

## Robert DiPietro

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## RESEARCH INTERESTS

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I'm primarily interested in machine learning for complex time-series data. Two recent projects are 1) designing recurrent neural networks that can learn extremely long-term dependencies and 2) learning meaningful representations of surgical motion, without supervision, in the context of robot-assisted surgery.

## EDUCATION

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| 09/13 – current | <b>PhD Candidate, Computer Science</b><br><b>Johns Hopkins University</b> , Baltimore, MD   |
| 09/08 – 05/10   | <b>Master of Science, Electrical Engineering</b><br><b>Northeastern University</b> , Boston, MA<br>Thesis: “The Detection of Sub-Pixel Objects and Mitigation of False Alarms in Hyperspectral Imagery”<br>GPA: 4.0 / 4.0 |
| 09/05 – 05/10   | <b>Bachelor of Science, Applied Physics and Engineering</b> , <i>summa cum laude</i><br><b>Northeastern University</b> , Boston, MA<br>GPA: 4.0 / 4.0   |

## RESEARCH AND PROFESSIONAL EXPERIENCE

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| 09/13 – current | <b>Johns Hopkins University</b> , <i>Graduate Research Assistant / Teaching Assistant</i><br>Advisors: Prof. Gregory Hager and Prof. Nassir Navab<br>Focus: Modeling complex time-series data, primarily for robot-assisted surgery |
| 06/10 – 07/13   | <b>MIT Lincoln Laboratory</b> , <i>Associate Research Staff</i><br>Advisors: Dr. Dimitris Manolakis and Dr. Gregory Berthiaume<br>Focus: Detecting chemical warfare agents in long-wave hyperspectral imagery                       |
| 05/09 – 05/10   | <b>Northeastern University</b> , <i>Graduate Research Assistant</i><br>Advisors: Prof. Vinay Ingle and Dr. Dimitris Manolakis<br>Focus: Detecting spatially-unresolved objects in short-wave hyperspectral imagery                  |
| 07/08 – 05/09   | <b>Northeastern University</b> , <i>Undergraduate Research Assistant</i><br>Advisor: Prof. Donald Heiman<br>Focus: Obtaining the size distribution of nanoparticles using only magnetic measurements                                |
| 05/07 – 12/07   | <b>iRobot Corporation</b> , <i>Engineering Intern</i><br>Designed, drafted, and machined test fixtures for various robots   |

## PUBLICATIONS

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- [1] Robert DiPietro, Christian Rupprecht, Nassir Navab, and Gregory D Hager. Analyzing and exploiting NARX recurrent neural networks for long-term dependencies. *arXiv preprint arXiv:1702.07805*, 2017.

