ANITA GHANDEHARI

Email: ghandeha@uci.edu | **Google Scholar**: Anita-Ghandehari | **LinkedIn**: Anita-LinkedIn | **Website**: Portfolio

SKILLS

- **Programming Language: Python** (TensorFlow, PyTorch, Sickit-Learn, OpenCV), **R, SQL, C++**
- **Machine Learning, Deep Learning, and Computer Vision** (Mask-RCNN, VGG, YOLO, U-Net, CNN, LSTM, XGBoost, SHAP values, PCA, Variational Auto Encoder)
- **Generative AI, LLM, LVM**: **Transformers, Attention, RAG (**LlamaIndex, Qdrant**), Function Calling, GPT, Claude, Gemini, Llama, Vertex AI**
- **Web Development: Flask, Django, React**
- **Edge-ML: TensorFlow Lite, TinyML** (Arduino Nano 33 BLE Sense)**, Hyperdimensional Computing**
- **Optimization: Multi-Objective Bayesian Optimization, Gaussian Process**
- **Intelligent Health Monitoring: Biosignals Analysis** (EMG, ECG, GSR, PPG, and EEG), **Multimodal Fusion Based Models** (Self-Attention), **Signal Processing**
- **Statistics:** Linear Discriminant Analysis, Data Visualization (Power BI, Tableau), Time Series Statistical Analysis
- **Embedded Design:** Verilog, SystemC, Modelsim, Quartus, and Xilinx FPGA

WORK EXPERIENCE

- **AI/ML Engineer Internship |** Vita Innovation Inc. July. 2024 – Sep. 2024
  - ✓ Developing a virtual Triage Assistant (EmerGenAI) in Emergency Rooms (ER) using **LLMs** equipped with a **supervisor** pipeline and a **RAG**-based **medication reconciliation** platform to avoid hallucinations. Additional features include a patient-friendly discharge note generator and a resource-matching platform for vulnerable populations.
  - ✓ Prepared a comprehensive **benchmark** of well-known **LLMs**, including **GPT**, **Gemini**, **Claude**, and **Llama**, to evaluate their knowledge in ER and implement a cascade-based selection of LLMs within ER workflow.
- **In-sensory Data Analysis Researcher |** University of California Irvine (UCI) Sep. 2023 – Present
  - ✓ Design and fabrication of a fully integrated, optimized, real-time, and on-demand **wearable** panel for emotion and gesture detection utilizing a **quantized multimodal CNN**-based network using **Edge-ML** frameworks.
  - ✓ Implementing and Evaluating via **TensorFlow** and **TensorFlow Lite Micro** on a **BLE Nano 33** ML board. Optimized the CNN-based network to achieve high predictive accuracy while also minimizing the memory and power consumption of the BLE Nano 33 device.
  - ✓ Integrating a finely tuned **LLM** for health recommendations, synthesizing subjects' emotional states, and activity levels from the panel with their feedback on personal well-being.
- **Health Monitoring Researcher** | Mitsubishi Electric and UCI Sep. 2023 – June 2024
  - ✓ Implementation of an **iPPG** detector based on facial landmarks for real-time, reliable, and accurate Heart Rate and Blood oxygen level extraction in the **Mitsubishi HealthCam** Project.
  - ✓ Developing a face and landmark detection framework based on **MediaPipe**.
- **NLP and LLM Research Intern |** University of California Irvine (UCI) June 2023 – Sep. 2023
  - ✓ Developed a tuned **LLM** based on **GPT** for generating psychological health recommendations, tailored to users' articulated emotions and experiences. This system is complemented by a U-Net architecture for the classification of subjects' facial expressions.
- **Data Science and Optimization Researcher |** University of California Irvine (UCI) Sep. 2022 – June 2023
  - ✓ Implemented a pipeline for the **optimization** of **3D printing** process parameters with the goal of uniform high-quality printing of MXene ink with a defined filament diameter. Using an **XGBoost** with a **physics-informed neural network,** we achieved an accuracy of 90.44% for predicting the printing quality, an MSE of 0.000273 mm^2, and an MAE of 0.00711 mm for predicting the filament diameter.
  - ✓ Implemented a **multi-objective Bayesian** framework for **optimizing** the **wearable** device sampling rate for each physiological signal recording procedure to reduce the power consumption of the wearable panel.

- ✓ DFT-based optimization of interactions between monomers and the target molecules to optimize selectivity in MIP-based sensors.

