

# MADHAV SANKAR

Phoenix, Arizona, USA

Email: [mnola147@asu.edu](mailto:mnola147@asu.edu) | LinkedIn: <https://www.linkedin.com/in/madhavsankar333/> | GitHub: <https://github.com/maddy-stagner> |

## PROFESSIONAL SUMMARY

---

Biomedical Informatics researcher and AI-driven healthcare technologist with expertise in clinical AI, healthcare analytics, computational biology, and translational biomedical informatics. Experienced in developing machine learning and deep learning systems for clinical decision support, healthcare workflow optimization, multi-omics integration, and biomedical natural language processing. Proven experience in academic mentorship, healthcare AI research, and interdisciplinary collaboration integrating biomedical science, artificial intelligence, and data-driven healthcare innovation.

## TECHNICAL SKILLS

---

- **Programming Languages**  
Python • R • SQL • JavaScript • Java • C++
- **Artificial Intelligence & Machine Learning**  
TensorFlow • PyTorch • scikit-learn • Keras • Deep Learning • LSTM • Transformers • GANs • Random Forest • Few-Shot Learning • NLP • BioBERT
- **Bioinformatics & Computational Biology**  
Genomics • Transcriptomics • Proteomics • Multi-Omics Integration • WGCNA • Precision Medicine • Sequence Analysis • Computational Genomics
- **Data Science & Visualization**  
Pandas • NumPy • Matplotlib • Plotly • Tableau • PCA • t-SNE • Statistical Modeling
- **Clinical & Biomedical Informatics**  
Clinical Decision Support Systems • EHR Optimization • Healthcare Analytics • Digital Health • Clinical NLP • Health Data Mining
- **Cloud & Big Data**  
AWS • Oracle Cloud Infrastructure • Apache Spark • Hadoop • Kafka
- **Web & Application Development**  
Flask • React • Gradio • REST APIs • D3.js

## RESEARCH INTERESTS

---

Biomedical Informatics • Artificial Intelligence in Healthcare • Clinical Decision Support Systems • Computational Biology • Deep Learning • Bioinformatics • Multi-Omics Integration • Precision Medicine • Clinical Natural Language Processing • Translational Bioinformatics • Healthcare Data Science • Digital Health • Machine Learning for Healthcare • Computational Genomics

## EDUCATION

---

**Arizona State University (ASU) — Phoenix, Arizona**  
Master of Science in Biomedical Informatics and Data Science

Aug 2023 – May 2025  
GPA: 4.0/4.0

### Relevant Coursework

- Health Data Mining
- Biomedical Informatics Symposium
- Introduction to Clinical Environments
- Clinical Informatics
- Biomedical Data Analytics

- Machine Learning for Healthcare
- Healthcare Data Science
- Clinical Decision Support Systems
- Biomedical Research Methods

### **Academic Activities**

- Participated in Biomedical Informatics Symposium speaker series and journal club discussions.
- Led academic discussions on emerging topics in biomedical informatics and healthcare AI.
- Mentored students in healthcare systems analysis and informatics-based workflow optimization.

**Vellore Institute of Technology (VIT) — Tamil Nadu, India**      July 2019 – May 2023

### **Bachelor of Technology in Biotechnology**

#### **Academic Focus**

- Biotechnology
- Molecular Biology
- Bioinformatics
- Computational Biology
- Biomedical Research

## **RESEARCH & PROFESSIONAL EXPERIENCE**

---

### **Psychometrics Data Scientist**

John Ware Research Group, Inc. — Remote, USA      Nov 2025 – Mar 2026

- Collaborated with Dr. John E. Ware Jr., creator of the internationally adopted SF-36 Health Survey, on advanced psychometric and outcomes research.
- Performed multivariate statistical modeling and machine learning analysis on large-scale health-related quality of life (HRQoL) datasets.
- Conducted factor modeling and validation studies across demographic and clinical cohorts.
- Developed AI-assisted predictive frameworks using patient-reported outcomes and psychometric indicators.
- Integrated computational modeling with classical psychometric methodologies to improve translational healthcare analytics.
- Supported research focused on improving physical and mental health summary scoring methodologies

