Randy Ardywibowo

Website: people.tamu.edu/~randyardywibowo • Email: randyardywibowo@tamu.edu

Education

Texas A&M University — College Station, TX
Ph.D. Candidate in Electrical Engineering — May 2022

Texas A&M University — College Station, TX
Bachelor of Science in Electrical Engineering, **GPA: 4.0/4.0** — May 2017

Work Experience

Research Assistant @ Electrical and Computer Engineering, Texas A&M University — College Station, TX
Topic: Learning Under Data Irregularity and Uncertainty — September 2017 – Present

- Achieved State-of-the-Art (SotA) (+23% accuracy) task-free **continual learning** through novelty detection.
- Achieved SotA (+57% accuracy) **anomaly detection** for likelihood-based **deep generative models** through distributional **Neural Architecture Search** (NAS).
- Developed method for better accuracy-energy efficiency trade-offs with dynamic feature selection for **Recurrent Neural Networks** (RNNs) through **variational inference** (98% accuracy with only 0.7% features used on average).
- Developed method to better **quantify uncertainty** in roadside image segmentation, image classification, and recommender systems with **Bayesian Neural Networks** through learnable Bernoulli dropout.
- Adaptive monitoring of **time-series** data through uncertainty quantification with switching **Gaussian Processes**.
- Co-authored **research proposals** on uncertainty quantification, continual learning, and monitoring. **Accepted and funded** for 4+ years by **DARPA**.
- Worked on **image** (classification, segmentation, generation), **time-series**, and **recommendation systems** data.

Research Intern @ Qualcomm Technologies Inc. — San Diego, CA
Topic: Dynamic Quantization for Deep Model Compression — May 2020 – August 2020

- Developed a patent applied for **deep learning model compression** through input-dependent **quantization** levels.
- **Presented research** to machine learning special interest groups inside of company.
- Delivered a paper publication and **patent application**.
- Worked on deep learning-based **image super-resolution** and **image classification** models.

Researcher Scientist @ Industrial and Systems Engineering Department, University of Washington — Seattle, WA
Topic: Computer Vision for Skin Cancer and Surgery Site Infections — May 2018 – August 2018

- Developed a **computer vision** architecture that firstly localizes, then segment and classify cancerous regions, as well as an **ensemble of deep networks** to classify images (87% classification accuracy, 0.73 segmentation IoU).
- **Coordinated a team** of graduate students to participate in the ISIC skin **image classification** and **segmentation** challenge.
- **Published a paper** on computer vision for automatic skin disease and wound assessments.

Undergraduate Researcher @ Electrical and Computer Engineering, Texas A&M University — College Station, TX
Topic: Time-series Modelling and Analysis — January 2016 – May 2017

- Switching-state **Auto-Regressive** (SAR) time-series models model that simultaneously learns, estimates missing values, and detects outliers during training.
- Systems control framework using **Reinforcement Learning** (RL) with Gaussian Processes (GP).
- Published paper on time-series, **Kalman filtering**, **wavelet**, **spline**, and Functional **Principal Component Analysis** (PCA) for **time-series** daily behavioral data.

Publications

- R. Ardywibowo, Z. Huo, Z. Wang, B. Mortazavi, S. Huang, X. Qian, "Task-free Continual Learning through Novelty Detection based Growing Networks", in submission.
- R. Ardywibowo, R. Dayana, H. Hwang, X. Qian, "DynamIQ: Dynamic Instance-dependent Quantization through Bitwise Conditional Gating", in submission.
- R. Ardywibowo, Z. Wang, B. Mortazavi, S. Huang, X. Qian, "ViDS: Variational Dynamic Selection in Bayesian Neural Networks for Efficient Human Activity Recognition", in submission.
- R. Ardywibowo, Z. Wang, X. Qian, "NADS: Neural Architecture Distribution Search for Uncertainty Awareness," ICML2020.
- S. Boluki, R. Ardywibowo, S. Z. Dadaneh, M. Zhou, X. Qian, "Learned Bernoulli Dropout using ARM Gradient", AISTATS2020.
- R. Ardywibowo, Z. Wang, B. Mortazavi, S. Huang, X. Qian, "Adaptive Activity Monitoring with Uncertainty Quantification using Switching Gaussian Process Models," AISTATS2019.
- Z. Jiang, R. Ardywibowo, A. Samareh, H. L. Evans, W. B. Lober, X. Chang, X. Qian, Z. Wang, S. Huang. "A Roadmap for Automatic Surgical Site Infection Detection and Evaluation Using User-Generated Incision Images." *Surgical infections* 20, no. 7 (2019): 555-565.
- R. Ardywibowo, C. Xiao, S. Gui, Y. Cheng, J. Liu, S. Huang, X. Qian, "Analyzing Daily Behavioral Data for Personalized Health Management," *Journal of Healthcare Informatics Research*, 1-20.
- R. Ardywibowo, "Analyzing Daily Behavioral Data for Personalized Health Management." B.S. diss., 2017.

