Arman Hajizadeh

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Education

Sharif University of Technology, Tehran
M.Sc. in Mechanical Engineering(field of study: Bioengineering) September 2019 - August 2022

Thesis Title: Multiplexed Real-Time PCR: Microtube-Based (First Commercialized in Iran, Startup Initiated) and Droplet-Based ,**Supervisor**: Prof. Amir Shamloo

Amirkabir University of Technology (Tehran Polytechnic) , Tehran
B.Sc. in Mechanical Engineering September 2012 - August 2018

Thesis Title: Computer vision in manufacturing and production: Automation of piloting for progressive dies using medial axis transformation (MAT) and Voronoi diagrams ,**Supervisor**: Prof. Behrooz Arezoo

Publications

- **Prediction of Aqueous Solubility of Drug Molecules by Embedding Spatial Conformers Using Graph Neural Networks (GNN)**
  [2022 29th National and 7th International Iranian Conference on Biomedical Engineering (ICBME)]
- **Fabrication and Enhancement of an Antibacterial Chitosan-coated Allantoin-loaded Skin Wound Dressing Using NaCMC/SA Hydrogels**
  [International Journal of Biological Macromolecules,Volume 253,Part 4, 31 December 2023, 127051]

Conferences and Presentations

- **Digital microfluidics: electrowetting technology for motion, disturbing, and splitting**

  Poster Presentation

  [28th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2024), October, Montréal, Canada]
- **Pixel-based reconfigurable organisms**

  Flash Talk

  [7th IEEE International Conference of Robosoft 2024, Bio-hybrid Workshop , April, San Diego, US]

Awards

- Membership in Iran's National Elites Foundation(Declined membership on February 15, 2024) 2023
- Recipient of a grant from the National Institutes of Medical Research Development of Iran for Prediction of Aqueous solubility of Drugs with GNN 2023
- Invention of a Real-time PCR (Patent Pending) 2022
- Granted for a Real-time PCR Device Production funded by Iran National Innovation Fund 2020
- Sharif University Dean's Fellowship(including full tuition waiver) 2019
- Ranked 56th amongst 22000 participants in Iran's annual national entrance exam for graduate student selection 2019
- Sharif University Dean's Fellowship(including full tuition waiver) 2017
- Ranked 39th amongst 26000 participants in Iran's annual national entrance exam for graduate student selection 2017
- AmirKabir University Dean's Fellowship(including full tuition waiver) 2012

- Ranked 986th amongst 260055 participants in Iran's annual national entrance exam for undergrad. Student selection 2012
- Selected for admission into Iran's prestigious selective school system; awarded full tuition waiver for outstanding academic performance. 2008
- Selected for National Organization for Development of Exceptional Talents, for Higher Secondary Education 2008
- Selected for admission into Iran's prestigious selective school system; awarded full tuition waiver for outstanding academic performance. 2005
- Selected for National Organization for Development of Exceptional Talents, for Lower Secondary Education 2005

Work Experience

Pars Human Gene(My SmartGene)(startup) April 2024 - present
Position: R & D
Detail: Developing an integrated digital microfluidic chip for DNA data storage (based on PurpleDrop)
References: damoun_dna@yahoo.com,

Zista Gene Sharif (startup) September 2022 - April 2024
Position: R & D, A year of leadership experience
Details: Developing real-time microtube-based and droplet-based biosensors (based on my master's dissertation
References: shamloo@sharif.edu, vosoughi@sharif.edu

Teaching Experience

Partial Differential Equations(First master's student to hold the position*) Oct 2021 - Jan 2022
Held weekly classes, graded assignments, midterms, and Final exam
Reference book: Boyce's Elementary Differential Equations and Boundary Value Problems
Reference: fotouhi@sharif.edu

Engineering Mathematics(First master's student to hold the position*) Oct 2020 - Jan 2021
Held weekly classes, graded Final exam
Reference book: Advanced Engineering Mathematics, 10th Edition, Erwin Kreyszig
Reference: daneshgar@sharif.ir

Fluid Mechanics I (In english) Oct 2020 - Jan 2021
Held weekly classes for teaching
Reference book: Fundamentals of Fluid Mechanics, by Bruce R. Munson
Reference: msani@sharif.edu

Statics and the Strength of Materials (In english) Oct 2020 - Jan 2021
Held weekly classes for teaching
Reference book: Statics and Mechanics of Materials, Russell Hibbeler
Reference: msani@sharif.edu

Thermodynamics I (In Persian) Jan 2020 – Jul 2020
Held weekly classes for teaching, designed and graded assignments
Reference book: Thermodynamics, An Engineering Approach, eighth edition, Cengel
Reference: masoud@stanfordalumni.org

* Ref: shahram.khazaei@sharif.edu

Software Skills

Modeling Software:

- Solidworks: General modeling (Real-time PCR components, 3-D printer components)
- FreeCAD: designing digital microfluidics devices component
- OpenSCAD: drawing Geometry of Electrodes for PCB of digital Microfluidics

