

## Eugenio Culurciello, PhD

*Entrepreneur, Leader, Engineer, Teacher*  
*~ Teaching machines how to learn ~*

Email: [euge@purdue.edu](mailto:euge@purdue.edu), [culurciello@gmail.com](mailto:culurciello@gmail.com)  
Web: <http://engineering.purdue.edu/elab/>  
<https://culurciello.github.io>  
<https://www.linkedin.com/in/eugenioculurciello/>  
<https://medium.com/@culurciello/>



### PROFESSIONAL INTEREST

- Deep Learning, Neural Networks, Machine Learning, Artificial Intelligence
- Multi-modal Large Language Models, knowledge graph, AGI, Document Understanding
- Artificial intelligence for edge devices, robots, 3D graphics, artificial vision
- Learning in unstructured environments, unsupervised and reinforcement learning

### HIGHLIGHTS

- CTO of Pascaline Systems Inc – a AI Data-Center company, 2024-
- Director of the Purdue Institute of Physical AI (IPAI), 2023-2024
- 2019 Most Impactful Inventors of FY19, Purdue Engineering Office of Technology and Commercialization
- Serial entrepreneur: founder: FWDNXT (2017, acquired: Micron Inc.), Teradeep (2013)
- Business leader: CEO, CTO, Head of Artificial Intelligence in multiple companies
- Technical leader: established and managing a laboratory facility, recruited and managing a group of 10+ direct and up to 100 indirect
- Head of machine intelligence Movidius (an Intel company), June 2016 - January 2017
- Recipient: Presidential Early Career Award for Scientists and Engineers (PECASE)
- Distinguished Lecturer: IEEE, Circuit and System Society
- Keynote address at the at System-On-A-Chip conference 2017 and 2011
- Designed 5 generations of deep learning processors (2006 -2022)
- Designed > 32 integrated circuits with published results (2001-2013)
- Expert in VLSI analog and mixed-signal microchip design, digital and mixed systems on a chip, biomedical instrumentation, algorithms on chip, product development
- Deep learning contributions featured on on the [MIT Technology Review](#), on [BBC](#), [FierceWireless](#) (Jan. 2014), and on [Business Insider](#), [Journal and Courier](#), on [18WLF TV](#), [Phys org](#), [the Engineer](#), [Imperial Valley News](#), [Purdue News](#), [Phone Arena](#), [Hoosier AG Today](#), [CN beta](#), (April 2014)

### EDUCATION

- PhD, The Johns Hopkins University, Baltimore, MD, Electrical and Computer Engineering, September 2004, Thesis: "Silicon on Sapphire CMOS Circuits and Devices for Sensor Interfaces"

- M.S., The Johns Hopkins University, Baltimore MD, Electrical and Computer Engineering, May 1999
- M.S., University of Trieste, Italy, Electrical Engineering, July 1997

## PROFESSIONAL EXPERIENCE

- Pascaline Systems Inc. CTO, May 2024 - present
- Purdue University, Full Professor, August 2023 - present
- Purdue University, Associate Professor with tenure, Purdue University, August 2011 - July 2022
- Micron Inc., Fellow, Machine Learning, Deep Learning and Artificial Intelligence, July 2019 – July 2022
- FWDNXT Inc., founder, CTO and president, January 2017 – July 2019
- EC consulting, Artificial Intelligence and Deep Learning, January 2008 - present
- Intel Movidius, Head of Machine Learning, April 2016 – December 2016
- Teradeep Inc, founder, CEO, CTO: December 2013 - April 2016
- Yale University, Associate Professor New Haven, CT July 2004– July 2011
- Director of the ‘e-Lab’ VLSI design laboratory at Yale University
- The Johns Hopkins University, Baltimore, MD, PhD Research Assistant, Sensory Communication & Microsystems Laboratory, Electrical and Computer Engineering, Academic advisor: Andreas G. Andreou, January 1998 – July 2004
- Professionals College ENAIP, Instructor, Udine, Italy, November 1997 – January 1998
- Johns Hopkins University, Thesis Student, Baltimore, MD, January 1997 – June 1997
- University of Trieste, Trieste, Italy, Research Assistant in Evaluation of variable resolution displays with visual search, Academic advisors: Ernst Niebur, Accardo Agostino

## PUBLICATION LIST

see website: <http://e-lab.github.io/publications.html>

## EXPERTISE

- Machine Learning: neural networks and deep learning, supervised and unsupervised learning, clustering learning, life-long and continual learning
- AI coding Cursor, Aider, Windsurf, Ollama and local installations of coder LLMs
- Computer vision: object recognition, categorization, tracking, learning
- Sequence learning, natural language processing, image and text understanding
- 3D graphics and deep learning, image to mesh, text to mesh, animation, front-end, BabylonJS, 3D assets, video-game design, visual programming (LiteGraph, Blockly)
- Robotics applications of reinforcement learning and continual learning
- Computer architecture: custom processors for machine learning
- Programming: Lua, Python C, C++, Java, Matlab, Mathematics, Xilinx FPGA tools
- Machine learning frameworks: Torch7, PyTorch, Tensorflow and more
- Chip design: Cadence, Synopsis, VHDL, Verilog, Spice, Tanner L-Edit
- Circuit simulation: Spice, Spectre, Hspice, EKV modeling
- Computer administration: Linux, Windows, Mac OS
- Document editing: LaTeX, Word, Illustrator, Photoshop, 3D CAD (Sketchup)