### **Instructor and Course Lead**

Arizona State University — College of Health Solutions

Instructor — BMI 404/504: Introduction to Clinical Environments      Jan 2026 – May 2026

- Served as instructor for graduate-level coursework focused on healthcare systems, clinical environments, and biomedical informatics workflows.
- Guided students in understanding clinical documentation systems, electronic health records (EHRs), and healthcare operations across multiple care settings.
- Mentored students in healthcare workflow analysis, root cause analysis (RCA), and healthcare process optimization methodologies.
- Led discussions on clinical informatics integration, patient care coordination, and healthcare technology implementation.
- Developed instructional materials and AI-integrated assignments related to healthcare workflow optimization and clinical data systems.

Instructor — BMI 312: Health Data Mining      Jan 2026 – May 2026

- Served as instructor for coursework focused on theories and methods of data science applications in medicine and biology using Python programming.
- Guided students through the complete lifecycle of biomedical data science projects including data preprocessing, statistical modeling, machine learning, and healthcare analytics.

- Taught applications of machine learning and predictive modeling techniques for solving biomedical and clinical problems.
- Mentored students in healthcare data mining methodologies, biomedical data interpretation, and translational analytics.
- Developed assignments and instructional modules integrating AI, healthcare informatics, and biomedical data science concepts.

Instructor — BMI 570: Biomedical Informatics Symposium Jan 2026 – May 2026

- Served as instructor for graduate biomedical informatics symposium courses involving speaker series and journal club discussions.
- Facilitated academic discussions on emerging topics in biomedical informatics, healthcare AI, clinical decision support systems, and translational data science.
- Guided students in critical evaluation of biomedical informatics literature and interdisciplinary healthcare research.
- Led student presentations and research discussions focused on AI-driven healthcare innovation and digital health technologies.
- Mentored graduate students in academic communication, scientific discussion, and research interpretation.

Course Leadership & Mentorship Jan 2026 – May 2026

- Mentored student teams in designing healthcare informatics interventions and implementation strategies.
- Guided students in EHR optimization, healthcare systems analysis, and clinical workflow redesign.
- Developed AI-integrated educational modules and assignments for biomedical informatics and healthcare data science training.
- Supported interdisciplinary collaboration among graduate students, healthcare professionals, and biomedical informatics researchers.

Instructor — Biomedical Informatics Symposium Aug 2025 – Dec 2025

- Served as instructor for the Biomedical Informatics Symposium graduate course series at Arizona State University.
- Led symposium speaker sessions, graduate journal club discussions, and academic presentations focused on biomedical informatics and healthcare AI.
- Guided students through discussions on emerging trends in clinical informatics, healthcare analytics, translational data science, and AI-driven healthcare systems.
- Facilitated interdisciplinary academic collaboration among graduate students, researchers, and healthcare informatics professionals.
- Mentored students in critical analysis of biomedical informatics literature, research methodologies, and healthcare technology innovation.

### **Data Scientist Intern**

Rapture Biotech International Pvt Ltd. May 2022 – Aug 2022

- Assisted in biotechnology data analysis and computational biology workflows.
- Performed data preprocessing, statistical analysis, and predictive modeling for biological datasets.
- Supported development of analytical pipelines for research-oriented biotechnology applications.

### **Research Assistant**

BioLim May 2021 – Jul 2021

- Supported biomedical research activities involving laboratory analysis and scientific documentation.
- Assisted in computational analysis and interpretation of biological datasets.
- Participated in collaborative research activities and technical reporting.

## **TEACHING, MENTORSHIP & ACADEMIC LEADERSHIP**

Student Project Mentor

## Arizona State University — Biomedical Informatics and Data Science. 2025 – 2026

- Mentored graduate students in healthcare workflow optimization, clinical informatics, and EHR-based intervention design.
- Guided students in root cause analysis, clinical systems evaluation, implementation planning, and healthcare process improvement.
- Supported development of technical and non-technical healthcare informatics solutions integrating clinical workflows and digital health systems.

