Christopher Yeung, Ph.D.

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Materials and data science engineer trained in artificial intelligence and machine learning in addition to photonics/optoelectronics design and fabrication. Specific expertise in:

- **Machine Learning**: Python, TensorFlow, Keras, PyTorch, OpenCV, SKLearn, Neural Networks, SHAP, Pandas
- **Data Science**: MySQL, MySQL Workbench, Tableau, AWS, SageMaker, S3
- **Photonic Design and Analysis**: Lumerical FDTD, MaxwellFDFD, RSoft (RCWA), COMSOL Multiphysics, MATLAB
- **Nanofabrication and 3D Printing**: Photolithography, stereolithography, fused deposition modeling
- **Materials characterization**: Scanning electron microscopy, UV/FTIR spectroscopy, mechanical testing

EDUCATION

UNIVERSITY OF CALIFORNIA, LOS ANGELES (UCLA) *Sept. 2018–June 2022*

Ph.D. in Materials Science and Engineering (GPA: 3.71)

- 14 research publications (6 first-authored, 8 co-authored, 3 cover features) and 4 conference presentations on various technologies, including additive manufacturing, bioelectronics, nanophotonics, and machine learning.
- Major contribution to a $956,000 UCLA grant. Source:
  newsroom.ucla.edu/releases/professors-grant-rising-heat-los-angeles-communities

UNIVERSITY OF CALIFORNIA, LOS ANGELES (UCLA) *Sept. 2014–June 2017*

M.S.E. in Materials Science and Engineering (GPA: 3.80)

- Thesis: Multiscale Material Modeling with Analytical Methods.

UNIVERSITY OF CALIFORNIA, IRVINE (UCI) *Sept. 2009–June 2013*

B.S.E in Mechanical Engineering and Materials Science & Engineering (GPA: 3.73)

- First Place, Senior Design Competition.

INDUSTRY EXPERIENCE

ADVANCED MICRO DEVICES, INC. *June 2022–Present*

Senior Member of Technical Staff, Santa Clara CA

- Developed automated and machine learning methodologies and tools for high volume semiconductor manufacturing process flow improvement and optimization.
- Applied data analytics methodologies to drive continued improvements in yield, power/performance, and quality in FPGA products and other advanced process technologies.

NORTHROP GRUMMAN CORPORATION *Oct. 2019–June 2022*

Research Scientist (Part-Time; Ph.D. Co-Op), Redondo Beach CA

- Research in the field of optics design science (nanophotonics and metaoptics/metasurfaces) and machine learning.
- Finalist in the 2021 Artificial Intelligence Grand Challenge.
- 6 first-authored journal publications; 4 conference presentations.

MSC SOFTWARE CORPORATION *Jul. 2013–Oct. 2018*

Product Manager, Newport Beach CA

- Managed over 10 releases (Alpha, Beta, GA) for MaterialCenter, a material data management framework (with REST API integration and Postgres/Oracle databases) with an annual revenue of over $3,000,000.
- Led a team of 10 developers and quality assurance engineers in bi-weekly sprint meetings and design reviews.

ACADEMIC RESEARCH EXPERIENCE

UNIVERSITY OF CALIFORNIA, LOS ANGELES (UCLA) *Oct. 2018–June 2022*

Graduate Student Researcher, Laboratory of Nanophotonics and Optics (Advisor: Prof. Aaswath Raman)

- Led a team of undergraduate students to develop novel deep learning algorithms and methods for the design and analysis of nanophotonic materials, including: convolutional and generative neural networks, and methods based on explainable AI, AutoML, and reinforcement learning.
- Developed shape and topology optimization algorithms based on the adjoint method and used rigorous coupled wave analysis and finite-difference methods to simulate/characterize long wave infrared nanophotonic structures.
- 5 first-authored journal publications (2 cover features) on machine learning for materials design.

UNIVERSITY OF CALIFORNIA, LOS ANGELES (UCLA) *Sept. 2018–Sept. 2019*

Graduate Student Researcher, Interconnected and Integrated Bioelectronics Lab (Advisor: Prof. Sam Emaminejad)

- Designed, fabricated, and characterized flexible electronic biosensing devices in Class 100 cleanroom facilities.
- 9 journal publications (1 first-authored, 1 cover feature) and 2 acknowledged publications on bioelectronics.