## HONORS

1. **Keynote address**, SoC conference 2017, <http://www.socconference.com/keynotes.htm>
2. Invited Talk EVW at CVPR <http://cvisioncentral.com/promotion/evw2014> June 28th 2014, Host: Sek Chai, SRI
3. Invited to the Microsoft Research Faculty Summit 2013, July 2013, Redmond WA.
4. SoC Conference, keynote talk, Nov 2nd 2011, title: "Vision for robots, vehicles and consumer electronics: how close are we?"
5. **Distinguished Lecturer of the IEEE**, Circuit and System Society 2011-2012
6. **Presidential Early Career Award for Scientists and Engineers (PECASE) 2009**, nominated by ONR program manager Thomas McKenna and Matthew Swiergosz. The Presidential Early Career Award for Scientists and Engineers (PECASE) is the highest honor bestowed by the United States government on outstanding scientists and engineers in the early stages of their independent research careers.
7. Our work on synthetic vision system has been featured on large number of media outlets, including MSNBC, the New York Times, the Economist (Fall 2010)
8. Yale Associate Faculty Fellowship, calendar year 2010
9. Best Paper Award, IEEE Circuit and System Society, for the IEEE ISCAS 2008 paper "Fall detection using an address-event temporal contrast vision sensor"
10. Invited to the National Academies, NAFKI Complex Systems Conference, with full travel grant, November 13-15<sup>th</sup> 2008
11. Yale Junior Faculty Fellowship, calendar year 2008
12. Best poster award: "Integrated Patch-Clamp Amplifier", Farah Laiwalla, Zhengming Fu, Kate Klemic, Fred Sigworth, Eugenio Culurciello, 14<sup>th</sup> Annual CMOC Symposium, Yale University, March 17<sup>th</sup> 2005

## PROFESSIONAL ACTIVITIES

1. Embedded Vision Alliance Research Advisory Board, [www.embedded-vision.com](http://www.embedded-vision.com), November 2015 - 2017
2. Conference program committee
  - Organizing committee ISCAS 2017: sponsorship chair. Involved in ICLR 2013, first conference with open-review system
  - IEEE BioCAS: tutorials chair 2007, 2008, demonstration chair: 2011
  - IEEE ISCAS Special Sessions Organizer, organized special sessions in 2008, 2009, 2010.
  - IEEE ISCAS 2011 Demonstration Session Chair
3. IEEE Circuits and Systems Society, Committee member:
  - Sensory Systems Technical Committee
  - Biomedical Circuits and Systems Technical Committee
  - Neural Networks Technical Committee
4. Neuromorphic Engineering workshop at Telluride, CO, 2001, 2004, 2006, 2009, 2013. Led a project on retinal implant prototype, image sensor network, synthetic vision systems
5. SOS Peregrine USC COOP workshop, University of Southern California, 2001
6. IEEE Senior Member, Member since 1993
7. Associate Editor for IEEE Transaction on Biomedical Circuit and Systems (BioCAS)

8. Associate Editor for PloS ONE Synthetic Vision Systems.
9. Reviewer for: IEEE Transaction on Electron Devices, IEEE Solid State Circuits Journal, IEEE Transaction on Circuits and Systems I and II, IEEE Transactions on Biomedical Circuits and Systems, IEEE Sensors, IEEE Transactions on VLSI Systems, Elsevier Optics Communications, PloS ONE, International Symposium On Circuits and systems (ISCAS), IEEE Transactions on Neural Networks, Kluwer Analog Integrated Circuits and Signal Processing, IEEE region 4 Electro-information Technology Conference, IET Electronics Letters
10. Reviewer for National Science Foundation: Dr. Khosla Jan. 2005, Dr. Rao Jan. 2006, Dr. Midkiff Dec. 2006. Invited to NSF biomedical panel Fall 2012, Spring 2013.
11. Reviewer for the Natural Sciences and Engineering Research Council of Canada (NSERC) in 2008, 2009.
12. Reviewer for the Qatar National Research Fund (QNRF) and the National Priorities Research Program (NPRP) in 2009 - 2013.
13. Reviewer for the proposals of the Research Grants Council (RGC) of Hong Kong, in 2009.

## TEACHING EXPERIENCE

1. BME495 Deep Learning for medical imaging, 400-level, Spring 2016-2025
2. BME595 Entrepreneurship, Fall 2022
3. BME595 Deep Learning, 500-level, Fall 2015-2018
4. BME 528/ECE 528 – Measurement & Stimulation of the Nervous System, Purdue University Spring 2015
5. BME 495 Computational Neuroscience and Learning, Purdue University Spring 2014
6. BME595, Artificial and Robotic Vision, Purdue University Spring 2013
7. BME 301, Bioelectricity, Purdue University Fall 2012, 2013
8. BME 595, Neuromorphic systems and synthetic vision, Purdue University Spring 2012
9. BME ECE 695, Analog Integrated Circuits and vision systems, Purdue Fall 2011
10. EENG201, Introduction to Computer Engineering, Yale 2009
11. ENAS993, Silicon on Sapphire devices, circuits and systems, Yale 2008,09
12. EENG 427 ENAS 627, Advanced Integrated Circuits, Yale 2005,07
13. EENG 348, Digital Systems, Yale University 2005,06,07,09
14. EENG 428 ENAS 628, Sensors and Biosensors, Yale University 2006
15. 520.495, Microfabrication Lab, Johns Hopkins University 1998
16. 520.498, Senior Design Project Laboratory, Johns Hopkins University 2003
17. Computer architecture short course, ENAIP, Italy, 1997