- **Machine Learning Engineer |** University of California Irvine (UCI) Sep. 2021 – Sep. 2022
  - ✓ Developed a **multimodal fusion-based deep neural network** with an embedded **Self-Attention layer** for detecting Stress and Depression utilizing **wearable** collected physiological signals including, **ECG**, **GSR**, **PPG**, and **body temperature.**
  - ✓ Implemented the Stress detection pipeline, from signal processing (**DWT** and **SWT)** to the subject's status prediction using **Pytorch**, **Scikit-Learn**, and **SciPy**. Evaluation of the stress detection pipeline showed an accuracy of 98.07%, 97.2%, and 99.3% for **adaptive** single-subject, generalized multi-subject, and **transfer learning**-based training approaches.
- **IoT and AI Intern** | Nojan Robotics, and Artificial Intelligence June 2020 – Aug. 2020
  - ✓ Developed a fully intelligent and real-time **IoT** kit to control building windows using **ZigBee** and **Wi-Fi** protocols.
  - ✓ Integrated real-time speech recognition and keyword spotting using a **CNN-LSTM** network, achieving an accuracy of 92.86% in detecting window control instructions for a hands-free user experience.

SELECTED PUBLICATIONS

- **The Role of Large Language Models in Emergency Care: A Comprehensive Benchmarking Study** (submitted to *NEJM AI) Borna Naderi, Longsha Liu, **Anita Ghandehari**, Neil Bhavsar, Darius Khoshons, Shriman Balasubramanian, Christian Davidson, Robert Tanouye, Justin Norden, Andrew Taylor, Rahul Sharma, Alexander Fortenko*
- **Optimization of Process Parameters in 3D-Nanomaterials Printing for Enhanced Uniformity, Quality, and Dimensional Precision Using Physics-Guided Artificial Neural Network** (Discover Nano | IF: 6.5) ***Anita Ghandehari,** Jorge A Tavares-Negrete, Jerome Rajendran, Qian Yi, Rahim Esfandyarpour*
- **A passive, reusable, and resonating wearable sensing system for on-demand, non-invasive, and wireless molecular stress biomarker detection** (Nano Research | IF: 9.9) *Shingirirai Chakoma*, Xiaochang Pei*, Huiting Qin***, Anita Ghandehari**, Sahar NajafiKhoshnoo, Jerome Rajendran, Rahim Esfandyarpour.*
- **Optimizing NFC-Based Wearable Sensors for Arterial Pulse Monitoring: A Comparative Study of Sampling Rates and Machine Learning Models** (IEEE BSN 2024) ***Anita Ghandehari,** Jorge A Tavares-Negrete, Xiaochang Pei, Jerome Rajendran, Shingirirai Chakoma, Rahim Esfandyarpour.*
- **EEMD. VMD, DMD, and FFT in Remote Photoplethysmography for Contactless Heart Rate and Respiration Rate Measurement** (IEEE BSN 2024) *Matthew Lo, Jingfeng Chen, Siana Jimenez, Francisco Aguirre, **Anita Ghandehari**, Zafer Sahinoglu, Farzad Ahmadkhanlou*
- **Machine-Learning Based Multi-Modal Battery-less Wearable Patch for Stress Monitoring** (Under review in *Nature Communication) **Anita Ghandehari***, Xiaochang Pei*, Jerome Rajendran, Sang Won Lee, Shingirirai Michael Chakoma, Sahar Najafi Khoshnoo, Qian Yi, Rahim Esfandyarpour*
- **A Multimodal, Environmentally stable, Regenerative, Battery-free, Wireless Wearable for On-demand Monitoring of Chronic Diseases and Stress Biomarkers.** (Under review in *Nature Biomedical Engineering*) *Jerome Rajendran, Xiaochang Pei, Shingirirai chakoma, **Anita Ghandehari**, Rahim Esfandyarpour.*
- **Machine Learning-Powered Optimization for Intelligent Data Acquisition in Multimodal Wearable Devices.** (Under review in *Advanced Science) **Anita Ghandehari,** Xiaochang Pei, Jerome Rajendran, Rahim Esfandyarpour*
- **Evaluating the Impact of Traveling on COVID-19 Prevalence and Predicting the New Confirmed Cases According to the Travel Rate Using Machine Learning: A Case Study in Iran** (ICCKE-2021) ***A. Ghandehari**, S. Shirvani, H. Moradi*

EDUCATION

University of California, Irvine (UCI) Sep. 2021- Present

Ph.D. in Electrical Engineering and Computer Science

- **Member of** Integrated Nano Bio Electronics Innovation Lab
- **Research Field:** Edge ML, Hyperdimensional Computing, Multimodal Optimization, Intelligent Health Monitoring

University of Tehran

B.Sc. in Electrical and Computer Engineering Sep. 2016- Feb. 2021

- **Member of** Embedded Systems Lab – Prof. Zain Navabi
- **B.Sc. Thesis**: "Pneumonia Detection and Infection Area Segmentation Using Mask-RCNN"- Prof. S. Safari