PHILIPPE BURLINA

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The Johns Hopkins University, Associate Research Prof., Dept. of C.S.
The JHU School of Medicine, Joint Faculty position

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(google scholar)	https://scholar.google.com/scholar?hl=en&q=burlina+philippe&btnG=&as_sdt=1%2C21&as_sdtp=
(google citations)	https://scholar.google.com/citations?user=R2WeuqAAAAAJ&hl=en

SUMMARY

My work is broadly in the areas of *machine intelligence algorithms, including machine learning, machine vision, data science, deep learning* **for the analysis of very large-scale data.** This includes the development of algorithms for problem areas that are impactful for medicine, robotics, and virtual/augmented reality. Specific application areas of my work are in video object detection and recognition, *real life/in the wild machine learning problems* such as zero/one/adaptive shot learning (i.e. learning algorithms that classify with little or no training data, learning semantic attributes of images, or semantic/deep embedding), *analyzing very large/multi-media/multi-sensor/visual/real time data* (e.g. video data, real time 3D/volumetric imaging data such as RGBD, 4D echography, hyperspectral video data, …), video analysis and medical image analysis. In the past, I have co- founded two startups (one focused on enterprise software, now part of IBM, and the other focused on computer vision, now part of Leidos). I *teach at* the JHU EP EE a graduate level course on Deep Learning and one on machine vision with emphasis on real time applications. I have a number of *peer-reviewed publications* (> 130 total, >30 peer reviewed journals, >1700 citations, h-index = 23).

WORK

- 2004-present: senior staff level then (currently) **principal staff scientist**: technical lead and technical contributor on various projects centered on AI, machine vision, machine learning. JHU/APL, Laurel, MD.
- 2012- **Associate Research Professor**, Johns Hopkins U., Dept. of Computer Science.
- 2011- **Joint Faculty**, Johns Hopkins U. School of Medicine.
- 2006-2011 Assistant Research Professor, Johns Hopkins U., Dept. of Computer Science.
- 2004-2012: **Section supervisor**, machine vision section, and prior to that, **assistant group supervisor**, physics and modeling group. JHU/APL. Laurel, MD.
- 2002-2004: **Director**, **software development.** Technical and line lead for group of 25 software developers, focused on the design and development for an enterprise web content management platform. FileNet (IBM), Costa Mesa, CA.
- 2000-2002: **Co-founder and VP**, **Engineering**. eGrail Bethesda, MD. Technical and line lead for team of 25 software engineers developing an enterprise content management platform.
- 1997-2000: **Co-founder and R&D technical lead**: ImageCorp, Inc., focused on the development of Computer Vision modules, Greenbelt, MD.

EDUCATION

- **Ph.D.**, **Electrical Engineering, University of Maryland at College Park, Computer Vision Lab** (1994): Ph.D. Dissertation on Computer Vision, with focus on visual navigation and estimation of 3D structure.
- **M.S.**, Electrical Engineering, University of Maryland at College Park, Communications and Control (1991)
- **Diplome d'Ingenieur** (B.S.), Computer Science, Université de Technologie de Compiegne, France (1988)
- University of Pennsylvania, Moore School of Engineering, 1985-1986

PROFESSIONAL SOCIETY MEMBERSHIP/SERVICE

- Technical reviewer for various technical journals (IEEE Trans. Pattern Analysis and Machine intelligence, IEEE Trans. On Medical Imaging, IEEE Trans. Image Processing, IEEE Trans. GRS, MICCAI's Medical Image Analysis,…)

and conferences on Machine Vision and Biomedical Imaging (MICCAI, ISBI, IGARS, IEEE Computer Vision and Pattern Recognition)
- Member: Medical Imaging Computing and Computer Assisted Intervention Society.
- NIH, Member, Biomedical Imaging Technology Study Section, 2014.