## UNIVERSITY SERVICE

1. Director of the Purdue Institute of Physical AI (IPAI), 2023-today
2. Initiative for Physical Artificial Intelligence (IPAI)  
<https://www.purdue.edu/computes/initiative-for-physical-artificial-intelligence/>, Spring 2023
3. Purdue BME Department steering committee on Center for Digital Health, Spring 2023
4. ML@Purdue, advisor to student group (700+ members!), Spring 2023
5. Data science initiative, Purdue College of Engineering panels, Spring 2018
6. Purdue University robotics group coordinator 2012 – 2013
7. Purdue University open access publication forum 2013 - 2014
8. Undergraduate Curriculum committee, Biomedical Engineering, Purdue, AY 2012-15

9. Graduate Curriculum committee, Biomedical Engineering, Purdue, AY 2011-12
10. University Council Committee on the School of Engineering & Applied Science 2010
11. School of Engineering, Vic Tyler Distinguished Lectureship committee 2009
12. Electrical Engineering curriculum steering committee, 2004 - 2007
13. Electrical Engineering web-page coordinator, 2006, 2008
14. Space committee for Computer Engineering Faculty, 2006 - 2007
15. Pierson College freshmen advisor, 2005 – 2008

## **COMMUNITY WORK**

Eugenio is an active philanthropist in community service via interest group memberships and capital donations for the improvement of our social nets and infrastructures. Eugenio regularly serves as public motivational speaker for young scientists, engineers, and entrepreneur. He is also interested in advancing and helping young kids and students in coding and programming, offering 1-to-1 and group tutoring to talented and motivated individuals.

Other professional community engagements are listed here:

1. Dr. Culurciello participated in the Connecticut Pre-Engineering Program, which provides outreach to under-represented students. This acclaimed program includes almost all of the schools in the New Haven Public School system and was the first national program to win a Presidential Award in Science, Mathematics, and Engineering Mentoring. Dr. Culurciello is involved in the Mentor Program, assisting as mentors for students in grades K- 12, and working with elementary school teachers and their classes.
2. Community seminar: “What Makes Your Gameboy Work: How Electronics are Evolving”, at Yale University Science Saturdays: a special lecture series designed for families that brings the excitement of research and the passion of scientists to school-age children in New Haven, October 10<sup>th</sup> 2009.

## **COLLABORATIONS IN INDUSTRY AND ACADEMIA**

Entrepreneur at heart, with a passion to take new discoveries on the fast route to commercialization and global use, E. Culurciello is internationally known for his research and entrepreneurial mission.

E. Culurciello is experienced in leading small team to achieve what large companies cannot do or think of. Solid experience in raising rounds, enticing audiences and investors with a solid plan, M&A, licensing, mentoring, managing, partnering with small, medium and Fortune 500 companies.

E. Culurciello co-founded FWDNXT Inc. in 2017, on the commercialization of deep neural network hardware and software solutions. <http://fwdnxt.com/>. Started a collaboration with Micron Inc. on the development of neural network accelerators, 12 employee on payroll, strategic partnership with Micron Inc., 10+ customers, sales of FPGA and SoC IPs. Working at Micron Inc. since July 2019 on the development of hardware for deep learning, compilers, machine learning applications. Experienced in robotics application for industrial and home-automation, intelligent cameras, data analytics and machine-learning-based forecasting.



E. Culurciello co-founded company Teradeep Inc. in 2013, <http://www.teradeep.com/>, in the area of artificial vision systems, security, home-automation, internet-of-things, robotics, cloud services. Hired 10 people and won a GigaOm Structure Data award as one of most-promising startups to launch in 2014. TeraDeep was invited to the Re.Work Deep Learning Summit. TeraDeep is one of 60 Hot Startups to Watch! TeraDeep is on the list of "EE Times Silicon 60: Hot Startups to Watch.

E. Culurciello is committed to working on applied machine learning products with commercial companies. In the recent years he interacted with: Micron, AMD, Amazon, Google, Facebook, Qualcomm, Samsung, Apple, Intel, Movidius, Nervana Sys, Continental, Valeo, John Deere, Synopsis, Cadence, Silanna Semiconductors (Silicon-on Sapphire), Warner Instruments (biomedical instrumentation), Red Shirt Imaging (optical neural recording), to name a few.

Dr. Culurciello maintains relationship with multiple DoD departments: ONR, DOE, Navy, Army, Air Force, DARPA, PNNL, CERN, etc. Also with contractors: Northrup Grumman, Mitre, InQTel, Irvine Sensors, Trident, to name a few.

