ALBERT G. BOULANGER

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Pioneer in far-reaching energy R&D involving intelligent systems and machine learning in electrical power, renewable energy, smart buildings, smart grids, smart cities, and healthcare for over 20 years.

EDUCATION

B.S. Physics, University of Florida
M.S. Computer Science, University of Illinois

EXPERTISE

Skills: data science, machine learning, pattern recognition, forecasting, time series analysis, causal inference, geostatistics, exploratory data analysis, data mining, algorithms, data analysis, computer science, artificial intelligence, program management, programming, software engineering, mathematical modeling, simulations, high performance computing, software development, statistics, knowledge engineering, modeling, system architecture, research, R&D, project management, strategic planning, SQL, Lisp, Python, R, databases, strategic thinking, leadership, management, coherent optical processing, lasers, holography, sustainability, energy, power grids, smart grids, microgrids, smart cities, smart buildings and cleantech.

Special skills: Systems integration, expert and knowledge-based systems, machine learning including the interface between numerical and symbolic algorithms, parallel computing, pattern recognition applied to 4D seismic data, computer representations of complex scientific and engineering objects, visualization, distributed systems, and interoperability. Specialties are complex systems integration and intelligent computational reasoning that interacts with humans within large-scale systems

EXPERIENCE

2019-Present Department of Neurology, Columbia University Medical Center
Columbia University New York, New York
Senior Data Engineer

Employed as Senior Data Engineer with the Department of Neurology at CUMC Columbia University. Involved in data engineering for the Thompson Project, a large scale initiative to use multiple datasets to move the needle on neurodegenerative diseases, specifically Alzheimer's.

2005-Present World Team Now, Malibu California.
VP & Director of Technical Strategy (nonprofit, volunteer)

Serves as a board member, VP, and Director of Technical Strategy of the nonprofit environmental and social organization, World Team Now and a partner in a related company, World Team-Building, LLC. Advise, leveraging 30+ years of expertise in science, technology, and energy, on big-picture technical matters and technical implementation decisions.

2019-2019   Mediphore Inc
                New York, New York
                Senior Developer

Virtualized the company's application and deployed it on development and production servers and documented steps. Installed a Gitlab repository and Docker.

2005-2017   Center for Computational Learning Systems,
                Columbia University New York, New York
                Senior Staff Associate

Employed as Senior Staff Associate with the Center for Computational Learning Systems (CCLS) of Columbia University. Involved in far-reaching energy research and development involving intelligent systems in electrical power, renewable energy, smart buildings, smart grids, and smart cities. Involved in over 15+ industry-sponsored R&D projects resulting in a startup, CALM Energy, and licensing of patents.

Acted as Director of the Smart-X {Cites, Buildings, & Grids} group at CCLS. Recent projects included a reinforcement learning based microgrid controller for Africa villages, and optimal placement of inductive charging stations for electric buses. For Con Edison, recent projects included image processing using deep learning of thermal images to look for trouble in manholes and using causal inference and machine learning to produce a cost vs. benefit study of reliability improvement programs. As part of a partnership with the Rudin Management Company and Selex ES, the Smart-X group developed the machine learning based forecasting and recommendation capability for a commercial product, the Di-BOSS Smart Building Solution.

1994-2005   Lamont-Doherty Earth Observatory,
                Columbia University, Palisades New York.
                Senior Staff Associate, 4-D Group

Worked as Senior Staff Associate in the 4-D Group at the Lamont-Doherty Earth Observatory of Columbia University. Focused on new business development within Roger Anderson's group at Lamont. Also worked on introducing machine learning concepts in asset management of power grids and oil and gas.

Involved in a variety of computer science initiatives within industry consortia, including visualization, system integration, advanced computation, databases, and interoperability. Visualized portfolio management data and results for the industry-sponsored portfolio management consortium. Worked on pattern recognition methods for identifying and tracking changes in oil and gas reservoirs by making use of multiple seismic surveys shot over time. The culmination was the formation of vPatch Inc., which commercialized groundbreaking technology the team developed and prior to that, the licensing the IP to 4D Technology Inc. and Baker Hughes.

2000-2002   CTO, vPatch Technologies Inc., Houston Texas.

Served as CTO for vPatch Technologies, Inc. during a leave of absence from Columbia. vPatch's business focus was to implement wired processes that connect business decision-making and hydrocarbon reservoirs in real time to enable the use of portfolio management, real-options, EVA and other modern techniques to plan and execute enterprise optimization.