SELECT PUBLICATIONS

Journal Publications (400+ Citations, h-index: 10, Full list at: scholar.google.com/citations?hl=en&user=-Z0gTdcAAAAJ)

1. DeepAdjoint: An All-in-One Photonics Inverse Design Framework Integrating Data-Driven Machine Learning with Optimization Algorithms, *ACS Photonics*, 2022 **(First Author)**. Algorithms/Languages/Modules include: cDCGAN.
2. Enhancing Adjoint Optimization-based Photonics Inverse Design with Explainable Machine Learning, *ACS Photonics*, 2022. **(Journal Cover; First Author)** – Algorithms/Languages/Modules include: Python, TensorFlow, Keras, AutoKeras, MATLAB, DenseNet, Deep SHAP, Adam, Adjoint Optimization, OpenCV.
3. Global Inverse Design across Multiple Photonic Structure Classes Using Generative Deep Learning, *Advanced Optical Materials*, 2021. **(Journal Cover; First Author)** – Algorithms/Languages include: Python, PyTorch, MATLAB, cDCGAN, Adam, One-sided Label Smoothing, Gaussian Filtering, Binary Cross-Entropy, OpenCV.
4. Multiplexed Supercell Metasurface Design and Optimization with Tandem Residual Networks, *Nanophotonics*, 2021. **(First Author)** – Algorithms/Languages/Modules include: Python, TensorFlow, Keras, MATLAB, ResNet, Adam, RMSProp, SGD, Tandem MSE, MaxwellFDFD.
5. Elucidating the Behavior of Nanophotonic Structures through Explainable Machine Learning Algorithms, *ACS Photonics*, 2020. **(First Author)** – Algorithms/Languages/Modules include: Python, TensorFlow, Keras, MATLAB, CNN, SKLearn, Deep SHAP, Adam, Lumerical FDTD, OpenCV.
6. A programmable epidermal microfluidic valving system for wearable biofluid management and contextual biomarker analysis, *Nature Communications*, 2020.
7. An Adhesive and Corrosion-Resistant Biomarker Sensing Film for Biosmart Wearable Consumer Electronics, *IEEE/ASME Journal of Microelectromechanical Systems*, 2020.
8. Noninvasive wearable electroactive pharmaceutical monitoring for personalized therapeutics, *Proceedings of the National Academy of Sciences of the United States of America*, 2020.
9. A wearable freestanding electrochemical sensing system, *Science Advances*, 2020.
10. A ferrobotic system for automated microfluidic logistics, *Science Robotics*, 2020. **(Journal Cover)**
11. A 3D-printed microfluidic-enabled hollow microneedle architecture for transdermal drug delivery, *Biomicrofluidics*, 2019. **(First Author)**
12. A Rapid and Low-cost Fabrication and Integration Scheme to Render 3D Microfluidic Architectures for Wearable Biofluid Sampling, Manipulation, and Sensing, *Lab on a Chip*, 2019.
13. A Wearable Electrofluidic Actuation System, *Lab on a Chip*, 2019.

Oral Conference Presentations (Peer Reviewed)

1. Explaining Adjoint Shape Optimization for Electromagnetic Design, *SPIE Photonics West*, San Francisco, California, January 2022.
2. Conditional Machine Learning-Based Inverse Design Across Multiple Classes of Nanophotonic Structures, *CLEO*, Los Angeles, California, May 2021.
3. Elucidating the Physics of Nanophotonic Structures Through Explainable Machine Learning Algorithms, *Frontiers in Optics / Laser Science*, Los Angeles, California, September 2020.
4. Inverse Design of Nanophotonic Structures with Interpretable Convolutional Neural Networks, *Photonics Online Meetup*, Los Angeles, California, January 2020.

TEACHING, LEADERSHIP, AND VOLUNTEERING

Teaching Assistant (UCLA) - Held discussions and graded assignments for: E205 (Model-based Systems Engineering), MSE131L (Diffusion & Diffusion-Controlled Reactions Lab), MSE121 (Materials Science of Semiconductors), and E213 (Data and Business Analytics).

Journal Reviewer - Over 30 combined invited/contributed peer-reviews for Materials Letters, JOSA B, Optics Express, and ACS Photonics.

CY Printing Studio (www.cyprinting.co) - Founded a service for delivering custom 3D printing services that combine FDM techniques, microcontroller integration, and CAD design.

UCLA Engineering Graduate Student Association (EGSA) Treasurer and Social Chair - Planned and coordinated social and professional events for the Engineering graduate student body. Managed organization finances as Treasurer.