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## Patryk Laurent, Ph.D.

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*Expert in understanding, defining and solving problems of software design and development on commodity or custom hardware. Able to lead scientists and engineers, and work closely with product development teams. Preferred methods include rapid prototyping, iterative design and implementation, containerization, and automated deployments (CI/CD) from version control. Prior industrial work spans building custom brain-inspired machine learning algorithms, API-first development, mobile apps, data/ML pipelines, authorization systems, home/IoT automation, simulation, and robotics.*

### Key Skills

- Hands-on approach to software development, leadership, early adoption of new technologies
- Prototyping and iterative design under constraint, linking stakeholders to developers to researchers
- Leveraging or designing machine learning algorithms, and determining if/when appropriate
- Managing and collaborating with Ph.D.-level scientists, aligning R&D focus to business goals

### Technology Stacks

• **Machine Learning:** TensorFlow/Keras, PyTorch, scikit-learn, custom • **MLOps:** MLFlow, Databricks  
• **Version Control:** (code) — git (preferred), subversion, gerrit; (data) — Delta Lake • **CI/CD:** Github Actions, Databricks Jobs/Tasks, Jenkins • **Embedded:** Arduino, ARM • **IDE:** vim, Visual Studio Code, IntelliJ • **Cloud Providers:** GCP, Azure, AWS, LambdaLabs • **Programming:** Python, NodeJS, Scala, Objective-C, Java, Assembly • **Typesetting/Text:** LaTeX, Pandoc

### Education

- 2009 **Ph.D.**, Computational Cognitive Neuroscience, Center for Neuroscience, University of Pittsburgh.  
2009 **Certificate**, Center for the Neural Basis of Cognition, Univ. of Pittsburgh & Carnegie Mellon Univ.  
2001 **B.A.**, Cognitive Sciences (with a Minor in Mathematics), University of Virginia.

### Positions held

- 2018-present **Director of Emerging Technologies, DMGT, plc.** (San Diego, CA & London, England).
  - Rapidly evaluated and advised on key emerging technologies for DMGT's operating companies.
  - Supervised data scientists across the companies, sharing knowledge and best practice.
  - Implemented ML models to test hypotheses on the value of business proprietary data.
  - Established automated pipelines to boost stakeholder-to-data scientist feedback.
  - Implemented authorization systems enabling sales and product organizations to bundle new SKUs with minimal technology organization involvement.
- ...2020 (6-month assignment) **DMGT: Architect in Residence, Trepp, LLC.** (San Diego, CA & New York, NY).
  - Determined new product development opportunities leveraging new extensive data lake
  - Implemented proofs-of-concept on numerical and textual datasets in commercial real estate (CRE) and mortgage-backed securities (CMBS).
- ...2019 (11-month assignment) **DMGT: Director, Data Intelligence, Genscape, Inc.** (San Diego, CA, Louisville, KY, Boston, MA).
  - Led 12+ data scientists developing ML models to nowcast energy consumption and production.
  - Leveraged data from EMF sensors, satellite images, weather data, smokestack video feeds.
  - Collaborated with software engineering and devops to get models into production.
- 2017-2018 **Director of Artificial Intelligence Initiatives, CliniComp, Intl.** (San Diego, CA).
  - Applied ML to classify and forecast dynamical, multi-scale temporal and spatial physiological data from hospital beds.
  - Grew and managed a team of data scientists and data engineers.

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- 2017

    - Liased between data science, software engineering, and product domain experts.

**Co-founder, CTO, Lasso Home, Inc.** (San Diego and Mountain View, CA).
  - 2017-present

    - Developed an iOS app leveraging computer vision to track and maintain home appliances.

