

# Steven Hay

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## Summary

*Engineer and researcher transitioning to computational neuroscience, with interests in the neural computations underlying visual processing. Brings over two decades of experience in complex systems engineering, machine learning, and multi-framework integration—skills directly applicable to multi-scale neural modeling.*

At Fluence Energy, co-developed a machine learning system using recurrent neural networks (GRU/LSTM architectures) to predict thermal dynamics in grid-scale battery systems, achieving a 45% reduction in cooling costs. Founded the company's Digital Intelligence group, which authored two patents pending. This work revealed the tension between models optimized for output metrics and those that explain underlying

dynamics—a challenge central to computational neuroscience.

In the Navy, worked alongside scientists at national laboratories on nuclear engineering topics and integrated systems-theoretical safety frameworks (Dr. Nancy Leveson's STAMP methodology) into analysis processes—developing the capacity to integrate multiple analytical frameworks applicable to multi-scale neural modeling.

Currently auditing coursework in neural computation and cognitive neuroscience, attending graduate seminars at the Redwood Center for Theoretical Neuroscience, and actively engaging with the vision science research community.

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## Education

Rensselaer Polytechnic Institute

TROY, NY

**BS Computer Science**

2003

Coursework in artificial intelligence, mathematical logic, and epistemology. Four semesters as teaching assistant.

**BS Electrical Engineering**

2003

Coursework in control systems, digital signal processing, and optimal control theory.

Naval Postgraduate School

MONTEREY, CA

**MS Engineering Science, Mechanical Engineering**

2005

Nuclear reactor design, materials engineering, computational fluid dynamics.

**Executive MBA**

2010

Economics, process optimization, business strategy.

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## Continuing Education

**Neural Computation (audited)**

2024

Dr. Bruno Olshausen, UC Berkeley. Sparse coding, efficient coding theory, neural computational models.

**The Human Brain (audited)**

2024

Dr. Nancy Kanwisher, MIT. Cognitive neuroscience, functional brain organization.

**Redwood Center for Theoretical Neuroscience**

2024–Present

Remotely attending graduate seminars on theoretical neuroscience.

**Biochemistry**

2024–Present

Self-directed study to strengthen understanding of molecular and cellular neuroscience.

**Bird Banding Workshop (Passerines)**

2025

NABC-certified extraction and banding training, Powdermill Nature Reserve, Rector, PA.

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## Research Experience

Fluence Energy

ARLINGTON, VA

**Director, Digital Intelligence**

Aug 2016 – Nov 2023

Co-developed a machine learning system to optimize cooling for grid-scale battery storage. Extracted six months of operational time-series data and trained a deep neural network (GRU/LSTM architecture) to predict future battery temperatures given HVAC status, system demand history, weather data, and operational variables. Coupled the predictive model with a simulated annealing optimizer to minimize

cooling cost while maximizing system availability. Results: 45% reduction in cooling costs from baseline, 30% improvement over optimized daily schedules, with no impact on availability or battery warranty.

Founded Fluence's Digital Intelligence group, reporting directly to CTO. Built and led a team of data scientists and engineers. Authored two patents pending in machine learning applications for energy systems.

Technical lead for due diligence resulting in acquisition of Advanced Microgrid Systems (machine learning startup with market bidding optimization using mixed integer linear programming).

#### Rensselaer Polytechnic Institute

##### Undergraduate Research, AI and Robotics Lab

Researched optimal path-traversal algorithms as part of a larger autonomous navigation project for mobile robots under Dr. Wes Huang. Evaluated heuristic approaches to the traveling salesman problem variant posed by the robot's operational constraints.

Huang, W. H. (2001). Optimal line-sweep-based decompositions for coverage algorithms. *Proceedings 2001 ICRA. IEEE International Conference on Robotics and Automation*.

##### Teaching Assistant

Sep 1998 – Apr 2003

Programming language theory and compiler design (Prof. Sybil Schupp, 2 years). "Minds and Machines" robotics laboratory (Profs. Selmer Bringsjord and Jim Fahey).

Bringsjord, S., & Heuveln, B. V. (2003). The "mental eye" defence of an infinitized version of Yablo's paradox. *Analysis*, 63(277), 61–70.

TROY, NY

Summer 2002

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## Industry Experience

#### Fluence Energy / AES Energy Storage

ARLINGTON, VA

##### Director, Systems Integration / Principal Staff Engineer

Aug 2016 – Nov 2023

Integrated electrical, computer, data acquisition, and control systems for first-in-industry grid-scale (10+ MW) battery energy storage projects across Maryland, California, Arizona, Indiana, N. Ireland, Netherlands, and Philippines. These projects formed the technical basis for Fluence's presence in 20+ countries.

Additional ML projects: lithium-ion battery degradation model using ARIMA for maintenance planning; valuation model combining usage profiles, weather prediction, and economic modeling; 4D data visualization for cooling system monitoring.

#### MPR Associates, Inc.

ALEXANDRIA, VA

##### Lead Engineering Consultant

Nov 2013 – Aug 2016

Implemented independent statistical calculations using convolution of multinomial probability distributions and various statistical tests to validate safety valve failure probabilities. Established grid-scale energy storage as a new consulting area, growing the team from one to five consultants on projects exceeding 1 GW-h total.

#### US Naval Reactors

WASHINGTON, DC

##### Technical Program Manager / Lead Engineer

May 2003 – Jun 2013

Coordinated with scientists at national laboratories on nuclear engineering research, including long-term mixed-phase corrosion studies. Integrated systems-theoretical safety frameworks (Dr. Nancy Leveson's STAMP methodology) into nuclear safety analysis processes—synthesizing control theory, organizational behavior, and probabilistic risk assessment.

Led technical and engineering response to Stuxnet for nuclear Navy: developed immediate response plan, foundational principles for control system security design, and operational practices for embedded nuclear I&C systems. Recognized with Navy Commendation Medal (2012).

Oversaw R&D of new controls platform leveraging software abstractions; delivered nuclear detectors, sensor interfaces, communications, and computing cards to system integrators.

#### US Navy

##### Nuclear Reactor Operator

Mar 1996 – Aug 1999

Selected for officer program with full scholarship.

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## Technical Skills

**Programming:** Python, SQL, JavaScript, C

**Machine Learning:** PyTorch, TensorFlow, Keras, NumPy, SciPy

**Methods:** Signal processing, statistical modeling, time-series analysis, recurrent neural networks, optimization algorithms

**Systems:** Linux, cloud platforms (AWS Lambda, S3, Snowflake)

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## Interests

**Open Source:** Maintained a Linux kernel fork for Rockchip RK3588 ARM microprocessor. ([GitHub](#))

**Photography:** Frequent contributor to Washington Post travel section; 2011 Talking Newspaper Association of the UK photography award. ([portfolio](#))