

HURIYE SADAT SADEGHI

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Tehran, Iran

Biomedical Engineering Researcher
Core Methods: Physiological Signal Processing • AI for Healthcare
Applications: Wearable & Digital Health • Embedded Medical Systems

Biomedical engineering researcher with an M.Sc. in Bioelectric Engineering and a B.Sc. in Electrical Engineering (Telecommunications). Took substantial hands-on responsibility for converting a master's research concept into a functioning fingertip-interfaced monitoring prototype and a first-author Scientific Reports publication. Experience spans PPG acquisition and feature extraction, embedded hardware/software integration, Random Forest regression in MATLAB, microcontroller implementation, scientific writing, and systematic debugging across sensor, circuit, code, and data layers. Additional experience in bioimplant production and quality assurance, hospital equipment, and university teaching supports an interdisciplinary, application-oriented research profile.

[LinkedIn](#) | [Google Scholar](#) | [ResearchGate](#) | [ORCID](#)
RESEARCH FOCUS

CORE METHOD Physiological Signal Processing	Physiological sensing; PPG acquisition and preprocessing; PPG-based monitoring; real-time physiological signal processing; physiological feature extraction; cuffless blood-pressure and respiratory-rate estimation; biomedical data analytics; clinically responsible validation.
CORE METHOD AI for Healthcare	Artificial intelligence and machine learning for healthcare; Random Forest regression; biomedical data analytics; clinical decision support; intelligent health monitoring; model evaluation.
APPLICATION Wearable & Digital Health	Digital health; wearable medical devices; vital-sign monitoring; remote patient monitoring; Medical IoT; intelligent alerting; health monitoring and assessment.
APPLICATION Embedded Medical Systems	Embedded medical systems; biomedical instrumentation; sensor integration and prototyping; medical-device prototyping; MAX30102/ESP32-based monitoring; remote monitoring systems.

EDUCATION

M.Sc. in Biomedical Engineering (Bioelectric Engineering) Shahid Beheshti University of Medical Sciences, Tehran, Iran (one of Iran's top medical universities) • GPA: 18.0/20.0 (original grading scale) • Thesis: Design and prototyping of an AI-powered vital-sign monitoring system with intelligent alerting • Supervisors: Mohsen Ahmadi and Pezhman Sasanpour	Oct 2022 - Sep 2025
B.Sc. in Electrical Engineering (Telecommunications) University of Kashan, Kashan, Iran • Thesis: Analysis of Insulating Optical Waveguides • Advisor: Mahmoud Nikoufard	Sep 2013 - Mar 2018

PUBLICATIONS & RESEARCH IN PROGRESS

Design and prototyping of an AI-powered wearable device for continuous vital signs monitoring with intelligent alerting Huriye Sadat Sadeghi, Mohsen Ahmadi, Daniel Rajabi <i>Scientific Reports</i> 15, 45178 (2025). DOI: 10.1038/s41598-025-28772-2	
Olympic Champion Algorithm (OCA): A new human-inspired metaheuristic algorithm for solving optimization problems Daniel Rajabi, Huriye Sadat Sadeghi, Mohammad Bagher Menhaj, Amir Abolfazl Suratgar, Seyedali Mirjalili <i>Preprint</i> (2025). DOI: 10.2139/ssrn.4962535	
Review manuscript on wearable physiological monitoring Huriye Sadat Sadeghi <i>Manuscript in preparation.</i>	

MASTER'S THESIS & RESEARCH EXPERIENCE

Graduate Researcher - AI-Powered Physiological Monitoring Prototype Department of Medical Physics & Biomedical Engineering, School of Medicine, SBMU • Designed and prototyped a fingertip-interfaced biomedical monitoring system in which the user places a fingertip directly on a MAX30102 module and processed parameters are displayed on an LCD; the prototype was not wrist-worn. • Led the build-oriented project as the primary project lead, converted it into a funded research project, and carried it through to completion. • Implemented the hardware and embedded software on an ESP32 platform; integrated LCD visualization, MicroSD logging, DS3231 timing, multi-level visual/audio alerts, and SIM808-based SMS and GPS emergency notification. • Extracted four waveform landmarks from fingertip PPG cycles and assembled 170 samples from 17 participants; used an 80/20 train-test workflow while recognizing the cohort's limitations for broad generalization. • Compared regression approaches and developed Random Forest models in MATLAB for SBP, DBP, and RR estimation; translated the learned relationships into simplified quadratic equations for embedded execution and documented the performance trade-off. • Diagnosed unstable MAX30102 readings by separating sensor, circuit, communication, code, and data causes; corrected the module's logic-level/pull-up configuration and improved signal stability. • Completed data analysis and hardware/software diagnostics and contributed to manuscript writing and revision, culminating in a first-author publication in Scientific Reports.	2022 - 2025
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SELECTED RESEARCH & TECHNICAL PROJECTS

Clinical Outcome Prediction with Machine Learning: Developed course projects for COVID-19 mortality prediction and pediatric respiratory length-of-stay prediction using clinical/laboratory features, dimensionality reduction, and comparative machine-learning models.

