philosophy and alarm rationalization for 160 water/wastewater facilities.

➢ **Cayuga Water Pollution Control Pant: Capacity Increase and Upgrade** – Developed control narratives and designed / programmed the new SCADA system. Coordinated the 4-month plant start-up as on-site project manager.

➢ **Regional Municipality of York – SCADA standards and Pilot Site Integration:** Undertook a complete review/update to Division 13 I&C specs, standard, and guidelines. Developed new HMI/PLC programming, screen and tagging standards.

➢ **City of Hamilton, SCADA Master Plan Project** – Led detailed I&C design, construction, and start-up for 25 facilities.

Controls and Commissioning Lead (2008 - 2010)
Controls Specialist (2007 - 2008)

CHEME ENGINEERING – Campbellville, Ontario, Canada

Cheme is a consulting engineering firm providing process engineering, commissioning, and validation services for the pharma industry.

Responsible for project management, process design, detailed controls design, drawing/spec preparation, tendering, bid evaluation, construction, managing contractors, contract administration, commissioning, and IQ/OQ/PQ validation.
Sample Projects:

➢ **Building 90 Facilities Upgrade** – Led process engineering for $20 million expansion of vaccine production facility: USP PW & WFI water systems, liquid waste treatment, lab water systems, clean steam, lyophilizer, support utilities, etc.

➢ **Building 86 Waste System** – Designed duplex pH neutralization system, led HAZOP review, prepared tender pkg, evaluated bids, acted as owner's rep, contract admin, reviewed shops, supervised installation/testing/commissioning.

WORK EXPERIENCE (cont'd)

Control Systems Consultant (2007)
INVENTURE SYSTEMS LTD – Concord, Ontario

Inventure Systems provides turnkey engineering solutions for the concrete industry, from upgrades to complete batch plants.
Provided control system engineering and process monitoring support for SCADA monitoring of ready-mix concrete plants.

Sample Project:
➢ **Ready-Mix Plant** – Developed detailed design for SCADA monitoring of fan, motor, vibration, and bin levels.

Control Systems Specialist (2006)
INTLVAC – Georgetown, Ontario

Intlvac designs and manufactures custom high vacuum systems for ion-beam etch, vapour deposition, and thin film applications.
Designed, implemented, and commissioned control systems for systems used in semiconductor, optics, and defence industries. Provided technical support for installed systems, developed training materials, and wrote user manuals.

Sample Projects:
➢ **Ion Beam Mill** – Developed control sequencing for ion beam mill employing central vacuum chamber and sample introduction chamber with motorized valves and robotics. Automated multiple PLC and microcontroller-based modular control systems for vacuum/cryo/diffusion pumps, liquid H2 cooling, cryostat, 10kV power supplies, and plasma control.
➢ **York University: Space Simulation Chamber** – Implemented microcontroller-based control of vacuum pumps, cryopumps, and polycold refrigeration systems to simulate space for Mars Rover project. Full LabVIEW front end.

Technical Coordinator – R&D (2005)
RWDI, Consulting Engineers & Scientists – Guelph, Ontario

RWDI provides a wide range of design services including wind engineering, air quality, wind/snow loading, and vibration analysis.
Assisted with engineering studies of air movement, loading, vibration, and wind tunnel simulations. Developed calculation tools using C/C++, C#, .NET, VisualBasic, Web Services, SQL, Excel Macros, FORTRAN, and dbase for statistical models.

Sample Projects:
➢ **1000-Year Wind Calcs** - Automated tool to correlate weather data and statistical models to estimate window loads.
➢ **Burj Khalifa Cladding Study** - Created statistical models using Weibull & Gamma distributions to estimate wind loads.

Web Designer / Programmer (1998 - 2015)
WEB MASTERING SERVICES – Guelph, Ontario

WMS provided consulting services for online transaction processing, user portals, and record storage for the insurance industry. Other services also included web development, online identity advice, and database administration services using wide range of technologies.

IT Help Consultant – Team Lead, Computing & Communications Services (2000 - 2005)
IT Help Consultant, Computing & Communications Services (1998 - 2000)
UNIVERSITY OF GUELPH – Guelph, Ontario

CCS is the UofG's central IT department which supports over a 100 products & services for the campus's 40,000+ user accounts.

Provided 1st and 2nd level support (both on-site and call centre) for staff, faculty, and students. Team-lead for drafting support policies, maintaining documentation, and training development. Developed and taught training seminars for staff, faculty, and students. 20-30 hours per week while completing part-time engineering degree at University of Guelph.

Graham's Marine Electrical Solutions (1994 - 1998)
GRAHAM'S MARINE ELECTRICAL SOLUTIONS – Penetanguishene, Ontario

Part-time and summer business I started when I was 16 years old installing/upgrading electrical systems in boats 20 to 100 ft.

EDUCATION

B.Sc. (Engineering) - Honours (2004)
University of Guelph, Guelph, Ontario, Canada
Major: Engineering Systems & Computing
Minor: Computer Science

Certificate in Project Management (2010)
University of Waterloo, Waterloo, Ontario, Canada

COMMUNITY INVOLVEMENT

Hart House Orchestra, Clarinet (2019-present), **Hart House Symphonic Band**, Clarinet & Bass Clarinet (2020-2022)
Rose Orchestra, Clarinet (2020-2022), **OWWA & WEAO mentoring programs**, volunteer mentor (2016-2022)
Guelph Little Theatre, played clarinet in pit orchestra for production of Gilbert & Sullivan's: *The Gondoliers* (2017)
Toronto Concert Band, Contrabass Clarinet (2015-2016), **Mississauga Pops Concert Band**, Clarinet (2015-2018)
MS Bike Ride for Multiple Sclerosis, Rider (2010 – present), Team Captain (2013 – 2014), Tour Leader (2015 – present)