

# Eric Carlson

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## EXPERIENCE

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### Philips Research North America, Cambridge, MA

Senior Scientist 2016-Present

- Senior architect of cloud-based analytics for global products
- Project lead of globally-distributed research team of 13 data scientists, delivered predictive algorithms, data visualization, and cloud infrastructure
- Developed protocols to satisfy FDA 510k requirements for algorithm release
- Developed big data pipelines using AWS and Spark to handle structured and unstructured data in compliance with HIPPA privacy guidelines

Senior Member Research Staff 2014-2016

- Developed research protocols and conducted global clinical studies
- Aligned with business partners to streamline processes and accelerate path to market

Member Research Staff 2013-2014

- Developed algorithms for fetal ECG monitoring and patient deterioration detection
- Taught Python and machine learning in New York, China, India, and The Netherlands

### Bionic Sight and Weill Cornell Medical College, New York, NY

Principal Research Scientist/Postdoctoral Associate 2011-2013

- Implemented neural model simulations on an embedded Linux processor and DSP and optimized for real-time simulation of 1200 neurons for a prosthetic device prototype
- Constructed a mobile robotic test platform to test neural network vision algorithms

### Mind Brain Institute, Johns Hopkins University, Baltimore, MD

Senior Programmer Analyst 2005-2011

- Developed novel experimental paradigm involving evolutionary stimulus generation
- Designed and implemented 100+ core HPC cluster
- Developed analysis programs to model neural responses to complex stimuli

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## EDUCATION

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**Johns Hopkins University**, School of Medicine, Baltimore, MD 2002-2011

Ph.D., Biomedical Engineering

**University of Michigan**, College of Engineering, Ann Arbor, MI 1998-2002

B.S., Electrical Engineering

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## PATENTS

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- Carlson, E.T., Eshelman, L.; Data-driven performance based system for adapting advanced event detection algorithms to existing frameworks, 2016
  - Derek Xu, Carlson, E.T., Farri, D., Yang, L., Eshelman, L.; Critical Care Patient Monitoring Service Recommendation using data and text mining techniques, 2016
  - Carlson, E.T., Eshelman, L.; Automated system for creation of tailored event detection systems; Filed December, 2014
  - Yang, L, Carlson, E.T., Eshelman, L; Method for score confidence interval estimation when vital sign sampling frequency is limited; Filed November, 2014
  - Carlson, E.T., Vairavan, S., Xu-Wilson, M., Cheng, L.; Fetal heart rate extraction from maternal abdominal ECG recordings; Filed January, 2014

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## SELECTED PUBLICATIONS

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- Gehrmann, S., Li, Y., Carlson, E.T., DERNONCOURT, F., CELI, L., A Comparison of Rule-Based and Deep Learning Models for Patient Phenotyping (in prep)
- Vaziri, S., Carlson, E.T., Wang, Z., Connor, C.E., A Channel for 3D Environmental Shape in Anterior Inferotemporal Cortex, *Neuron*, 2014; 84(1):55-62
- Helfenbein, E., Firoozabadi, R., Chien, S., Carlson, E.T., Babaeizadeh, S., Development of three methods for extracting respiration from the surface ECG: A review, *J. Electrocardiology*, 2014; S0022-0736(14)00294-5
- Xu-Wilson, M., Carlson, E.T., Cheng, Limei, Vairivan, S., Spatial Filtering and Adaptive Rule Based Fetal Heart Rate Extraction from Abdominal Fetal ECG Recordings, *Computing in Cardiology*, 2013; 40:197-200
- Pandarinath, C., Carlson, E.T., Nirenberg, S.N., An inexpensive system for multisite optical interrogation of neural circuitry with sub-millisecond precision, *Bioinformatics and Bioengineering*, Nov. 2013; p. 1-6
- Hung, C.C., Carlson, E.T., Connor, C.E., Medial axis shape coding in macaque Inferotemporal Cortex, *Neuron*, 2012; 74: 1-15
- Carlson, E.T., Rasquinha, R.J., Zhang, K., Connor, C.E., A sparse object coding strategy in area V4, *Current Biology*, 2011; 21(4):288-293
- Yamane, Y., Carlson, E.T., Bowman, K.C., Wang, Z., Connor, C.E., A neural code for three-dimensional object shape in macaque inferotemporal cortex, *Nature Neuroscience*, 2008;11(11):1352-60

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## SELECTED PRESENTATIONS AND POSTERS

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- Carlson, E.T., Yang, L., Eshelman, L., Lord, W., Reisetter, J., Data-driven continuous risk profiling for early deterioration detection, International Conference on Complexity in Acute Illness, Charlottesville, VA, 2014 (Poster)
- Carlson, E.T., Rasquinha, R.J., Connor, C.E., Sparse coding of natural object boundaries in monkey area V4, Society for Neuroscience, San Diego, CA, 2010 (Poster)
- Connor, C.E., Carlson, E.T., What is the neural tuning space in macaque monkey area V4?, Chicago, IL, 2009 (Presentation)
- Carlson, E.T., Connor, C.E., Transformation from Gabor filters to contour shape in Area V4, San Diego, CA, 2007 (Poster)

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## SKILLS

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- Programming: Python, Spark, C/C++/C#, Perl, BASH, SQL, Java, Matlab, D3.js, OpenGL
- Infrastructure: OpenStack, AWS, Ansible, EMR, Docker, Yarn, Kubernetes, Proxmox
- Quantitative Analysis: Data mining, deep learning, neural response analysis, linear/non-linear modeling, statistical analysis
- Hardware Design: Mixed-signal analog and digital circuit design, FPGA, ARM, and microcontroller embedded systems programming
- Research Techniques: Retrospective longitudinal studies, prospective clinical trials, study protocol design, in vivo and ex vivo extracellular electrophysiology