Embedded Biomedical Monitoring & Wireless Communication: Designed and tested Arduino/Proteus systems integrating Wi-Fi, Bluetooth, GPS, EEG-related signal workflows, and heart-rate analysis, with emphasis on hardware-software integration and functional verification.

Physiological Systems Modeling: Built MATLAB/Simulink electrical models of the eye, heart, blood vessels, muscle, knee, respiratory system, and circulatory responses to explore physiological behavior and measurement principles.

Healthcare Optimization & Sensor-Based Activity Recognition: Completed projects on radiotherapy dose-distribution optimization, bioimplant design/material selection, and CNN hyperparameter optimization for sensor-based human-activity recognition.

TECHNICAL SKILLS

Biomedical & signal methods: PPG acquisition and preprocessing; physiological feature extraction; biomedical instrumentation; experimental design; model evaluation using MAE, RMSE, R^2 , and MAPE

Machine learning & data: Random Forest Regression; comparative regression/classification workflows; train-test evaluation; MATLAB data analysis; Python

Embedded systems: ESP32; MAX30102; Arduino IDE; embedded C/C++; LCD integration; MicroSD; SIM808 GSM/GPS; DS3231 RTC; sensor and circuit debugging

Engineering software: MATLAB; Simulink; Proteus; Altium Designer; Microsoft Office

Research practice: Scientific writing and revision; literature review; data visualization; reference management; interdisciplinary collaboration; technical documentation

PROFESSIONAL & CLINICAL-TECHNICAL EXPERIENCE

Clinical Engineering Intern - Imam Hossein Hospital

Apr 2024 - Jul 2024

Tehran, Iran

- Gained hands-on exposure to ventilators, autoclaves, electrosurgical units, neonatal cribs, defibrillators, patient monitors, and incubators; supported inspection, troubleshooting, maintenance, and safety-oriented equipment workflows.

Technical & Operations Staff - Danesh Baft Alborz

2018 - 2020

Bioimplant Co.

Iran

- Supported production and quality assurance for bone, cardiovascular, and ligament/tendon bioimplants; assisted documentation and product-registration activities and collaborated across cleanroom, biotechnology, and tissue-engineering operations.

TEACHING & ACADEMIC SUPPORT

Teaching Assistant - Shahid Beheshti University of Medical

2023 - 2024

Sciences

- Supported Medical Instrumentation and Technology Management of Medical Equipment and Safety Standards under Mohsen Ahmadi.

Private Tutor - Mathematics & Physics (2017-2020): Taught secondary-school mathematics and physics, including problem-solving preparation for mathematics competitions.

Educational Consultant & Mathematics Instructor - Ghalamchi Cultural Institute (2013-2015): Provided academic counseling, tailored instruction, and entrance-examination preparation.

HONORS & SCHOLARSHIPS

- Ranked 1st in the M.Sc. Biomedical Engineering - Bioelectric cohort (10+ students), 2024.
- Ranked 13th among 540 candidates in Iran's graduate entrance examination for Medical Engineering (Bioelectric Engineering), 2022.
- Ranked in the top 1% among 162,879 candidates in Iran's national B.Sc. entrance examination, 2013.
- Received a partial M.Sc. scholarship and full scholarships for B.Sc. and high-school study, as reported in the academic record.
- 2nd Place - University Swimming Competitions.

SELECTED GRADUATE COURSEWORK

Medical Instrumentation; Biomedical Signal Processing; Pattern Recognition; Medical Informatics; Medical Imaging; Digital Image Processing; Physiological Systems Modeling; Clinical Engineering Laboratory; Medical Equipment Technology and Safety Standards.

LANGUAGES

Persian: Native | **English:** Working academic proficiency; TOEFL iBT mock score: 91/120 | **Arabic:** Basic

ACADEMIC REFERENCES

Dr. Mohsen Ahmadi <i>M.Sc. Thesis Advisor</i> Assistant Professor, Faculty of Medical Engineering, SBMU dr.mohsen.ahmadi@gmail.com +98 912 299 6104 Scopus	Prof. Pezhman Sasanpour <i>M.Sc. Thesis Advisor</i> Professor, Faculty of Medical Engineering, SBMU pesasanpour@sbmu.ac.ir +98 912 383 5090 Google Scholar	Dr. Reza Shahghadami <i>M.Sc. Thesis Referee & Course Professor</i> Assistant Professor, Faculty of Medical Engineering, SBMU shahghadami@gmail.com +98 912 311 0824 Google Scholar
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