In his early career, Dr. Culurciello demonstrated leadership in the field of electrical engineering by establishing several collaborations nationally and internationally in highly interdisciplinary areas bridging electronics, neuroscience and biology. He collaborated with Fred Sigworth on patch-clamp instrumentation, and with Vincent Pieribone in optical brain-machine interfaces, with Dr. Botond Roska (Basel, Switzerland) on development of novel instrumentation for the study of the retina, with prof. Gunhee Han (S. Korea) and prof. Jun Ohta, (Nara NAIST, Japan) in optical neural interfaces and low-noise image sensors, with Ernst Niebur (Johns Hopkins University) on development of synthetic attentive vision system. He has also participated to the Neuromorphic Engineering workshop at Telluride, CO in July 2009 (and also in 2001, 2004, 2006). During this meeting, he led a project on retinal implant prototype, image sensor network, synthetic vision systems. He worked with machine-learning leaders as Yann LeCun (NYU), Andrew Ng (Stanford) Jeffrey Hinton (Google, University of Toronto)

## **INVITED TALKS AND SEMINARS**

1. ORNL Cross Correlation: A Distinguished Lecture Series at ORNL, "AI for nothing and brains for free", host: Suhas Sreehari, April 2023
2. Micron Japan AI and machine intelligence Seminar Speaker, October 2020
3. Micron Technology Leadership Seminar speaker, July 2020
4. October 1st 2018 Purdue MCCS colloquium speaker, host: Anne Sereno
5. May 1-3 2018, Invited talk at the Embedded Vision Summit, Embedded Vision Alliance
6. Feb 21st 2018: seminar on hardware for deep learning, Oregon Health Science University, discussion on CryoEM
7. Feb 22nd 2018: seminar on hardware for deep learning, Pacific Northwest National Lab, discussion on Proton decay
8. Jan 11th 2018: NAVAIR, seminar on hardware for deep learning, Point Mugu, discussion on AI for defense
9. September 7th 2017, Software Stir at Anvil, Purdue
10. Two invited talks at the Embedded Vision Summit, May 1-3 2017, Embedded Vision Alliance

11. Artificial Intelligence, past, present, future, April 14th 2016, Computational Science and Engineering, Applied Mathematics, Purdue
12. Artificial Intelligence, past, present, future, January 30th 2016, Purdue Mathematical and Computational Cognitive Science, host: Gregory Francis
13. 5th June 2016 special session in Design Automation Conference (June 5-9, 2016) on the topic of Low-Power Image Recognition (invited)
14. Deep Learning in practice, April 7th 2016, Futurewei Technologies, Inc, annual Strategy and Technology Workshop (STW) (invited)
15. Deep Learning in practice, Purdue University CS Machine Learning and Applications Seminar, September 30th 2015
16. Boston University NeuroHAM - <http://neuroham.bu.edu>, June 10th 2015 (invited)
17. JHU APL, November 5th 2014, Host: Roos Matthew, Title: Enabling gadgets to perceive the world
18. Purdue University, Dawn or Doom Summit, Thursday September 18, 2014, Title: Visual Intelligence and the Terminator
19. University of Udine, July 10th 2014, Host: Andrea Fusiello [andrea.fusiello@uniud.it](mailto:andrea.fusiello@uniud.it), Title: Modeling the human visual system in hardware
20. Invited Talk EVW at CVPR <http://cvisioncentral.com/promotion/evw2014/> June 28th 2014, Host: Sek Chai, SRI
21. University of California at Riverside, Feb 21st 2014, host: Najjar Walid [najjar@cs.ucr.edu](mailto:najjar@cs.ucr.edu), Title: Modeling the human visual system in hardware
22. Qualcomm, San Diego CA, February 7th 2014, host: Anthony Lewis, Title: Enabling computers to perceive the world
23. Swinburne University Melbourne, May 28th 2013, Title: Optogenetic tools, models and hardware to reverse engineer the human visual system, host: David Liley, Swinburne
24. Monash University, Melbourne, May 25<sup>th</sup> 2013, Title: Optogenetic tools, models and hardware to reverse engineer the human visual system, host: Jamie Evans
25. University of Melbourne, May 22nd 2013, Title: Modeling the human visual system in hardware, host: Steven Prawer
26. UIC talk/seminar, April 5th 2013, Title: Modeling the human visual system in hardware
27. Qualcomm, San Diego CA, April 2nd 2013, Title: Modeling the human visual system in hardware, host: Anthony Lewis
28. Google, Mountain View CA, April 1st 2013 Title: Modeling the human visual system in hardware, host: Rahul Sukthankar [sukthankar@google.com](mailto:sukthankar@google.com)
29. Purdue Biomedical Sciences Seminar, March 18<sup>th</sup> Title: "Synthetic human vision: eyes for machines", host: James F. Leary
30. Google NYC, January 17th 2013, Title: Image and video understanding: speeding-up computation through hardware acceleration host: Jonathan Ross [hash@google.com](mailto:hash@google.com)
31. Purdue University, December 14th 2012, Mathematical/Computational Cognitive Science area in the department of Psychological Sciences at Purdue, host: Sebastien Helie
32. Johns Hopkins University Symposium on Visual attention, Title: Finding and learning proto-objects in a synthetic vision system, September 27th 2012. Host: Ernst Niebur
33. Purdue April 2012 Computer Vision/Graphic seminar, Modeling the human visual system in hardware, host: Daniel Aliaga [aliaga@purdue.edu](mailto:aliaga@purdue.edu)
34. University of Southern California, March 30th talk, Bio-inspired hardware vision systems for robotics, host: Hossein Hashemi <[hosseinh@usc.edu](mailto:hosseinh@usc.edu)>, Zahra Safarian
35. Arizona State University, March 28-29, 2012, Title: Bio-inspired hardware vision systems for robotics, host: Bertan Bakkaloglu <[Bertan.Bakkaloglu@asu.edu](mailto:Bertan.Bakkaloglu@asu.edu)>