**Advisor, Accel Robotics** (San Diego, CA).

    - Advising on topics in computer vision and AI/machine learning for autonomous systems.
  - 2016-2017

**Director of Engineering (AI), LeEco US** (San Diego, CA & Beijing, China).

    - Created ML-based apps on Android ecosystem of devices (using TensorFlow and OpenCV).
    - Designed novel UI/UX to recognize naturalistic user behaviors, and minimize false positives.
    - Collaborated with software engineering towards productization.
  - 2014-2016

**Senior Scientist/Director of R&D, Brain Corporation** (San Diego, CA).

    - Managed a team of 8+ scientists/engineers at various levels (Ph.D., M.Sc.).
    - Documented, packaged, and deployed a commercially-available robotics software framework.
    - Co-designed and investigated a novel state-of-the-art ML architecture that learned to robustly track objects in continuous video (DARPA-funded).
    - Implemented a projector- and vision-based gestural, machine learning prototype system (technical services for a Fortune 500 consumer electronics company).
  - 2012-2014

**Scientist, Brain Corporation** (San Diego, CA).

    - Designed and implemented a iOS gamepad-based smartphone user interface for supervised learning on Brain Corporation's *eyeRover* technology showcase robot.
    - Developed a machine learning prototype to remotely control off-the-shelf IoT devices and robots in response to visual cues and gestures (over WiFi and infrared) using Qualcomm hardware.
    - Contributed to the design of an end-to-end spiking neural network "nervous system" for a robot to follow target objects and avoid obstacles (for Qualcomm Research).
    - Implemented an annotated visualization system for engineered neural networks.
  - 2009-2012

**Postdoctoral Researcher, Department of Psychological and Brain Sciences, The Johns Hopkins University** (Baltimore, MD).

    - Used Reinforcement Learning to investigate visual attention focus and human decision making, using neuroimaging (fMRI) and behavioral methods.
    - Analyzed recurrent spiking neural networks as a mechanism for reward discounting functions.
    - Provided technical support and advice to multiple fMRI and big data projects at Johns Hopkins.
    - Initiated development of an integrative theory of basal ganglia function in Reinforcement Learning as a network with hippocampus, cerebellum, and neocortex.
  - 2003-2009

**Graduate Researcher, Center for Neuroscience, University of Pittsburgh (CNUP) and Center for the Neural Basis of Cognition (CNBC)** (Pittsburgh, PA).

    - Simulated Reinforcement Learning agents that learned to control their saccadic eye movements and visual attention during reading and survival tasks.
    - Designed, carried out, and modeled human behavioral Reinforcement Learning experiments.
    - Used fMRI to discover brain regions involved in rewarding motor and mental acts.
    - Developed real-time sound/echo cancellation technique to hear fMRI participants.
    - Studied recurrent neural networks for continuous speech perception.
  - 2002-2003

**Software Developer, Super Natural Tools, Inc.** (Roanoke, VA)

    - Co-wrote and deployed a streaming communications and data analysis system (Java).
    - Adopted agile development and extreme programming techniques.
  - 2000-2002

**Co-Founder and CTO, Inductive Logic, Inc.** (Charlottesville, VA)

- Developed natural language processing sentiment analysis software for online forums (Perl).
- Participated in the University of Virginia Darden School of Business Incubator program.

1997-2000

**Software Developer, ScholarOne, Inc.** acq'd by Reuters (Charlottesville, VA)

- Co-developed ManuscriptCentral and AbstractCentral online publishing systems.
- Automated Macintosh software to convert and format uploaded manuscripts.

1997-2000

**Undergraduate Researcher, Laboratory of Systems Neurodynamics, University of Virginia** (Charlottesville, VA).

- Researched the capabilities of sparse recurrent spiking neural networks as models of hippocampal function in memory, sequence learning, and language processing.

## Selected Patents

2020 Piekniejszy, F., Richert, M., Fisher, D., **Laurent, P.**, Petre, C. (2020) Systems and methods for predictive/reconstructive visual object tracker. United States Patent Office Number 10,818,016.

2020 Meier, P., Passot, J-B-, Gabardos, B. I., **Laurent, P.**, Sinyavskiy, O., O'Connor, P., Izhikevich, E. (2020) Apparatus and methods for control of robot actions based on corrective user inputs. United States Patent Office Number 10,843,338.

