

# Lambert Leong

ML/AI Health Researcher & Medical Data Scientist

Department of Radiology

University of Washington

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## EXPERTISE

- **Deep Learning/Machine Learning:** Convolutional Neural Networks (CNN), Variational Auto-Encoder (VAE), Self-Supervised Learning (SSL), Hyperparameter Optimization, Generative Medical Image Models, Principal Component Analysis (PCA), Classification & Regression, Linear, Tree-based and Ensemble Methods
- **Medical Imaging:** Radiomics/Biomarkers, Single & Dual 2D & 3D X-ray modalities, Privacy and Storage
- **Research:** Technical Manuscript & Grant Writing, Owning & Initiating Research Agendas/Projects,

## EDUCATION

- 2023 **PhD, Bioengineering**, *University of Hawaii*, Honolulu, HI, USA. GPA 3.95/4.0  
Dissertation: “**Reducing the Burden of Cancer with Artificial Intelligence**”  
Advisor: Prof. John Shepherd
- 2018 **MS, Computer Science**, *University of Hawaii*, Honolulu, HI, USA. GPA 3.89/4.0  
Thesis: “**A Heuristic for Optimizing the Physical Layout and Network Topology of Integrated 3D Multi-chip Systems Under Temperature Constraints**”  
Advisor: Prof. Henri Casanova
- 2014 **BS, Biology**, *University of Oregon*, Eugene, OR, USA. GPA 3.2/4.0  
Minor: Chemistry

## EXPERIENCE

- Current **Postdoctoral Researcher**, *OncoRad*, University of Washington, Washington
- Developing biomarkers predictive of favorable cancer clinical trial outcomes through multi-modal, longitudinal image modeling.
- 2018 – 2023 **Graduate Research Assistant**, *Shepherd Research Lab*, University of Hawaii Cancer Center, Hawaii
- Engineered a pipeline to extract raw medical data, enabling deep learning on quantitative body composition imaging. This innovation led to regression models outperforming previous benchmarks ( $R^2$ ) by 15%.
  - Pioneered X-ray physics-informed VGG-16 perceptual loss functions, achieving quantitatively accurate generative medical images that can be analysed with commercial clinical software.
  - Performed initial modeling which identified novel breast cancer imaging biomarkers. Final model exhibited 10% Area Under the Curve (AUC) improvement compared to previously published models.
  - Crafted a Matlab-based preprocessing pipeline for spectral decomposition, pinpointing tissue traits within cancer clusters through convex hull computation.
- Summer 2020 **Machine Learning Research Intern**, *Anthropometry and Biomechanics Facility*, NASA, Texas
- Reduced fitting error in 3D body scan visualizations for bone and soft tissue using genetic algorithms, leading to enhanced spacesuit design.
  - Developed a Python implementation for a local system transpose, enabling the standardization of 3D scans to the same global coordinates system.
- 2016 – 2018 **Graduate Student Researcher**, *Concurrency Research Group*, University of Hawaii, Hawaii
- Devised a simulation harnessing a greedy algorithm, optimizing the 3D physical layout of multi-CPU architectures for optimal heat dissipation, culminating in a publication at DAC 2020.
  - Leveraged task parallelism via MPI, achieving a 19X speed up in simulation speeds versus single-thread implementation.
- 2015 – 2018 **Research Scientist**, *Eyegenix LLC*, Hawaii
- Data-driven polymer design through regression modeling, culminating in successful polymer implantations during animal trials.
  - Synthesized and presented scientific findings and advancements to stakeholders through rigorous monthly, quarterly, and annual reporting.
- Summer 2017 **Database Engineer**, *Social Science Research Institute*, University of Hawaii, Hawaii
- Designed and implemented a relational database to monitor recidivism rates for the state of Hawaii, by integrating data from multiple state databases, and defining the data model and relational schema.