**1992-1994   BBN Laboratories Division, BBN Systems and Technologies
                Corporation, Cambridge, Massachusetts
                Scientist Applied Physics Department.**

Readied the acoustic modeling system PRISM, implemented in Lisp, for beta test. The goal of PRISM was to support engineering acoustics design. Also led the design and integration of image management and manipulation functions for an Army project called MIDAS. MIDAS integrated database technology with image analysis and acoustic modeling functions.

**1982-1992   BBN Laboratories Division, BBN Systems and Technologies
                Corporation, Cambridge, Massachusetts
                Scientist, Intelligent Systems Department**

Worked on several intelligent systems, expert systems, and machine learning applications and frameworks: the Steamer intelligent tutoring system; DesigNet, an intelligent CAD tool for designing packet switching networks and a tool for automated network management; the FLEX rule base system framework and applications of it including a human factors simulation of radar operators, a wind shear adviser for pilots, and an expert system for audit selection for the IRS; teaching AI to clients; AI tools for parallel processors; a parallel rule base system for a manufacturing-process simulation/diagnostic demonstration; a machine learning framework called Beginner under internal funding; and the application of Beginner to relating biological indicators of rivers to their health

Within the Speech Department, investigated methods using unsupervised clustering to automate the analysis of recorded conversations of ground-control to plane conversations and was the systems integrator and implemented the GUI for the resulting demonstration system called Gister.

Previous work experience

Previous work experience included 6 years of part-time work in high school and college at the National Hurricane and Experimental Meteorology Laboratory, Coral Gables, Florida. Was a co-principle investigator on a study of the effect of cloud seeding on lightning.

HONORS

Member of the winning team of a GE Ecomagination Challenge Innovation Prize in 2010 to apply machine learning to optimize electric delivery truck charging schedules: http://engineering.columbia.edu/smart-grid-project-wins-ge-grant.

American Association of Artificial Intelligence certificate of recognition for the conference paper:
P. Gross, A. Boulanger, M. Arias, D. Waltz, P. Long, C. Lawson, R. Anderson, M. Koenig, M. Mastrocinque, W. Fairechio, J. Johnson, S. Lee, F. Doherty, and A. Kressner, "Predicting electricity distribution feeder failures using machine learning susceptibility analysis," in *Proceedings of the 21st National Conference on Artificial Intelligence - Volume 1*, 2006, pp. 1705–1711.

Three Special Achievement Awards from the National Hurricane and Experimental Meteorology Laboratory for accomplishments in programming and work on lightning.

Co-winner of the Max A. Eaton prize for the best student paper at the 11th Technical Conference on Hurricanes and Tropical Meteorology.

ENTREPRENEURIAL

Co-founder and CTO of vPatch Inc to commercialize 4D seismic reservoir modeling software. http://tiger.aboulanger.com/web/vpatch/

Co-founder and partner of CES Enterprise LLC. Incubator for advanced business/technology solutions for the Oil and Gas Industry http://ces-enterprise.com/

Co-founder CALM Energy Inc. startup from Columbia University Ventures. http://www.calmenergyinc.com/

Co-founder and partner of World Team- Building, LLC to conduct the for-profit aspects of the World Team project http://worldteamnow.org/blog/wtn-ev/

BOOKS

- Computer-Aided Lean Management for the Energy Industry, Roger N. Anderson, Albert Boulanger, John A. Johnson, Arthur Kressner, PennWell Books, 2008

PUBLICATIONS

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2. "An Innovative Approach to Vehicle Electrification for Smart Cities," Promiti Dutta, Albert Boulanger, Roger Anderson and Leon Wu. Handbook of Research on Social, Economic, and Environmental Sustainability in the Development of Smart Cities. IGI Global, 2015. 193-212.
3. "Di-BOSS: Research, Development & Deployment of the World's First Digital Building Operating System," Roger Anderson, Albert Boulanger, Vaibhav Bhandari, Jessica Forde, Ashish Gagneja, Arthur Kressner, Ashwath Rajan, Vivek Rathod, Doug Riecken, David Solomon, Leon Wu, John Gilbert, Eugene Boniberger, Mattia Cavanna, Willem Neiuwkerk, Bruce Sher, Nate Maloney in Automated Diagnostics and Analytics for Buildings, Fairmont Press, 9/2014
4. "Game theoretic approach to offering participation incentives for electric vehicle-to-vehicle charge sharing," Promiti Dutta, Albert Boulanger, Transportation Electrification Conference and Expo (ITEC), 2014 IEEE, vol., no., pp.1,5, 15-18 June 2014
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7. "Di-BOSS™: Digital Building Operating System Solution," Jessica Forde, Vivek Rathod, Hooshmand Shookri, Vaibhav Bandari, Ashwath Rajan, John Min, Ariel Fan, Leon Wu, Ashish Gagneja, Doug Riecken, David Solomon, Lauren Hannah, Albert Boulanger, Roger Anderson," 2013 Conference on Neural Information Processing Systems (NIPS 2013), Demonstration 12/6/2013