### Mentored Projects

#### “From Plate to Problem”

- Mentored students in developing an EHR-based dietary safety intervention to reduce adverse dietary events in inpatient settings.
- Guided workflow analysis, dietary restriction documentation strategies, and clinical decision support design.
- Assisted students in implementation planning and patient safety optimization for inpatient healthcare systems.

#### “Vanishing Images”

- Supervised students in designing radiology workflow optimization strategies to reduce delays caused by imaging misrouting.
- Guided students in developing EHR validation systems and radiology notification workflows for clinical decision support.
- Assisted in healthcare workflow analysis and implementation strategy development.

### Behavioral Health Workflow Optimization Project

- Mentored students in developing an acuity-based behavioral health intake prioritization system integrated with NextGen EHR workflows.
- Guided technical and non-technical interventions to improve outpatient behavioral health patient flow and reduce wait times.
- Assisted in development of healthcare process improvement methodologies and implementation frameworks.

## **RESEARCH PROJECTS**

---

### **OmicsFusion AI: Deep Learning Integration of Genomics, Transcriptomics, and Proteomics for Precision Medicine**

- Developed an AI-powered multi-omics integration pipeline using deep learning models for disease prediction.
- Integrated genomics, transcriptomics, and proteomics datasets using automated preprocessing workflows.
- Implemented PCA and t-SNE visualization methods to identify biological patterns and molecular clustering.
- Designed reproducible bioinformatics pipelines within Google Colab for scalable computational analysis.
- Built model export systems for future deployment and translational research applications.

### Technologies

Python • TensorFlow • Deep Learning • Google Colab • PCA • t-SNE • Bioinformatics

### **WearSenseAI – Real-Time Risk Stratification Using Wearable Sensor Data**

- Developed an intelligent healthcare monitoring platform leveraging wearable sensor data and machine learning.
- Built predictive models using Random Forest classification and SMOTE balancing for patient deterioration prediction.
- Performed feature engineering and feature importance analysis for physiological risk assessment.
- Designed real-time risk alert simulations using streaming physiological signals.

- Focused on applications in remote healthcare and resource-limited clinical environments.

Technologies

Python • scikit-learn • SMOTE • Machine Learning • Healthcare Analytics

### **Deep Learning Model for Diabetes Prediction**

- Developed a deep learning model for diabetes onset prediction using the Pima Indians Diabetes Dataset.
- Performed data preprocessing, missing value handling, and feature scaling using StandardScaler.
- Built a neural network architecture with hidden layers and dropout regularization using TensorFlow/Keras.
- Implemented early stopping during model training to optimize validation performance.
- Achieved strong classification performance with comprehensive evaluation metrics and visualization.
- Integrated Kafka-based proof-of-concept streaming for scalable healthcare data processing.

Technologies

Python • TensorFlow • Keras • Kafka • scikit-learn • pandas • NumPy • matplotlib

### **Enhancing Communication Through a Community Health Data Platform**

- Developed a bilingual real-time community health data platform supporting English and Spanish languages.
- Integrated geolocation technologies and healthcare data management tools to improve healthcare accessibility.
- Designed user-friendly interfaces optimized for low-bandwidth healthcare environments.
- Improved communication and decision-making for frontline healthcare workers.

Technologies

Web Development • Geolocation Technology • Healthcare Informatics • Data Integration

### **RareAid 5.5 – AI-Powered Rare Disease Early Detection Platform**

- Designed and developed an AI-powered healthcare platform for early detection of rare diseases through intelligent symptom analysis.
- Built conversational AI systems for dynamic symptom checkups and disease prediction.
- Implemented personalized risk assessment, dietary recommendations, and wellness guidance.
- Developed a highly interactive and animated healthcare-focused user interface.
- Led end-to-end system development including AI modeling, frontend design, and platform architecture.

Technologies

Python • Gradio • AI/ML • Health Informatics • UI/UX Design

### **AI-Assisted Clinical Documentation System**

- Built an AI-powered clinical documentation platform to automatically summarize physician-patient conversations.
- Generated structured clinical notes to reduce manual documentation burden and improve provider workflow efficiency.
- Applied NLP-based summarization approaches for healthcare documentation automation.