2019 **Laurent, P.** & Izhikevich, E. (2019). Systems and methods to operate controllable devices with gestures and/or noises. United States Patent Number 10,295,972.

2019 Piekniejszy, F., Richert, M. Fisher, D. **Laurent, P.** Petre, C. (2019) Systems and methods for predictive/reconstructive visual object tracker. United States Patent Office Number 10,282,849.

2018 **Laurent, P.**, Petre, C. and Izhikevich, E.M. (2018). Home animation apparatus and methods. United States Patent Number 9,860,077.

2017 Ponulak, F., Kazemi, M., **Laurent, P.**, Sinyavskiy, O., Izhikevich, E. (2017). Apparatus and methods for haptic training of robots. United States Patent Number 9,597,797.

2016 **Laurent, P. A.**, Passot, J-B-, Wildie, M., Izhikevich, E. (2016) Adaptive robotic interface apparatus and methods. United States Patent Number 9,242,372.

2016 **Laurent, P. A.**, Passot, J-B-, Ponulak, F., Izhikevich, E. (2016) Discrepancy detection apparatus and methods for machine learning. United States Patent Number 9,248,569.

2016 **Laurent, P. A.**, Passot, J-B-, Sinyavskiy, O., Ponulak, F., Gabardos, B. I., Izhikevich, E. (2016) Predictive robotic controller apparatus and methods. United States Patent Number 9,314,924.

2016 **Laurent, P. A.**, Passot, J-B-, Izhikevich, E. (2016) Robotic control arbitration apparatus and methods. United States Patent Number 9,296,101.

2016 Passot, J-B-, Sinyavskiy, O., Ponulak, F., **Laurent, P.**, Gabardos, B. I., Izhikevich, E. (2016) Robotic training apparatus and methods. United States Patent Number 9,384,443.

2016 Meier, P., Passot, J-B-, Gabardos, B. I., **Laurent, P.**, Sinyavskiy, O., O'Connor, P., Izhikevich, E. (2016) Apparatus and methods for control of robot actions based on corrective user inputs. United States Patent Number 9,358,685.

2015 Izhikevich, E. M., **Laurent, P.**, Polonichko, V. (2015) Spoofing remote control apparatus and methods. United States Patent Number 9,613,308

## Publications

2021 (in press) Ito, T., Yang, G. R., Laurent, P., Schultz, D. H., & Cole, M. W. (2021). Constructing neural network models from brain data reveals representational transformations underlying adaptive behavior. bioRxiv, 2020-12. (pre-print) ([doi:10.1101/2020.12.24.424353](https://doi.org/10.1101/2020.12.24.424353)).