## FELLOWSHIPS

- 2023 **CS Research Mentorship Program Fellowship**, Google

2022 **AIM-AHEAD** - Artificial Intelligence/Machine Learning Consortium to Advance Health Equity and Researcher Diversity, National Institutes of Health via University of Hawaii

## HONORS & AWARDS

2023 **Merit Based Awards for Research**, Graduate Student Organization, University of Hawaii

2023 **Outstanding Dissertation Award**, University of Hawaii

2019 - 2021 **Trainee Travel Grant**, University of Hawaii Cancer Center

2020 **Graduate Student Organization Research Grant**, University of Hawaii

## PROJECTS

### o Photo Mosaic

Developed a high-resolution photomosaic generator program as a project to hone my software engineering skills. This project combined my expertise in computer vision (OpenCV) and machine learning (sklearn) with my love of photography. I utilized k-nearest neighbors for efficient image retrieval, matching, and placement. Mosaic animations were optimized via dynamic programming (memoization), tree search algorithms, and parallel computing techniques, all within an object-oriented programming framework. [See More!](#)

### o Dynamic Health Data Visualization

Furthered my expertise in curating public health data from multiple sources as well as cleaning, interpolation, and visualizing that data in an effective and compelling way. Dynamic graphs are the result and they include date annotations of relevant event (e.g. health policy changes) which better inform viewers of possible time dependent trends within health data. I integrate these data science concepts, plots, and best practices into my regular research workflow and presentations. [See More!](#)

## NOTABLE PUBLICATIONS

2023 **Leong, Lambert T**, Michael C Wong, Yannik Glaser, Young E Liu, Brandon K Quon, Devon Cataldi, Peter Sadwoski, Steven B Heymsfield, and John A Shepherd. Deep learning furthers the understanding of local distributions of fat and muscle on body shape and health using 3d surface scans. *Nature Communications Medicine (Under Review)*. Nature Publishing Group, 2023.

2022 **Leong, Lambert T**, Michael C Wong, Yannik Glaser, Thomas Wolfgruber, Steven B Heymsfield, Peter Sadwoski, and John A Shepherd. Quantitative imaging principles improves medical image learning. *(Under Review) arXiv preprint arXiv:2206.06663*, 2022.

2022 Yannik Glaser, John Shepherd, **Leong, Lambert**, Thomas Wolfgruber, Li-Yung Lui, Peter Sadowski, and Steven R Cummings. Deep learning predicts all-cause mortality from longitudinal total-body dxa imaging. *Communications medicine*, volume 2, pages 1–12. Nature Publishing Group, 2022.

2021 Xun Zhu, Thomas K Wolfgruber, **Leong Lambert**, Matthew Jensen, Christopher Scott, Stacey Winham, Peter Sadowski, Celine Vachon, Karla Kerlikowske, and John A Shepherd. Deep learning predicts interval and screening-detected cancer from screening mammograms: a case-case-control study in 6369 women. *Radiology*, volume 301, pages 550–558. Radiological Society of North America, 2021.

2021 **Leong Lambert T**, Serghei Malkov, Karen Drukker, Bethany L Niell, Peter Sadowski, Thomas Wolfgruber, Heather I Greenwood, Bonnie N Joe, Karla Kerlikowske, Maryellen L Giger, et al. Dual-energy three-compartment breast imaging for compositional biomarkers to improve detection of malignant lesions. *Communications Medicine*, volume 1, pages 1–11. Nature Publishing Group, 2021.

2020 **Leong Lambert T** and Sean Wiere. Digit recognition from wrist movements and security concerns with smart wrist wearable iot devices. In *53rd Hawaii International Conference on System Sciences*. HICSS, 2020.

2019 Michihiro Koibuchi, **Leong Lambert**, Tomohiro Totoki, Naoya Niwa, Hiroki Matsutani, Hideharu Amano, and Henri Casanova. Sparse 3-d nocs with inductive coupling. In *2019 56th ACM/IEEE Design Automation Conference (DAC)*, pages 1–6. IEEE, 2019.

## TOOLS & SKILLS

- o **Programming Languages**: Proficient: Python | Experience with: Matlab, C, Java
- o **ML/AI/Computer Vision**: TensorFlow, Keras, OpenCV, Scikit-learn, PyTorch, Blender
- o **Big Data**: Pandas, DICOM, SQL
- o **Fundamentals**: Git, Linux, Conda, Docker