Technologies

Natural Language Processing • Python • Clinical Informatics

### **AI-Powered Sepsis Detection and Monitoring System**

- Developed an intelligent ICU monitoring platform using LSTM-based deep learning models for sepsis prediction.
- Simulated real-time patient vitals and integrated interactive dashboards using Plotly and Gradio.
- Implemented risk assessment systems, report generation, and clinical query simulation.
- Demonstrated integration of AI, time-series forecasting, and medical informatics for critical care support.

Technologies

PyTorch • LSTM • Plotly • Gradio • Clinical AI

### **Few-Shot Learning for Early Detection of Rare Diseases using Synthetic Data**

#### **Augmentation**

- Simulated rare disease datasets with highly imbalanced class distributions.
- Applied SMOTE-based augmentation strategies for rare disease classification.
- Designed and trained few-shot learning models using deep neural network architectures.
- Evaluated model performance using classification metrics and visualization approaches.
- Built reproducible computational workflows within Google Colab.

Technologies

Few-Shot Learning • Deep Learning • SMOTE • Google Colab

### **AI-Powered Differential Diagnosis Assistant**

- Developed a multimodal clinical NLP assistant for generating ranked differential diagnoses.
- Integrated BioBERT, spaCy, Whisper, and LangChain for advanced clinical text analysis.
- Implemented symptom extraction, voice transcription, PDF interpretation, and contextual memory systems.
- Designed scalable architecture compatible with large clinical datasets including MIMIC-III.

Technologies

BioBERT • spaCy • Whisper • LangChain • NLP • Clinical AI

### **Microbiome Based Prediction Model**

- Developed a full-stack disease prediction platform integrating machine learning and microbiome analytics.
- Built RESTful APIs using Flask and integrated predictive models optimized with scikit-learn.
- Designed interactive visualizations using React and D3.js.
- Implemented scalable backend architecture for secure healthcare data communication.

Technologies

React • Flask • scikit-learn • D3.js • JavaScript • C++

### **AI-Powered Prediction of Non-Coding Variant Effects Using Genomic NLP and Deep Learning**

- Developed a genomic language modeling framework for predicting functional impacts of non-coding variants.
- Applied k-mer tokenization and BiLSTM architectures for DNA sequence representation learning.
- Evaluated classification performance using ROC curves and model interpretability metrics.
- Designed scalable workflows for future integration with ENCODE and gnomAD datasets.

**Technologies**

Deep Learning • Genomic NLP • BiLSTM • Python

### **AI-Powered Clinical Decision Support to Predict and Prevent Critical Events**

- Developed a hybrid LSTM + Transformer clinical decision support system for early patient deterioration prediction.
- Simulated ICU patient trajectories and real-time monitoring systems.
- Designed predictive models to identify future critical events from physiological data.
- Visualized real-time patient monitoring outputs and deterioration predictions.

Technologies

LSTM • Transformers • Clinical Decision Support • Deep Learning

### **HealthyAnswers.AI – A 3D-Themed AI-Powered Healthcare Chatbot**

- Developed an AI-powered healthcare chatbot providing conversational medical guidance.
- Designed an immersive 3D-themed user interface with natural language processing capabilities.
- Built context-aware healthcare response systems for enhanced patient engagement.

Technologies

Python • NLP • API Integration • Healthcare Chatbots

### **DeepCellScope: AI-Driven Enhancer Mutation Impact Predictor for Cell-Type-Specific Genomics**

- Built a deep learning platform for predicting enhancer mutation impacts across specific human cell types.
- Combined genomic sequence analysis with regulatory signal interpretation.
- Developed an interactive Gradio-based research interface.

Technologies

Deep Learning • Genomics • Gradio • Computational Biology

### **Privacy-Preserving Synthetic Health Data Generation using Conditional GANs**

- Developed a conditional GAN-based framework for generating realistic synthetic healthcare datasets.
- Addressed healthcare privacy challenges through privacy-preserving data generation methodologies.
- Compared synthetic and real patient distributions through statistical and visualization analysis.
- Designed reproducible computational pipelines for healthcare AI research.