8. "Improving efficiency and reliability of building systems using machine learning and automated online evaluation," Leon Wu, Gail Kaiser, David Solomon, Rebecca Winter, Albert Boulanger, Roger Anderson, Systems, Applications and Technology Conference (LISAT), 2012 IEEE Long Island, vol., no., pp.1,6, 4-4 May 2012

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10. "Failure Analysis of the New York City Power Grid," Leon Wu, Roger N Anderson, Albert G Boulanger, Cynthia Rudin, Gail E Kaiser, CU CS Technical Report CUCS-025-14, 2012

11. "Using Support Vector Machine to Forecast Energy Usage of a Manhattan Skyscraper," Rebecca Winter, Albert Boulanger, Roger Anderson, Leon Wu, AGU Fall Meeting Abstracts 1, 0984, 2011

12. "Vehicle Electrification: Status and Issues," Albert Boulanger, Andy Chu, Suzanne Maxx, and David Waltz, Proceedings of the IEEE, vol.99, no.6, pp.1116-1138, June 2011

13. "Adaptive Stochastic Control for the Smart Grid," Roger Anderson, Albert Boulanger, Warren Powell, and Warren Scott, Proceedings of the IEEE, vol.99, no.6, pp.1098-1115, June 2011

14. "Estimation of System Reliability Using a Semiparametric Model," Leon Wu, Timothy Teravainen, Gail Kaiser, Roger Anderson, Albert Boulanger, and Cynthia Rudin, Proceedings of IEEE EnergyTech, 2011.

15. "Evaluating Machine Learning for Improving Power Grid Reliability," Leon Wu, Gail Kaiser, Cynthia Rudin, David Waltz, Roger Anderson, Albert Boulanger, Ansaf Salleb-Aouissi, Haimonti Dutta, and Manoj Poolery, Proceedings of the ICML 2011 workshop on Machine Learning for Global Challenges, International Conference on Machine Learning, 2011.

16. "Seizure Detection from Multiple Frequency Bands of Intra-cranial EEG using High Dimensional Clustering," Haimonti Dutta, David Waltz, Karthik M Ramasamy, Phil Gross, Ansaf Salleb-Aouissi, Hatim Diab, Manoj Pooleery, Albert Boulanger, Catherine Schevon and Ronald Emerson, Poster at the Fourth International Workshop on Seizure Prediction ISPW4, Kansas City, MO, June 2009.

17. "Estimating the Time Between Failures of Electrical Feeders in the New York Power Grid," Haimonti Dutta, David Waltz, Alessandro Moschitti, Daniele Pighin, Philip Gross, Claire Monteleoni, Ansaf Salleb-Aouissi, Albert Boulanger, Manoj Pooleery and Roger Anderson, Next Generation Data Mining Summit, NGDM 2009, Columbia MD.

18. "Ranking Electrical Feeders on the New York Power Grid," Phil Gross, Ansaf Salleb-Aouissi, Haimonti Dutta and Albert Boulanger, ICMLA, 2009, Miami, FL.

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22. "Predicting Electricity Distribution Feeder Failures Using Machine Learning Susceptibility Analysis," Philip Gross, Albert Boulanger, Marta Arias, David Waltz, Philip M. Long, Charles Lawson, Roger Anderson, Matthew Koenig, Mark Mastrocinque, William Fairechio, John A. Johnson, Serena Lee, Frank Doherty, Arthur Kressner, Eighteenth Innovative Applications of Artificial Intelligence Conference Boston, Massachusetts July 18–20 2006

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R. N.; Boulanger, A.; Teng, Y-C; Xu, L.; Neal, R. and Meadow, W. - 1997, World Oil, Sep 97, pp. 75-79.

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47. "4-D Seismic: The Fourth Dimension in Reservoir Management Part 1: What is 4-D and how does it improve recovery efficiency?," Roger Anderson, Albert Boulanger, Wei He, Yu-Chiung Teng, Billy Meadow, and Randall Neal, World Oil, March 1977

48. "4D Seismic Monitoring of Reservoir Production," Roger Anderson, Albert Boulanger, Wei He, and Liqing Xu, 3D Atlas, SEG/AAPG Memoir, September, 1996

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PATENTS & PATENT APPLICATIONS

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