

Zhenan Yin

Luddy School of Informatics, Computing, and Engineering | Indiana University Indianapolis (IUI)

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EDUCATION

Ph.D. in Informatics (Health & Biomedical Informatics)

08/2025 - Present

Indiana University Indianapolis, IN, USA

Advisor: Dr. Saptarshi Purkayastha, Purkayastha Lab for Health Innovation

Bachelor of Science in Electrical Engineering (Machine Learning & Controls)

09/2016 – 06/2019

University of California, San Diego, CA, USA

Undergraduate Coursework in Science, Math, and Engineering

09/2013 – 08/2016

De Anza College, Cupertino, CA, USA

RESEARCH INTERESTS

Artificial intelligence in healthcare; multimodal learning; medical signal processing; explainable and trustworthy medical AI.

RESEARCH EXPERIENCE

CrossSeizure: Learning Generalizable Representations for Cross-Dataset Epileptic Seizure Classification

Graduate Researcher, Indiana University Indianapolis

09/2025 – Present

- Developing a CNN-Transformer hybrid framework to achieve cross-dataset generalization in epileptic seizure classification using minimally preprocessed raw EEG signals.
- Designing domain-invariant representation learning pipelines evaluated across BEED, BONN, and CHB-MIT datasets with diverse sampling rates and channel configurations.
- Implementing multi-dataset pretraining and domain adaptation strategies (DANN, CDAN) to enhance robustness and clinical transferability.
- Established within-dataset and cross-dataset performance benchmarks by reproducing the SeqBoostNet framework (FFT + UMAP + ensemble) to validate the necessity of domain adaptation.

Embeddings are Noise Eliminators: Ablation Studies to Show What is Eliminated in Foundation Models

Graduate Researcher, Indiana University Indianapolis

08/2025 – 10/2025

- Conducted large-scale ablation studies on over 249,000 chest X-rays (NIH-CXR14, Emory CXRv2) to investigate intrinsic noise-filtering properties of foundation model embeddings.
- Evaluated domain-specific (RAD-DINO) and general-purpose (DINOv3) Vision Transformer architectures through controlled synthetic noise injection and logistic regression analysis.
- Demonstrated that foundation model embeddings suppress non-clinical artifacts while preserving diagnostic features, acting as intrinsic noise filters in radiological representation learning.
- Implemented a scalable and reproducible PyTorch-based computational pipeline with CUDA parallelization for high-throughput embedding evaluation and statistical benchmarking.

- **Status:** Manuscript submitted to Radiology: Artificial Intelligence (under review).

The Connection Between *Mycobacterium tuberculosis* and Macrophage Cells in Lung Cancer Progression

Summer Research Assistant (Remote), Pembroke College, University of Cambridge 07/2024 – 08/2024

- Conducted systems biology modeling to investigate how *Mycobacterium tuberculosis* infection alters macrophage metabolism and contributes to lung cancer progression.
- Implemented genome-scale metabolic models (iAB-AMØ-1410, iAB-AMØ-1410-Mt-661) in COBRApy to perform Flux Balance and Flux Variability Analyses for host–pathogen interaction mapping.
- Identified 223 infection-specific essential reactions and quantified nutrient dependencies through medium minimization to reveal candidate metabolic drug targets.
- Simulated infection-induced metabolic burden, showing a 92% reduction in macrophage biomass growth rate due to Mtb-driven energetic constraints.

Triton Town Autonomous Vehicles

Undergraduate Researcher, University of California, San Diego

02/2019 – 06/2019

Advisor: Prof. Maurício de Oliveira & Prof. Jack Silberman

- Designed and implemented a deep learning-driven autonomous vehicle capable of real-time navigation and object detection using Raspberry Pi, TensorFlow, OpenCV, and the DonkeyCar framework.
- Collected and processed over 35,000 images frames to train convolutional neural networks (CNNs) for lane detection, steering prediction, and obstacle avoidance.
- Integrated electronic control modules, motor drivers, and sensors to build a reliable embedded platform with sub-150 ms inference latency.
- Reduced vehicle failure rate from 25% to 3% through iterative testing and model optimization, achieving fully autonomous operation across 10 indoor and 6 outdoor laps.