- Mimics: Medical image modeling (Tibia, Carotid artery)
- 3-Matic: Clean up rough data of Mimics

Physics and Multi-Physics Simulation:

- Comsol: Fluid-solid interaction, solid mechanics, laminar flow, piezoelectric, semiconductors, plates and shells, Marangoni effect, electromechanical devices, electromagnetic devices, Shape Optimization, Topology optimization, Mixing, Acoustics, Surrogate Models, Particle Tracing

Electrical Engineering Software:

- Arduino: Temperature and circuit control for PCR
- Altium Designer & KiCad : PCB design in Electrowetting on dielectric

Programming & Scripting:

- Python: numpy, pandas, scikit-learn, scipy, skimage, multi-thread programming, open cv, Flask(Web application for biosensors), pyElastica, TensorFlow, FeniCs, PyBamm, Taichi, Pybullet, BWA, Bowtie, GATK, FastQC, HTSeq
- R language: Statistical analysis, Microbiome
- Matlab: Undergraduate problems, Nonlinear optimization, COBRAToolbox
- HTML, CSS: What I need to build up my own webpage
- LaTeX(TikZ, Asymptote): Technical writing, document preparation
- Linux: Shell scripting, system administration, development environment setup
- Git & Google Colab: Code versioning, collaborative code development, cloud-based machine learning, and seamless Git integration

Graphics & Visualization: :

- Graphics: BioRender, Adobe Illustrator, and Inkscape
- Visualization: Matplotlib, seaborn, ggplot2 , and GraphPad Prism

Experimental Skills

- Electronics (Arduino and Raspberry Pi), Multi-thread programming, and Image Processing
- Microfluidics, PDMS chip fabrication, Droplet generation, Lithography, Working with PMMA (Laser, MicroCNC), Chip Fabrication with Pressure-Sensitive Adhesive (PSA)
- Electrospinning and co-Electrospinning
- Gene amplification working with MIC PCR
- Familiar with Cell Culture: worked with endothelial cells, L929, and a7r5

Service and Outreach Activities

Sharif University of Technology Mentorship Program: Mentor January 2024- April 2024
Scalable mRNA and siRNA Lipid Nanoparticle Production Using a Herringbone Microfluidic Device, Aisan Niazi

Sharif University of Technology Mentorship Program: Mentor August 2023- May 2024
Thermal runaway propagation simulation in a battery pack with Python, Delaram Movahedian

Sharif University of Technology Mentorship Program: Mentor August 2022
Simulation of light uniformity for Real-time PCR, Mohammad Sayyah

Sharif University of Technology Mentorship Program: Mentor Jul 2022
Simulation of Sea Carpet, energy harvester, Shayesteh Hafezi

NeurIPS: Student Volunteer Dec 2021

Kanoon Farhangi Amoozesh Organization, educational sector: Tutor Sep 2017 - Sep 2019

Sina Robotics and Medical Innovators Co. Ltd.: Intern Jun 2017 - Aug 2017

Future Green MicroSystems Inc.: Volunteer at 3-D printing Section Jun 2016 - Jul 2016

Sanat Pajouhan Kia Co.: Intern Jun 2015 - Sep 2015

Open Projects

PCR:

- Real-time droplet-based PCR (Ref.)
- Mixing quality in paper-based microfluidics device (Ref.)
- Shape Optimization of the geometry of hurdles for electroosmotic mixing (Ref.)
- Smart coil: PCR with heat induction (Ref.)
- Simulation of a capillary-driven microfluidics device (Ref.)

Tissue Engineering:

- In-vivo investigation of heparinized polyurethane/silk fibroin vascular graft for acute thrombogenesis prevention in a canine model (Ref.)

Soft Robotics and Soft tissues:

- Motion of Three-Cube Robot with Evolutionary Algorithm(Ref.)
- Robot Design with Taichi (Ref.)
- Simulation of a Biohybrid Microswimmer (Ref.)
- Brain (Ogden) tumor growth simulation in Fenics (Ref.)

System Biology:

- Best microbiota for the most efficient biofuel cells (Ref.)
- Gut microbiome and their influences on Alzheimer's disease (Ref.)

Graduate course projects

- Gait Analysis and Fall Detection Wearable Device for Parkinson's patients (course: Bioinstrumentation)
- Structural role of implants in mechanoregulation of bone in proximal tibia osteotomy(course: Biomechanics of Musculoskeletal Injury)
- Designation of nanopores with NAMD, VMD (course: Principles of Bioengineering)
- Artificial muscle fabrication with PDMS and electrodes(Volunteer experimental Project + numerical, Continuum mechanics)

Languages and Hobbies

- **Languages**: Fluent in Azari and Persian, proficient in Turkish and English
- **Hobbies**: Playing Football, Watching Sports, Hearts, Classic board games: Backgammon and chess, Game design, doing dishes
- **curiosity-driven exploration**: Synthetic biology, hydrodynamic quantum analogs, statistical Thermodynamics, PINN