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- 2016 Tremel, J., **Laurent, P. A.**, Wolk, D. A., Wheeler, M. E., & Fiez, J. A. (2016) Neural signatures of experience-based improvements in deterministic decision making. *Behavioural Brain Research*. 315: 51-56. ([doi:10.1016/j.bbr.2016.08.023](https://doi.org/10.1016/j.bbr.2016.08.023))
- 2016 Guediche, S., Reilly, M., Santiago, C., **Laurent, P.**, Blumstein, S. E. (2016) An fMRI study investigating effects of conceptually related sentences on the perception of degraded speech. *Cortex*. 79: 57-74. ([doi:10.1016/j.cortex.2016.03.014](https://doi.org/10.1016/j.cortex.2016.03.014))
- 2015 **Laurent, P. A.**, Hall, M. G., Anderson, B. A., Yantis, S. (2015) Valuable orientations capture attention. *Visual Cognition*. 23 (1-2): 133-146. ([doi:10.1080/13506285.2014.965242](https://doi.org/10.1080/13506285.2014.965242))
- 2015 Guediche, S., Holt, L., **Laurent, P. A.**, Lim, S.-J., Fiez, J. (2015) Evidence for cerebellar contributions to adaptive plasticity in speech perception. *Cerebral Cortex*. 25 (7): 1867-1877. ([doi:10.1093/cercor/bht428](https://doi.org/10.1093/cercor/bht428))
- 2014 Anderson, B. A., **Laurent, P. A.**, Yantis, S. (2014) Value-driven attentional priority signals in human basal ganglia and visual cortex. *Brain Research*. 1587 (2014): 88-96. ([doi:10.1016/j.brainres.2014.08.062](https://doi.org/10.1016/j.brainres.2014.08.062))
- 2013 **Laurent, P. A.** (2013) A neural mechanism for reward discounting: Insights from modeling hippocampal-striatal interactions. *Cognitive Computation*. 5(1): 152-160. ([doi:10.1007/s12559-012-9178-8](https://doi.org/10.1007/s12559-012-9178-8))
- 2013 Cole, M. W., **Laurent, P. A.**, Stocco, A. (2013) Rapid instructed task learning: A new window into the human brain's unique capacity for flexible cognitive control. *Cognitive, Affective, & Behavioral Neuroscience*. 13(1): 1-22. ([doi:10.3758/s13415-012-0125-7](https://doi.org/10.3758/s13415-012-0125-7))
- 2013 Anderson, B. A., **Laurent, P. A.**, Yantis, S. (2013) Reward predictions bias attentional selection. *Frontiers in Human Neuroscience*. ([doi:10.3389/fnhum.2013.00262](https://doi.org/10.3389/fnhum.2013.00262))
- 2012 Anderson, B. A., **Laurent, P. A.**, & Yantis, S. (2012) Generalization of value-based attentional priority. *Visual Cognition* 20(6): 647-658. ([doi:10.1080/13506285.2012.679711](https://doi.org/10.1080/13506285.2012.679711))
- 2012 Yantis, S., Anderson, B. A., Wampler, E. K., & **Laurent, P. A.** (2012). Reward and Attentional Control in Visual Search. *Nebraska Symposium on Motivation 2011: The Influence of Attention, Learning, and Motivation on Visual Search*. Springer New York, 2012. 91-116.
- 2011 Reichle, E. D., Liu, Y., & **Laurent, P. A.** (2011). The emergence of adaptive eye movement control in reading: Theory and data. *Studies of Psychology and Behavior*, 9, 45-52.
- 2011 Anderson, B. A., **Laurent, P. A.**, & Yantis, S. (2011) Learned value magnifies salience-based attentional capture. *PLoS ONE* 6(11): e27926 ([doi:10.1371/journal.pone.0027926](https://doi.org/10.1371/journal.pone.0027926))
- 2011 Anderson, B. A., **Laurent, P. A.**, & Yantis, S. (2011) Value-driven attentional capture. *PNAS*, 108(25):10367-10371. ([doi:10.1073/pnas.1104047108](https://doi.org/10.1073/pnas.1104047108))
- 2008 **Laurent, P. A.** (2008) The emergence of saliency and novelty responses from reinforcement learning principles. *Neural Networks*, 21:1493-1499. ([doi:10.1016/j.neunet.2008.09.004](https://doi.org/10.1016/j.neunet.2008.09.004))
- 2008 Reichle, E. D., Vanyukov, P. M., **Laurent, P. A.**, & Warren, T. (2008) Serial or parallel? Using depth-of-processing to examine attention allocation during reading. *Vision Research*, 48: 1831-1836. ([doi:10.1016/j.visres.2008.05.007](https://doi.org/10.1016/j.visres.2008.05.007))
- 2006 Reichle, E. D. & **Laurent, P. A.** (2006) Using reinforcement learning to understand the emergence of 'intelligent' eye-movement behavior during reading. *Psychological Review*, 113: 390-408. ([doi:10.1037/0033-295X.113.2.390](https://doi.org/10.1037/0033-295X.113.2.390))
- 2003 Mitman, K. E., **Laurent, P. A.**, & Levy, W. B (2003) Defining time in a minimal hippocampal CA3 model by matching time-span of associative synaptic modification and input pattern duration. *Proceedings of the International Joint Conference on Neural Networks (IJCNN)*. ([doi:10.1109/IJCNN.2003.1223651](https://doi.org/10.1109/IJCNN.2003.1223651))