Freelance Work

Solo Web App Developer @ frankstanford.com — College Station, TX
Client: Dr. Frank Stanford — May – August 2017

- Developed front-end, back-end, and **Content Management System** (CMS) from scratch using **Meteor**, **Angular**, **MongoDB**, and various web APIs. Deployed web app using **NginX** on **Digital Ocean**.
- Discussed with client Frank Stanford regarding ease of use of the **User Interface** (UI) and website design for client's personal needs.

App Developer @ MasjidPay — Houston, TX
Client: Dr. Jaffee Suardin — January – June 2016

- Developed an **iOS** app which simplifies interaction between mosques and their community, as well as providing a simple and easy mosque donation service.
- Programmed mobile user interfaces, registration system, interaction with a **web API**. Developed database in **MongoDB**.
- Implemented user password security using **SHA2 + salt encryption**, and password strength checker.

Undergraduate Researcher @ AggiE-Challenge — College Station, TX
Topic: *Autonomous Robots for Building Lighting Assessments* — September 2015 – May 2016

- Developed a **tele-operated robot** that can automatically map a building and identify lights in it.
- Implemented light detection algorithm with **OpenCV** blob detection.
- Developed a 3D light location finding algorithm to project 2D points in an image into 3D space.
- Implemented **Simultaneous Localization and Mapping** (SLAM) with HectorSLAM.

Undergraduate Researcher @ Computer Science Department, Texas A&M University — College Station, TX
Topic: *Augmented Reality for Drones* — September 2014 – September 2015

- Continued development of AerialAR, an **augmented reality** program for controlling emergency responder drones.
- Programmed **sketch recognition** to detect the **GPS** coordinates and building names in a user selected area.
- Interfaced with **Google Places API** in **Objective-C**, iOS.

Skills

- **General Programming Languages:** Python, C++, C, R, MATLAB, Bash, LaTeX.
- **Deep Learning Frameworks:** PyTorch, Tensorflow, JAX.
- **Deep Neural Networks (NNs):** Convolutional NNs, Recurrent NNs, Autoencoders, Generative Adversarial Nets, Graph NNs.
- **Classic Machine Learning (ML):** Principal Component Analysis (PCA), Support Vector Machine (SVM), Naïve Bayes, Linear Discriminant Analysis (LDA), Latent Dirichlet Allocation (LDA), K-Nearest Neighbors (KNN), K-Means Clustering, Decision Trees.
- **Bayesian ML:** Variational Inference, Belief Networks, Bayesian Nonparametrics, Bayesian NNs.
- **ML Applications:** Continual Learning, Anomaly Detection, Uncertainty Quantification, Neural Architecture Search, Image Classification + Segmentation + Generation, Time-series Forecasting, Recommendation Systems, Graph/Network Classification, Partial Differential Equation (PDE) Solvers.
- **Time Series Modeling:** Kalman Filters, Hidden Markov Models (HMM), Gaussian Processes (GP).
- **Control:** Markov Decision Process (MDP), Reinforcement Learning (RL).
- **Web/App Development:** HTML, CSS, JavaScript, TypeScript, Sass, Node.js, Meteor, Angular, NginX, Electron, Objective-C, Swift, Java.
- **Circuits:** Verilog, PSpice, LabVIEW.
- **Languages:** English (native proficiency), Bahasa (native proficiency).

Honors and Awards

- Mary T. and Albert M. Loudon Award
- Gathright Scholar Award (2015, 2016)
- Undergraduate Research Awards
- Physics Mechanics Scholar Award