TEACHING
- 2017-present: teaching a class on deep Learning https://ep.jhu.edu/programs-and-courses/525.733-deep-vision
- 2012-present: Associate research professor, Dept. of Computer Science, Johns Hopkins University, Baltimore, MD. (Assistant research professor from 2006-2012).
- 2011-present: Joint faculty appointment with the JHU Medical School/Wilmer Eye Institute.
- 2010-present: teaching a class on computer vision (525.443), JHU/EPP/Dept. of Electrical Engineering

DOMAIN KNOWLEDGE/CODING/LANGUAGES/OTHER
- **Deep Learning and computer vision frameworks:** caffe, Keras, OpenCV
- **Domain knowledge:** Machine learning and machine vision, deep learning, image/video analysis, machine intelligence, data science, medical image analysis, biomedical imaging, signal and image processing, multi-media and multi-image modality exploitation (electro-optic, video, hyperspectral, scanning electron microscopy) estimation, detection, and tracking; Enterprise software systems; content and record management, e-process/workflow management, authentication, authorization, deployment engines.
- **Software Languages/scripts/frameworks**: Python, Matlab, C/C++, PHP, Java, Mathematica.
- **Software development lifecycle (SDLC):** agile, extreme programming
- **Frameworks:** LAMP (Linux, Apache, MySQL, PHP), J2EE.
- **SCM/IED/design:** PyCharm, eclipse, visual studio, Visio, IBM Rational ClearQuest, TeamTrack, Git, cvs, svn; DBMS: MySQL, MS SQL Server, Oracle, …
- **Fluent:** French, Italian, some Spanish,…

SELECTED PATENTS
- For a full list: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C21&q=philippe+burlina+patent&btnG=
- Systems and methods for remote tagging and tracking of objects using hyperspectral video sensors (US8295548)
- System and method for automated detection of age related macular degeneration and other retinal abnormalities (US Patent 8,896,682, 2014)
- Automated pneumothorax detection (US Patent 8,914,097, 2014)
- Hyperspectral imaging for detection of skin related conditions (US Patent 8,761,476, 2014)
- Patient-Specific Segmentation, Analysis, and Modeling from 3-Dimensional Ultrasound Image Data (Patent App. 13/609,476, 2012). System and method of managing web content (US20040216084)
- Systems and methods for determining eye glances (US20020176604)
- Content manager integration (US20040225730)

HOBBIES
Experimenting with software frameworks/codebases**;** swim**;** little soccer coach; cycling, running, hiking, yoga.

PUBLICATIONS
>130 papers, > 30 in peer reviewed journal.

Full paper list
https://scholar.google.com/citations?hl=en&user=R2WeuqAAAAAJ&view_op=list_works&sortby=pubdate
https://scholar.google.com/scholar?hl=en&q=philippe+burlina&btnG=&as_sdt=1%2C21&as_sdtp=
https://scholar.google.com/citations?user=R2WeuqAAAAAJ&hl=en

Selected recent papers
[1] P. **Burlina**, et al. "Automated Grading of Age-Related Macular Degeneration From Color Fundus Images Using Deep Convolutional Neural Networks." JAMA ophthalmology, 2017.

[2] P. **Burlina**, "MRCNN: A Stateful Fast R-CNN", Int. Conference on Pattern Recognition, 2016.

[3] P. **Burlina**, S. Billings, N. Joshi and J. Albayda, "Automated diagnosis of myositis from muscle ultrasound: Exploring the use of machine learning and deep learning methods", PloS ONE, 2017.

[4] P. **Burlina**, K.D. Pacheco, N. Joshi, D.E. Freund, N.M. Bressler, "Comparing Human and Machine Performance for Grading AMD: A Study in Using Universal Features and Transfer Learning", Computers in Biology and Medicine, 2017.

[5] J. Markowitz, A. Schmidt, P. **Burlina**, I-J. Wang, "Combining Deep Universal Features, Semantic Attributes, and Hierarchical Classification for Zero-Shot Learning", arXiv preprint arXiv:1712.03151, 2017.

[6] K Katyal, E. W. Staley, M. S. Johannes, I-J. Wang, A. Reiter, P. **Burlina**, "In-Hand Robotic Manipulation via Deep Reinforcement Learning ", Proceedings of the Workshop on Deep Learning for Action and Interaction, in Conjunction with Annual Conference on Neural Information Processing Systems, NIPS 2016.

[7] K Katyal, I-J. Wang, P. **Burlina**, "Leveraging deep reinforcement learning for reaching robotic tasks", IEEE CVPR workshop on deep learning for robotic applications, 2017.

[8] J. Markowitz, A. Schmidt, P. **Burlina**, I-J. Wang, "Hierarchical Zero-Shot Classification with Convolutional Neural Network Features and Semantic Attribute Learning", Machine Vision and Applications, 2017.