Technologies

PyTorch • GANs • Synthetic Data • Healthcare AI

### **AI-Assisted Robotic Surgery Support**

- Designed an AI-assisted robotic surgery prototype for real-time visual analysis and surgical feedback.
- Developed systems capable of detecting surgical tools and generating safety guidance during procedures.
- Integrated real-time video analysis with surgical scene interpretation.

Technologies

Computer Vision • AI • Surgical Informatics • Real-Time Systems

### **WGCNA Identifies Critical Genes in COPD**

- Analyzed the GSE106986 dataset using Weighted Gene Co-expression Network Analysis (WGCNA).
- Performed pathway enrichment analysis using Metascape.
- Constructed gene regulatory networks and identified 13 hub genes associated with COPD.

- Conducted computational validation using additional biological datasets.

Technologies

R • WGCNA • Bioinformatics • Genomics

### **Oral Bioavailability Enhancement of Metformin**

- Investigated SEDDS nanocarrier systems to improve oral drug delivery efficiency.
- Explored formulation strategies targeting P-glycoprotein-mediated drug efflux mechanisms.
- Evaluated excipient selection approaches for improved therapeutic bioavailability.

Technologies

Drug Delivery • Nanotechnology • Pharmaceutical Biotechnology

## **PUBLICATIONS & MANUSCRIPTS**

---

### **Manuscript Under Review**

Ware, J. E., Jr., & Sankar, M.

“Structural and criterion evaluation of SF-36 physical and mental health summary scoring: A foundation for improved short-form development.”

Submitted to Medical Care, January 2026.

### **Publication**

“Manufacturing Manure from Collected Waste Food & Delivering it to Farmers in Need.”

Published Nov 2020.

## **PRESENTATIONS & SYMPOSIUM PARTICIPATION**

---

### **Biomedical Informatics Symposium**

2025 – 2026

Arizona State University

- Participated in graduate biomedical informatics symposium discussions and research presentations.
- Presented journal club discussions related to healthcare AI, biomedical informatics, and digital health systems.
- Engaged in interdisciplinary academic collaboration focused on healthcare analytics and translational informatics.

## **HONORS & AWARDS**

---

### **ASU SUN Award**

Sep 2025

Arizona State University — College of Health Solutions

Awarded for creative integration of artificial intelligence into Biomedical Informatics and Data Science educational workshops and curriculum development.

### **Certificate of Achievement and Appreciation**

Arizona State University — College of Health Solutions

May 2026

Recognized for leadership, mentorship, and instructional contributions as Instructor and Course Lead for BMI 404/504 and BMI 570 courses.

## **CERTIFICATIONS**

---

- Oracle Cloud Infrastructure Generative AI Professional Certification Preparation — LinkedIn (2025)
- AWS Machine Learning Essential Training — LinkedIn (2025)
- Tableau Certified Data Analyst Certification Preparation — LinkedIn (2025)
- Python Data Analysis for Healthcare — LinkedIn (2025)
- Building NLP Pipelines with spaCy — LinkedIn (2025)

- Advanced Linux: The Linux Kernel — LinkedIn (2025)
- SQL: Data Reporting and Analysis — LinkedIn (2025)
- Artificial Intelligence Foundations: Machine Learning — LinkedIn (2025)
- Cloud Hadoop: Scaling Apache Spark — LinkedIn (2025)
- An Introduction to How Generative AI Will Transform Healthcare — LinkedIn (2025)
- Basic Life Support (BLS) — American Heart Association
- IRB – Biomedical Research (Group 1) — CITI Program
- Responsible Conduct of Research (Graduate Student and Postdoctoral Researcher) — CITI Program
- Responsible Conduct of Research (Faculty and Senior Personnel) — CITI Program
- Basics of Extracellular Vesicles — University of California, Irvine
- Nanotechnology and Nanosensors — Technion – Israel Institute of Technology