Deep Learning for Plankton Image Retrieval

Undergraduate Research Assistant, University of California, San Diego

11/2017 – 05/2019

Advisor: Prof. Nuno Vasconcelos, Statistical Visual Computing Lab (SVCL)

- Developed a deep learning-based system for automated plankton image labeling and retrieval to support ecological research at the Scripps Institute of Oceanography.
- Applied transfer learning with ResNet-50 and InceptionResNetV2 models and integrated Approximate Nearest Neighbor (ANN) search for large-scale image similarity retrieval.
- Built a prototype web interface for visualizing search results and accelerating image annotation.
- Expanded dataset diversity through data augmentation using Keras and TensorFlow, increasing classification accuracy to 90% for fine-grained plankton species.

Conformal Ultrasonic Device for Non-Invasive Central Blood Pressure Monitoring

Undergraduate Research Assistant, University of California, San Diego

05/2017 – 12/2018

Advisor: Prof. Sheng Xu, Xu Research Group

- Fabricated a stretchable conformal ultrasonic probe using laser micro-cutting and soft elastomer encapsulation for non-invasive cardiovascular monitoring.
- Simulated ultrasound beam patterns and penetration depth in MATLAB and compared predicted and experimental results to validate transducer performance.
- Analyzed device stability and acoustic coupling under mechanical deformation to ensure signal fidelity during motion.
- Prepared IRB documentation and risk assessments for human-subject testing of the device.

- Contributed to the publication “*Monitoring of the Central Blood Pressure Waveform via a Conformal Ultrasonic Device*” (*Nature Biomedical Engineering*, 2018).

Automated Vending Machine Control System

Control System Project Lead, University of California, San Diego

04/2018 – 06/2018

- Designed a three-level automated vending machine using SolidWorks, integrating 3D-printed trays, spiral ejectors, and a laser-cut acrylic structure.
- Programmed and optimized the control algorithm with NI myDAQ and LabVIEW for instantaneous product dispensing and fault-free operation.
- Led system integration and testing to ensure mechanical reliability and real-time control performance.
- Recognized with the *Most Reliable Device Award* and earned the *LabVIEW Associate Developer Certificate* from National Instruments.

PUBLICATIONS

Muthyala R, Yin Z, Jilla A, Li F, Dapamede T, Khosravi B, Chavoshi M, Gichoya J, Purkayastha S. Embeddings are Noise Eliminators: Ablation Studies to Show What is Eliminated in Foundation Models. *Radiology: Artificial Intelligence*. Submitted, 2025.

Wang C, Li X, Hu H, Zhang L, Huang Z, Lin M, Zhang Z, Yin Z, Huang B, Gong H, Bhaskaran S, Gu Y, Makihata M, Guo Y, Lei Y, Chen Y, Wang C, Li Y, Zhang T, Chen Z, Pisano AP, Zhang L, Zhou Q, Xu S. Monitoring of the central blood pressure waveform via a conformal ultrasonic device. *Nat Biomed Eng*. 2018 Sep;2(9):687–695. doi:10.1038/s41551-018-0287-x. Epub 2018 Sep 11. PMID:30906648; PMCID:PMC6428206.

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, C, C++, LabVIEW, SQL

Deep Learning Frameworks: PyTorch, TensorFlow, Keras

Data & Analysis Libraries: Numpy, Pandas, Scikit-learn, Seaborn, COBRAPy

Tools & Technologies: Git, Linux

Domain Knowledge: Artificial Intelligence, Medical Imaging, Signal Processing, Healthcare Informatics

PROFESSIONAL EXPERIENCE

DICT (Data, Information, Communication, Technology) Project Solution Team Lead

China Mobile Yunnan Co., Ltd.