[9] P. **Burlina**, A. Schmidt, I.J. Wang, "Zero Shot Deep Learning from Semantic Attributes", IEEE Int. Conference on Machine Learning and Applications, 2015

[10] P. **Burlina**, D.E. Freund, N Joshi, Y Wolfson, N.M. Bressler, "Detection of Age-Related Macular Degeneration via Deep Learning", Int. Symp. Biomedical Imaging (ISBI), 2016 IEEE 13th International Symposium on, 184-188, 2016.

[11] P. **Burlina**, D.E. Freund, S. Kankanahalli, N. Joshi, Y. Wolfson, N.M. Bressler, "Automated Age Related Macular Degeneration Diagnostics via Pre-Trained Deep Learning", NIH-IEEE 2015 Strategic Conference on Healthcare Innovations and Point-of-Care Technologies for Precision Medicine, 2015.

[12] D. Rollend, P. Rosendall, S. Billings, P. **Burlina**, K. Katyal, K. Wolfe, "Face Detection and Object Recognition for a Retinal Prosthesis", Asian Computer Vision Conf. Workshop Assistive Vision, 2016.

Some other selected journals/book chapters

[13] S Vyas, J Meyerle, P **Burlina** "Non-invasive estimation of skin thickness from hyperspectral imaging and validation using echography", Computers in biology and medicine, 2015

[14] A. Feeny, M.Tadarati, D. Freund, N.Bressler, P. **Burlina**, "Automated segmentation of geographic atrophy of the retinal epithelium via random forests in AREDS color fundus images", in Computers in Biology and Medicine, 2015

[15] P. **Burlina**, C. Sprouse, D. DeMenthon, R. Mukherjee, R. Juang, T. Abraham, "Patient Specific Mitral Valve Closure Prediction using 3D Echocardiography", in Ultrasound in Medicine and Biology, Vol. 39, No. 9, May 2013.

[16] C. Sprouse, R. Mukherjee, P. **Burlina**, "Mitral Valve Closure Prediction with 3D Personalized Anatomical Models and Anisotropic Hyperelastic Tissue Assumptions", IEEE Transactions on Biomedical Engineering, Vol. 60, No. 11, Nov 2013.

[17] R. Mukherjee, S. Vyas, R. Juang, C. Sprouse, and P. **Burlina**, "Endocardial Surface Delineation in 3D Transesophageal Echocardiography", Ultrasound in Medicine and Biology, Vol. 39, No. 12, 2013.

[18] S. Vyas, A. Banerjee, P. **Burlina**, "Estimating Physiological Skin Parameters from Hyperspectral Signatures", Journal of Biomedical Optics, Vol 18, issue 5, May 2013.

[19] M. Trucco, A. Ruggeri, E. Chaum. J.P. Hubschwan, B. Al-Diri, C Cheung, D. Wong, M. Abramoff, G. Lim, D. Kumar, H. Jelinek, P. **Burlina**, N. Bressler, F. Merideau, G. Quellec, T. MacGillivray, B. Dhillon, "Validating Retinal Fundus Image Analysis Algorithms: Issues And A Proposal", Investigative Ophthalmology and Vision Sciences, to appear May 2013.

[20] S. Kankanahalli, P. **Burlina**, Y. Wolfson, D. Freund, N. Bressler, "Automated Classification of Severity of Age-Related Macular Degeneration from Fundus Photographs", Investigative Ophthalmology and Vision Science, vol. 54 issue 3, March 2013.

[21] R. Mukherjee, C. Sprouse, A. Pinheiro, T. Abraham, P. **Burlina**," Computing Myocardial Motion in 4D Echocardiography", Ultrasound in Medicine and Biology, 2012, Vol. 38, No. 7, July 2012.

[22] WR Gray*, DM Kleissas*, JM Burck, JT Vogelstein, E Perlman, PM **Burlina**, R Burns, RJ Vogelstein, "Towards a Fully Automatic Pipeline for Connectome Estimation from High-Resolution EM Data," Neuroinformatics, 2012.

[23] Banerjee and P. **Burlina**, "Efficient Particle Filtering via Sparse Kernel Density Estimation", IEEE transactions Image Processing, Vol. 19, No. 9, September 2010.