36. Drexel University, March 20, 2012, Modeling the human visual system in hardware, Host: Mark Hempstead <mhempstead@coe.drexel.edu>
37. Purdue Center Implantable Device symposium feb 24th 2012, "Biomedical instrumentation for optogenetic cortical recordings and high-throughput patch-clamp", host: Pedro Irazoqui
38. Purdue BME seminar Feb 15th 2012: "Scaling up neuroscience: optogenetic neural recording", host: Nam Kong
39. Machine Learning Purdue seminar, Feb 14th 2012: "Machine learning for synthetic vision systems", host: S V N Vishwanathan
40. SoC Conference, keynote talk, Nov 2nd 2011, title: Vision for robots, vehicles and consumer electronics: how close are we?
41. Purdue AVL laboratories seminar, "The Eye of the Terminator: Modeling the human visual system in hardware", host: Avi Kak
42. Samsung, Korea, April 27th 2011, "An hardware accelerated vision system for general-purpose vision algorithms", host: Wunki Jung
43. Yonsei, Korea, April 22nd 2011, "An accelerated vision processor for general-purpose vision algorithms" host: prof. Gunhee Han
44. University of Illinois at Chicago, April 8th 2011 "The Eye of the Terminator: Modeling the human visual system in hardware", host: Dr. Mitra Dutta
45. NYU/Poly February 15th, 16th 2011 Modeling the human visual system in hardware"
46. host: Farshad Khorrami
47. Yale Institute for Nanoscience and Quantum Engineering, January 28th 2011, Synthetic eyes, vision, and tools to reverse engineer the brain from the e-Lab team @ Yale, host Paul Fleury
48. IEEE Yale chapter: "How the magic 5 from Yale vanquished Intel and nVidia: The story of NeuFlow: the first Eye of the Terminator", Tuesday, September 28th 2010, host: Hur Koser
49. Purdue University, August 19<sup>th</sup> 2010, "Biomedical instrumentation for optical brain imaging and high-throughput patch-clamp", host Dr. Wodicka
50. Swartz Seminar, Yale Neuroscience May 14<sup>th</sup> 2010, "The eye of the Terminator: modeling the visual system in hardware", host: Xiao-Jing Wang
51. New York University NYU – May 12<sup>th</sup> 2010, "The eye of the Terminator: modeling the visual system in hardware", host: Yann LeCun
52. Northeastern University March 30<sup>th</sup> 2010, "Novel biomedical instrumentation for optical brain imaging and high-throughput patch-clamp", host. Dana Brooks"
53. University of New Haven, March 3<sup>rd</sup> 2010 "Integrated biomedical instrumentation: miniature patch-clamp and brain imaging devices", host: Prof. Ismail Orabi.
54. University of Washington at St Louis, Feb 19<sup>th</sup> 2010, "Biomedical instruments for patch-clamp recordings and voltage-sensitive dye imaging", host: Viktor Gruev.
55. Yale Science Saturdays, October 10<sup>th</sup> 2009, "What Makes Your Gameboy Work: How Electronics are Evolving", host: Ainissa Ramirez
56. Yale - Aging Research Seminar: "Synthetic vision system for assisted living" 9/2/2009, host: Lisa Barry.
57. Telluride Neuromorphic Engineering Workshop, July 3<sup>rd</sup> 2009: "Optical Neural Recording: in-vivo fast functional brain imaging with fluorescent dyes".
58. Yale Biomedical Engineering Seminar, April 16<sup>th</sup> 2009: "Novel instrumentation for optical brain imaging and high-throughput patch-clamp", host: Erin Lavik.
59. DARPA NeoVision 2, "Efficient feedforward categorization of objects and human postures with address-event image sensors", April 8<sup>th</sup> 2009.