03/2024 – 07/2025

- Managed 5+ concurrent healthcare IT implementation projects, coordinating between China Mobile technical teams, hospital administrators, and third-party system vendors across Yunnan Province.
- Led EHR system integration project at The First Affiliated Hospital of Kunming Medical University, managing vendor coordination, timeline planning, and interoperability requirements to ensure clinical data continuity.
- Increased project delivery efficiency from 75% to 90% by introducing milestone-based schedule tracking, risk forecasting, and performance optimization frameworks.
- Collaborated with top-tier hospital information system enterprises to establish the Internet Hospital of Yunnan Province on China Mobile Cloud, cutting onboarding costs for smaller medical institutions by 55%.
- Oversaw solution design and policy compliance for ongoing regional telemedicine and Internet Hospital projects, aligning implementation with national eHealth standards.

DICT (Data, Information, Communication, Technology) Project Solution Manager

China Mobile Yunnan Co., Ltd. Kunming Branch

10/2019 – 02/2024

- Spearheaded healthcare digital transformation initiatives under China Mobile's DICT strategy, managing full project lifecycles from requirements definition to post-deployment evaluation.
- Delivered large-scale healthcare informationization projects valued at 21 million Chinese Yuan by aligning multidisciplinary teams, controlling schedules, and mitigating implementation risks.
- Architected and led the design of VPDN Medical Insurance Account Management Software, developing functional prototypes and technical specifications that improved project delivery efficiency by 15% and obtained national software copyright certification.
- Directed the Kunming Fangcang Shelter Hospital Medical Data Transmission Network Project, achieving completion 10 days ahead of schedule and reducing labor costs by 8% through optimized resource planning during the COVID-19 response.
- Key completed projects:
 1. Yunnan Third People's Hospital 5G Mobile Nursing Construction Project
 2. Healthcare 2.0 Development Plan
 3. 5G Medical Insurance Network Project
 4. VPDN Medical Insurance Account Management Software
 5. Integrated Precision Dispatch Rescue System Construction

PRESENTATIONS & CONFERENCES

Oral Presentation, Co-Author: Yin Z. "Construction of a Hospital-Wide Critical Illness Rescue Network Based on 5G for Severe Illness Early Warning Platform." Finalist (Top 30) in the 5G+ Healthcare Special Competition Finals, 7th "Blooming Cup" 5G Application Competition, September 19, 2024; Hosted by the China Academy of Information and Communication Technology (CAICT) and the China Communication Standards Association (CCSA).

PATENTS & INTELLECTUAL PROPERTY

China Mobile Communications Group Yunnan Co., Ltd. (2023, February 15). Certificate No. 10834368. Software Name: China Mobile VPDN Management System [VPDN Management System] Y1.0. Registration No. 2023SR0247197. National Copyright Administration of the People's Republic of China.

AWARDS & CERTIFICATIONS

University Fellowship, Indiana University, 2025

Qualification of Telecommunication Professional, Ministry of Human Resources and Social Security and Ministry of Industry and Information Technology (China), 2020

Certified LabVIEW Associate Developer (CLAD), National Instruments, 2018

COMMUNITY & VOLUNTEER EXPERIENCE

Student Police Aid

Foothill-De Anza Community College District Police Department, Cupertino, CA 01/2015 – 08/2016

- Dispatched student patrols, managed campus access, and ensured facility security.
- Assisted with fingerprinting and onboarding for new faculty and staff.
- Supported event logistics, including parking and crowd management for campus activities.

Emergency Department Volunteer

El Camino Hospital, Los Gatos, CA

01/2014 – 12/2014

- Assisted ER nurses in preparing rooms and equipment for incoming patients.
- Monitored and replenished medical supply inventories to ensure readiness for emergency care.