[24] Jorstad, D. DeMenthon, I-Jeng Wang, and P. **Burlina**, "Distributed Consensus on Camera Pose", IEEE Transactions on Image Processing, Vol. 19, No. 9, September 2010.

[25] H.V. Nguyen, A. Banerjee, P. **Burlina**, J. Broadwater, R. Chellappa, "Tracking and ID Via Object Reflectance Using A Hyperspectral Video Camera", Machine Vision Beyond Visible Spectrum, Guoliang Fan (Ed.), Springer 2010.

[26] A.Jorstad, P. **Burlina**, I-J. Wang, D. Lucarelli, D. DeMenthon, R. Tron, A. Terzis, R. Vidal, "Estimating the Pose of an Object in a Distributed Camera Network", in JHU APL Tech Digest, Vol 8, No 3, 2010.

[27] Sprouse, A. Jorstad, D. DeMenthon, P. **Burlina**, F. Continjoch, T. Ngo, D. Herzka, E. McVeigh, J. Stearns, K. Grogan, M. Brady, T. Abraham and D. Yuh, "Computational Cardiac Modeling Based on Transesophageal Echocardiographic Imaging", in JHU APL Tech Digest, Vol 8, No 3, 2010.

[28] Banerjee, P. **Burlina** and C. Diehl, "Support Vector Methods for Anomaly Detection in Hyperspectral Imagery", IEEE Transactions on Geoscience and Remote Sensing, Vol. 44, No. 8, pp. 2282-2291, 2006.

[29] Banerjee, P. **Burlina**, and C. Diehl, "SVDD for Anomaly Detection", in "Kernel Methods for Remote Sensing Data Analysis", Gustavo Camps-Valls and Lorenzo Bruzzone, editors, Wiley & Sons, 2009.

Some other selected conference papers

[30] S. Vyas, J. Gammie, P. **Burlina**, "Computing Cardiac Strain From Variational Optical Flow In Four-Dimensional Echocardiography", Int. Symp. Computer-based Medical Systems, May 2014.

[31] S. Vyas, A. Banerjee, and P. **Burlina**, "Machine Learning Methods for In Vivo Skin Parameter Estimation," in 26th IEEE International Symposium on Computer-Based Medical Systems, (CBMS), 2013.

[32] S. Vyas, P. **Burlina**, D. Kleissas, R. Mukherjee, "Automated Walks using Machine Learning for Segmentation", MRBrains, MR Brain Image Segmentation Workshop, MICCAI 2013.

[33] S. Vyas, R. Mukherjee, F. Sosa, P. **Burlina**, "Endocardium Segmentation in 3D Transesophageal Echocardiography", IEEE Int. Symp. Biomedical Imaging, 2013.

[34] S. Vyas, A. Banerjee, L. Garza, S. Kang, P. **Burlina**, "Hyperspectral Signature Analysis of Skin Parameters", SPIE Medical Imaging, 2013.

[35] P. **Burlina**, R. Mukherjee, C. Sprouse, "A Personalized Mitral Valve Closure Simulator", IEEE Engineering Medicine and Biology Symposium, 2012.

[36] C. Sprouse, R. Mukherjee, P. **Burlina**, "Valvular Closure Prediction using Anisotropic and Hyperelastic Tissue models and Individualized Anatomy Derived from RT3DE", IEEE Engineering Medicine and Biology Symposium, 2012.

[37] M. Fitch, M. Gross, R. Juang, W. Chowdhury, M. Pomper, R. Rodriguez, P. **Burlina**, "Toward Hyperspectral Imaging of PSMA Ligand for Prostate-Cancer Resection", IEEE Int. Symp. Biomedical Imaging, 2012.

[38] R. Mukherjee, A. Pinheiro, J. Gammie, D. Yuh, T. Abraham, E. McVeigh, and P. **Burlina**, Dense Myocardial Motion From 4d Ultrasound: Comparative Performance Evaluation, IEEE ISBI, 2012.

[39] R. Meth, J. Ahn, A. Banerjee, R. Juang, P. **Burlina**, "Parameter estimation for support vector anomaly detection in hyperspectral imagery", Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XVIII, SPIE 2012.

[40] S. Vyas, H. V. Nguyen, A. Banerjee, P. **Burlina**, R. Chellappa, "Computational modeling of skin reflectance spectra for biological parameter estimation through machine learning", Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XVIII, SPIE 2012.