60. Samsung Research, Korea, "Event-based image sensors for synthetic vision", December 5<sup>th</sup> 2008, host: Seog-Heon Ham.
61. Yonsei University, Seoul S. Korea, December 5<sup>th</sup> 2008, host: prof. Gunhee Han.
62. KAIST (Korean Advanced Institute of Science and Technology), Daejeon S. Korea, December 9<sup>th</sup> 2008, host: prof. Hoi-Jun Yoo.
63. National Academies, NAFKI Complex Systems Conference, invited with full travel grant, November 13-15<sup>th</sup> 2008.
64. Columbia University, "Silicon-on-sapphire: mixed-signal circuits and micro-systems design and opportunities", October 31<sup>st</sup> 2008. Host: prof. Yannis Tsividis.
65. IEEE International SOI conference, "Mixed Signal Microsystems in Emerging SOI ", invited talk, October 6-9 2008. Host: Mario Pelella, AMD.
66. DARPA DSRC Electronic Stem Cell, "Efficient feedforward categorization of objects and human postures with address-event image sensors", June 5<sup>th</sup> 2008, host: Paul Hasler.
67. University of Washington, "Integrated potentiostat for patch-clamp instrumentation", invited to weekly Electrical Engineering seminar series, Friday May 23<sup>rd</sup> 2008, Host: prof. Mani Soma.
68. Texas A&M University, "A Silicon on Sapphire Instrument for ion channels patch-clamp research", Thursday, February 28, 2008, invited seminar for the Department of Electrical and Computer Engineering. Host: prof. Edgar Sanchez-Sinencio.
69. Cornell University, "An integrated patch-clamp potentiostat", March 14<sup>th</sup> 2008, invited to the Department of Electrical and Computer Engineering, seminar Analog Devices VLSI Series. Host: prof. Alyssa Apsel.
70. University of Milan, Politecnico of Milan, Italy, "Current-mode biosensors for cell physiology", December 17<sup>th</sup> 2007, invited to a Seminar lecture. Host: prof. Marco Sampietro.
71. University of Trento, Italy, "Address-Event image sensors for sensor networks", July 16<sup>th</sup> 2007, invited to a Seminar lecture. Host: prof. Massimo Gottardi.
72. Tufts University, "An integrated patch-clamp amplifier in silicon on sapphire CMOS", April 10<sup>th</sup> 2007, invited to weekly Seminar lecture. Host: prof. Sameer Sonkusale.
73. Yale university, "Address-event image sensors: a future view of the world", invited to the Applied Mathematics Seminar, Tues. Sept. 12<sup>th</sup> 2006. Host: prof. Ronald Coifman.
74. Princeton University, "An Integrated Patch-Clamp Amplifier and the Battle of Bulk-Silicon vs. Silicon on Insulator CMOS", Invited colloquium speaker at the weekly colloquium series, March 13<sup>th</sup> 2006. Host: prof. Sigurd Wagner.
75. University of Arizona, "Address-event image sensors and networks", Invited colloquium speaker at the weekly colloquium series, March 3<sup>rd</sup> 2006. Host: prof. Andreas Spanias.
76. University of Connecticut, "Silicon on Sapphire Systems and Devices", Invited colloquium speaker at the ITE weekly colloquium series, April 22<sup>nd</sup> 2005. Host: prof. Faquir Jain.
77. Yale University, "Silicon on Sapphire Technology: Systems and Devices", invited to the Center for Systems Science Seminar Series. April 1<sup>st</sup> 2005, Host: prof Kumpati Narendra.
78. University of Udine, Italy, invited lecture: "Silicon on Sapphire Technology Systems and Devices, December 22<sup>nd</sup> 2004. Host: prof. Luca Selmi.

## GRANTS AND AWARDS

1. ONR grant on robotics brains and physical AI learning, DURIP add-on, 2023-2026

2. FWDNXT Inc. startup raised > 2M\$ from 2017 to 2019, acquired by Micron Inc. June 2019.
3. Purdue seed funding: "Autonomous exploration and localization of targets for aerial drones" to the iGSDI's RFP on "AI+" with David Cappelleri, ME Purdue, April 2018
4. FWDNXT Inc. (Purdue incubator) raised 1.5 M\$ for 1st year, August 2017
5. SRC: *C-BRIC: Center for Brain-inspired Computing Enabling Autonomous Intelligence*, submitted in response to the Joint University Microelectronics Program (JUMP) Research Announcement, Period: 9/2017 – 9/2022, Funding: 22 M\$ total, 1,2 M\$ to E. Culurciello's group,
6. ONR, Software and hardware for deep learning of video sequences, Office of Naval Research N00014-15-1-2791, Performance Period: 11/01/2015-10/31/2019, funding: \$800,000
7. ONR, Efficient hardware-acceleration for sparse-matrix computation, Office of Naval Research N00014-17-1-2225, funding: \$170,350, Performance Period: 01/01/2017 to 02/28/2019
8. Teradeep Inc. (Purdue incubator) raised 1.5 M\$ from Xilinx Inc. December 2015
9. NIH (PI Vincent Pieribone, Co-PI: E. Culurciello), "High-Speed, wide field fluorescent imaging of cortex in freely moving animals", Total Purdue Amount: \$1,168,196, Total period: August 2012- August 2016.
10. ONR PECASE (PI: Eugenio Culurciello) Title: A Trillion Operations-Per-Second Vision System for DoD Applications, Total Award Amount: \$1,000,000, Total Period: 02/01/11 – 01/31/15
11. ONR MURI (PI: Ernst Niebur, lead Johns Hopkins Univ.) Title: Figure-Ground Processing, Saliency and Guided Attention for Analysis of Large Natural Scenes, Total Award Amount: \$4,500,000, Amount award: \$463,407, Total Period: 06/01/09 – 05/31/14
12. ONR, Development of a Scalable Hyperbaric (0-500 psig) Multichannel Instrumentation (Plana Patch Clamp) for High-throughput, Single-cell Analysis of the Pharmacological Modulation of Macroscopic Ionic, Project Period: 09/12/11-09/11/15, Total Sponsor Award: \$480,000,
13. Google Research Awards program, "Hardware-accelerated scene-understanding vision system", Total Award Amount: 57,500, Period: Sept 2012-Aug 2013.
14. NSF IDBR: High-Throughput Instrumentation for Lipid Bilayers and Patch-clamp, , Sponsor Award No.: 1154498-DBI, Total Award Amount: \$660,000, Total Period: 08/15/2011 to 06/30/2014,
15. NIH (PI Vincent Pieribone, Co-PI: E. Culurciello), Title: High-Speed, wide field fluorescent imaging of cortex in freely moving animals, Total Award Amount: \$140,000, Total Period: 9/1/2011 – 8/31/2012
16. NSF ECS-0622133 (PI: E. Culurciello), Title: A Lightweight Event-Based Synthetic Vision System for Assisted-Living and Machine Vision Applications, Total Award Amount: \$330,000, Total Period: 07/01/09 - 06/30/12
17. DARPA NeoVision 2, HRL Lab, LLC (Co-PI: E. Culurciello), Award Amount: \$299,493, Total Period: 10/01/09 – 12/31/13
18. NIH (PI Vincent Pieribone, Co-PI: E. Culurciello), Title: High-Speed, Wide Field Fluorescent Imaging of Cortex in Freely Moving Animals, Total Award Amount: \$1,131,473, Total Period: 07/01/09 – 06/30/11
19. NIH STTR Phase II (PI: F Sigworth, Co-PI: E. Culurciello), Title: Patch Clamp Amplifier on a Chip, Total Award Amount: \$449,999, Total Period: 04/01/09 – 03/31/11
20. ONR BAA 2008 (PI: E. Culurciello), Award No.: N000140810065, Title: Patch Clamp Amplifier on a Chip, Incremental funding: \$44,500, Total Period: 10/1508-10/14/11