- [2] Christian Rupprecht, Iro Laina, Robert DiPietro, Maximilian Baust, Federico Tombari, Gregory D Hager, and Nassir Navab. Learning in an uncertain world: Representing ambiguity through multiple hypotheses. *International Conference on Computer Vision (ICCV)*, 2017.
- [3] Huseyin Coskun, Felix Achilles, Robert DiPietro, Nassir Navab, and Federico Tombari. Long short-term memory kalman filters: Recurrent neural estimators for pose regularization. *International Conference on Computer Vision (ICCV)*, 2017.
- [4] Robert DiPietro, Colin Lea, Anand Malpani, Narges Ahmidi, S Swaroop Vedula, Gyusung I Lee, Mija R Lee, and Gregory D Hager. Recognizing surgical activities with recurrent neural networks. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2016.
- [5] D. Manolakis, S. Golowich, and R. DiPietro. Long-Wave Infrared Hyperspectral Remote Sensing of Chemical Clouds: A focus on signal processing approaches. *IEEE Signal Processing Magazine*, 31(4), 2014.
- [6] C. Brett, R. DiPietro, D. Manolakis, and V. Ingle. Efficient Implementations of Hyperspectral Chemical-Detection Algorithms. *Proceedings of SPIE*, 8897, 2013.
- [7] R. DiPietro, E. Truslow, D. Manolakis, S. Golowich, and R. Lockwood. False-Alarm Characterization in Hyperspectral Gas-Detection Applications. *Proceedings of SPIE*, 8515, 2012.
- [8] R. DiPietro, D. Manolakis, R. Lockwood, T. Cooley, and J. Jacobson. Hyperspectral Matched Filter with False-Alarm Mitigation. *Optical Engineering*, 51(1), 2012.
- [9] B. Plouffe, D. Nagesha, R. DiPietro, S. Sridhar, D. Heiman, S. Murthy, and L. Lewis. Thermomagnetic Determination of  $\text{Fe}_3\text{O}_4$  Magnetic Nanoparticle Diameters for Biomedical Applications. *Journal of Magnetism and Magnetic Materials*, 323(17), 2011.
- [10] B. Jugdersuren, S. Kang, R. DiPietro, D. Heiman, D. McKeown, I. Pegg, and J. Philip. Large Low Field Magnetoresistance in  $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$  Nanowire Devices. *Journal of Applied Physics*, 109(1), 2011.
- [11] R. DiPietro, H. Johnson, S. Bennett, T. Nummy, L. Lewis, and D. Heiman. Determining Magnetic Nanoparticle Size Distributions from Thermomagnetic Measurements. *Applied Physics Letters*, 96(22), 2010.
- [12] S. Kang, G. Brewer, B. Jugdersuren, R. DiPietro, D. Heiman, A. Buechele, D. McKeown, I. Pegg, and J. Philip. Magnetotransport Properties of Mn-Si-C Based Nanostructures. *Journal of Applied Physics*, 107(10), 2010.
- [13] R. DiPietro, D. Manolakis, R. Lockwood, T. Cooley, and J. Jacobson. Performance Evaluation of Hyperspectral Detection Algorithms for Sub-Pixel Objects. *Proceedings of SPIE*, 7695, 2010.
- [14] S. Kang, G. Brewer, J. Battogtokh, R. DiPietro, D. Heiman, A. Buechele, D. McKeown, I. Pegg, and J. Philip. Growth and Characterization of  $\text{Mn}_5\text{SiC}$  Nanowires. *Nanoscience and Nanotechnology Letters*, 1(2), 2009.

## TEACHING EXPERIENCE

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### Johns Hopkins University, Baltimore, MD

2018 Spring	Co-Instructor for EN.601.382, Machine Learning: Deep Learning Lab
2018 Spring	Co-Instructor for EN.601.482/682, Machine Learning: Deep Learning
2017 Fall	Teaching Assistant for EN.601.475/675, Introduction to Machine Learning
2015 Fall	Instructor for EN.500.111, HEART: Machine Learning for Surgical Workflow Analysis
2015 Spring	Teaching Assistant for EN.600.476/676, Machine Learning: Data to Models
2014 Spring	Co-Instructor for EN.600.120, Intermediate Programming
2014 Intersession	Instructor for EN.600.101, MATLAB for Data Analytics

## AWARDS AND HONORS

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- 2016 **Excellence in Teaching Award**, Department of Computer Science, Johns Hopkins University
- 2014 **Intuitive Surgical Fellowship (2014–2015)**, Johns Hopkins University
- 2014 **International Exchange Program**, Johns Hopkins University and Technical University of Munich  
US-Germany Research Collaboration on Medical Systems Engineering
- 2013 **Louis M. Brown Engineering Fellowship**, Johns Hopkins University
- 2012 **Team Award**, MIT Lincoln Laboratory
- 2009 **Eta Kappa Nu**, Northeastern University  
Electrical and Computer Engineering Honor Society
- 2007 **Sigma Pi Sigma**, Northeastern University  
Physics Honor Society

## MISCELLANEOUS WRITING

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- 2016 **A Friendly Introduction to Cross-Entropy Loss** 100,000+ views  
<https://rdipietro.github.io/friendly-intro-to-cross-entropy-loss/>