21. ONR BAA 2008 (PI: E. Culurciello), Award No.: N000140811014, Title: A High-Speed, In-vivo Optical Neural Recording System, Amount of Award: \$381,697, Total Period: 10/15/08-10/14/11
22. ONR BAA 2007 (PI: E. Culurciello), Title: Integrated Microscale Biosensor for Cell Membrane and Patch-Clamp, Total Award Amount: \$439,471, Total Period: 10/15/07-10/14/10
23. NSF (PI: E. Culurciello, Co-PI: F. Sigworth), Title: IDBR: High-Performance Integrated Patch Clamp Amplifiers, Total Award Amount: \$547,974, Total Period: 07/01/07 – 06/30/10
24. NSF ECS-0622133 (PI: E. Culurciello, Co-PI: Savvides), Title: A Lightweight Event-Driven Network of Biomimetic Image Sensors, Total Award Amount: \$270,000, Total Period: 09/01/06 – 08/31/09
25. NIH STTR 1R41NS062408-01A1, “Patch Clamp Amplifiers on a Chip”, (PI: Fred Sigworth, Co-PI: E. Culurciello), Total Award Amount: \$134,245, Total Period: 06/01/06 – 05/30/07
26. ARO STIR 53393-LS-II (PI: Vincent Pieribone, Co-PI: E. Culurciello), Title: Development of an Implantable Optical Neuroprosthetic: System Integration and Testing, Total Award Amount: \$50,000, Total Period: 09/01/07 – 05/31/08
27. ARO STIR 193 (PI: Vincent Pieribone, Co-PI: E. Culurciello), Title: Development of an Implantable Optical Sensor for Use in Neural Prosthetics, Total Award Amount: \$50,000, Total Period: 07/20/06 – 04/19/07
28. Peregrine Semiconductors (PI: E. Culurciello), \$10,000 grant for research on energy harvesting circuits, 2007

## **STUDENTS AND STAFF**

Current collaborator:

1. Shakti Wadekar, PhD student at Purdue
2. Sravani Ramishetty, PhD student at Purdue

## **FWDNXT Staff 2019**

1. Marko Vitez, senior software engineer
2. Abhishek Chaurasia, lead machine learning engineer
3. Aliasger Zaidy, lead computer architect
4. Andre Ming Chang, lead compiler engineer
5. Lukasz Burzawa, machine learning engineer
6. Sheik Dawood, machine learning engineer
7. Jacob Stevens, hardware engineer
8. Madankumar Sampath, hardware and SoC engineer
9. Jim Johnston, legal counsel
10. Michael Glapa, software engineer

## **Academic Post-doctorate and Research associates:**

1. Dr Evan JoonHyuk Park, Jan. 2013 – optical neural recording, – 1<sup>st</sup> job: startup embedded sport equipment
2. Dr. Phi-Hung Pham, Jan 2012 – neuromorphic vision microchips, – 1<sup>st</sup> job: LG Electronics, USA

3. Dr. Shoushun Chen post-doctorate associate, PhD Hong Kong University of Technology, Jan. 2008-Jun. 2009, – 1<sup>st</sup> job: assistant professor at Nanyang Technical University (NTU) Singapore.
4. Dr. Dongsoo Kim, PhD Yonsei University 2008, S. Korea, post-doctorate associate since Jan. 2008 -June 2010, 1<sup>st</sup> job: Aptina Inc.
5. Dr. Selcuk Talay, PhD Bogazici University, 2007, Turkey, post-doctorate associate since Aug. 2009
6. Dr. Andrew Kunil Choe, PhD Yonsei University 2007, S. Korea, post-doctorate associate from Nov. 2009 – September 2010, – 1<sup>st</sup> job: LG imaging sensors, Korea

#### **Academic Staff:**

1. Berin Martini, Software developer, full-time since, June 2008 – December 2015
2. Polina Askelrod, Software developer, full-time Sep. 2008 – June 2011
3. Farah Laiwalla, 2004-2005, moved to graduate studies at Brown University.
4. Jordan Bates, Software developer for neural networks, Fall 2011 – Spring 2013

#### **Former academic PhD students:**

1. Lukasz Burzawa, May 2020 MS Purdue ECE, 1<sup>st</sup> job: machine learning engineer at Micron Inc., then Amazon and Armada
2. Sheik Dawood, May 2020 MS Purdue ECE, 1<sup>st</sup> job: machine learning engineer at Micron Inc., then Amazon
3. Juan Andreas Carvajal, December 2019 MS Purdue ECE, 1<sup>st</sup> job: machine learning engineer at Latent.ai
4. Thomas Molnar, May 2020 MS Purdue ECE, 1<sup>st</sup> job: US Air Force cadet.
5. Abhishek Chaurasia, June 2019, thesis: “Efficient deep networks for real-world interaction”, 1<sup>st</sup> job: lead machine learning engineer at Micron Inc., then Chaos Inc.
6. Aliasger Zaidy, July 2019, thesis: “Inference engine: a high efficiency accelerator for deep neural networks”, 1<sup>st</sup> job: lead computer architect AI at Micron Inc., then ZeroASIC
7. Andre Ming Chang, May 2019, thesis: “Compiler for a trace-based deep neural network accelerator”, 1<sup>st</sup> job: lead AI compiler engineer at Micron Inc., then Chaos Inc.
8. Alfredo Canziani, August 2017, thesis: “Cortexnet: a robust predictive deep neural network trained on videos”, 1<sup>st</sup> job: NYU post-doctorate associate with Yann LeCun
9. Vinay Gokhale, May 2017, thesis: “Snowflake: a model agnostic accelerator for deep convolutional neural networks”, 1<sup>st</sup> job: Google TPU team, then AMD
10. Aysegul Dundar, May 2016, thesis: “Learning from minimally labeled data with accelerated convolutional neural networks”, 1<sup>st</sup> job: NVIDIA, then professor in Turkey
11. Jonhoon Jin, May 2016, thesis: “Fast and robust convolutional neural networks optimized for embedded platforms”, 1<sup>st</sup> job: Lighthouse AI, <https://www.light.house/>, then Apple Inc.
12. Giovanni Barbera, October 2015, thesis: “Design of an embedded fluorescence imaging system for implantable optical neural recording”, 1<sup>st</sup> job: NIH/NIDA with Da-Ting Lin.
13. Brian Goldstein, May 2013, thesis: “Integrated-Circuit Low-Current Measurement Systems for Biomedical Sensing”, 1<sup>st</sup> job: Ion Torrent Inc.
14. Evan JoonHyuk Park, May 2012, thesis: “Mobile Imaging Systems for Behaving Animals”, 1<sup>st</sup> job: post-doctorate associate, Pierce Institute, Yale University.
15. Wei Tang, May 2012, “Asynchronous Sensor and Wireless Communication Circuits and Systems”, 1<sup>st</sup> job assistant professor at the University of New Mexico

16. Pujitha Weerakoon, March 2009, thesis: “An Integrated Patch-Clamp Amplifier for Automated, High-Throughput, Whole-Cell Recording Systems”, 1<sup>st</sup> job: post-doctorate associate in Fred Sigworth lab, Yale University.
17. ZhengMing Fu, December 2007, thesis: “Low Power and Intelligent Image Sensing”, 1<sup>st</sup> job: Freescale Semiconductors.

**Current academic PhD students / team lead:**

1. 2 compiler engineers
2. 1 HW engineer
3. 4 machine learning engineers
4. 2 contractors

**Visiting students:**

1. Vincenzo Lomonaco, University of Bologna, Fall 2017 - Spring 2018
2. Angelo Rottigni, Politecnico di Milano, Italy, Fall 2009
3. Jose Carrasco, University of Sevilla, Spain, Fall 2008
4. Paolo Manfrin, University of Trieste, Italy, Fall 2008
5. Evan Park, RPI University, Summer 2005
6. Dongsoo Kim, Yonsei University, S. Korea, Spring 2008

**Significant Undergraduate students:**

1. Logesh Ramadoss, Ruihang Dui, 2017-2018 -- machine learning
2. Henrique Rocha, Spring 2007, Fall 2007 – hyper-resolution on image sensors
3. Kofi Keteku, Summer 2007 and academic year 2007-08 – Fall detection sensor
4. Matthew Herpich, all academic year 2006-07 – Patch-clamp Bio-sensor
5. Simba Marrakesh, all academic year 2006-07 – Octopus image sensor
6. Ajay Kishore, Spring 2006 – image sensor light adaptation
7. Hazael Montanaro, Summer 2008, 2009 – patch clamp amplifier software interfaces
8. Jonathan McMillian, Summer 2009, year 2010 – embedded software for vision
9. Conrad Lee, Summer 2009 – Visual attention coding
10. Faye Zhao, Summer 2010 – synthetic vision system and convolutional neural networks
11. Ifigeneia Derekli, Summer 2010 – synthetic vision system and convolutional neural networks

**PERSONAL INFORMATION**

**Spoken languages:** Fluent in Italian and English, basic Korean and Chinese

**Citizenship:** US, Italian citizenship, European Community

**Marital Status:** Married

**Hobbies:** Spending time with my wife Kyoungsoo and our son Geo, fixing old cars in a small garage, astrophotography, Photography, mountain-biking, hiking, ice-skating, volleyball, home improvements, painting, cooking/baking, home automation, hacking computers and cell-phones, video-games, programming embedded devices. Computers always make my day!