

AMIRHOSSEIN HAJIAGHAJANI

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OBJECTIVE

Pursue a Ph.D. degree in Electrical Engineering in the area of bio-electromagnetics.

RESEARCH INTERESTS

- Bio-Electromagnetics
- Electromagnetic Pattern Synthesis
- Biosensors and Actuators
- Magnetic Drug Targeting
- Magnetic Separation
- MEMS

EDUCATION

- **M.Sc. in Electrical Engineering at Iran University of Science and Technology, Tehran, Iran.** 2015–2018
 - Major: Electromagnetic Fields & Waves
 - GPA: 3.65/4 (scaled by WES)
 - Thesis Title: Arbitrary Spatial Patterning of Subwavelength Electric and Magnetic Fields
 - Supervisor: Dr. Ali Abdolali
 - Visiting Student Researcher at EMC Design Lab, Korea Advanced Institute of Science and Technology (KAIST)
- **B.Sc. in Electrical Engineering at Iran University of Science and Technology, Tehran, Iran.** 2011–2015
 - GPA: 3.75/4 (with honors - scaled by WES)
 - Thesis Title: Design and Implementation of a Magnetic Steering System for Targeted Drug Delivery
 - Supervisor: Dr. Ali Abdolali
- **Diploma in Mathematics and Physics, Kamal High School, Tehran, Iran.** 2007–2011
 - GPA: 19.55/20

PUBLICATIONS

- A. **Hajiaghajani**, A. Abdolali. "Magnetic Field Pattern Synthesis and Its Application in Targeted Drug Delivery: Design and Implementation". *Bioelectromagnetics* 39 (4), 325-338 (2018).
- A. **Hajiaghajani**, A. Abdolali. "Patterning of Subwavelength Magnetic Fields Along a Line by Means of Spatial Spectrum: Design and Implementation". *IEEE Magnetism Letters* 8, 1-4 (2017).
- A. **Hajiaghajani**, S. Hashemi, A. Abdolali. "Adaptable Setups for Magnetic Drug Targeting in Human Muscular Arteries: Design and Implementation". *Journal of Magnetism and Magnetic Materials* 438, 173–180 (2017).
- K. Rouhi, A. **Hajiaghajani**, A. Abdolali. "Magnetic Particle Separation by an Optimized Coil: A Graphical User Interface". *Journal of Magnetism* 22 (2), 214-219 (2017).
- A. **Hajiaghajani**, D. Kim, A. Abdolali, S. Ahn. "Arbitrary Remote Steering and Wireless Powering to Microrobots Using Spatiotemporal Patterning of Magnetic Fields". *IEEE/ASME Transactions on Mechatronics*, **under review**.

- S. Hashemi, A. **Hajiaghajani**, A. Abdolali. "An Electromagnetic Approach for Noninvasive Anesthesia".
Electromagnetic Biology and Medicine, **under review**.

HONORS & ACHIEVEMENTS

- Received scholarship as a Master's visiting research student from Feb to Jun 2018 at KAIST. 2018
- Acknowledged as the top researcher of the year among 200 Electrical Engineering graduate students, IUST. 2018
- Certificate of Health, Safety and Environment (HSE) in laboratories, IUST. 2017
- Ranked 2nd among 30 graduated Electrical Engineering students in the field of communication entering the BSc program in 2011, IUST. 2015
- Accepted as an honored student to Electrical Engineering M.Sc. program and bypassing the required entrance exam, IUST. 2015
- Outstanding IEEE student branch award, IEEE Iran section. 2015
- Chair of IEEE student branch at IUST. 2014 – 2016
- Qualified as the youngest certified Iranian nanotechnology instructor, INTIC. 2012
- Silver medal in national Olympiad of nanoscience and technology, INTIC. 2011
- Gold medal in national Olympiad of nanoscience and technology, INTIC. 2010

TEACHING EXPERIENCE

- **Workshops taught, held by IEEE Student Branch:**
 - "Comsol Multiphysics" Summer 2014
 - "Cadence OrCad" Fall 2014
- **Teacher assistant, School of Electrical Engineering, IUST:**
 - "Electronics II" taught by Dr. Adib Abrishamifar Fall 2014
 - "Electrical Circuits II" taught by Dr. Ali Abdolali Fall 2014
 - "Electrical Circuits I" taught by Dr. Ali Abdolali Spring 2014
 - "Principles of Electrical Engineering" taught by Dr. Abdolali Fall 2013

TECHNICAL & SOFTWARE SKILLS

- **Electromagnetics:** Comsol Multiphysics (Advanced), CST Studio (Intermediate)
- **Programming:** Matlab (Advanced)
- **Measurement:** Spectrum analyzer (Advanced), Electromagnetic near field probing (Advanced), Microwave network analyzer (Intermediate)
- **Molecular Dynamics:** Tinker (Advanced), Hyperchem (Advanced)
- **Misc.:** Cadence OrCad, Adobe Photoshop, Adobe Illustrator (All advanced), PCB design (Intermediate), HTML (Intermediate)

LANGUAGES

- **English**
 - TOEFL (iBT): 98/120 (R:26, L:23, S:24, W:25) - Oct. 2017
 - GRE General: Q:166, V:140, W:3.5 - Nov. 2017
- **Persian (Native)**

ASSOCIATIONS

- **Nanoclub Elites Association, INTIC.** 2012 - Present
- **Student member, IEEE.** 2014 - Present
- **Student Scientific Association, IUST.** May 2013 - May 2014

FEATURED PROJECTS

- **Wireless power transfer and remote steering of microrobots (*Visiting Research Project at KAIST*)** 2018

This research advances my MSc thesis on patterning of low frequency magnetic fields and aims to power and steer biomedical microrobots floating on a fluid and is followed by *in vitro* experimental validation.

- **Patterning of electric fields by means of spatial spectrum for highly focused brain stimulation (MSc Course: Selected Topics on Frequency Selective Surfaces)** 2017

This project is a part of MSc thesis project to enhance the focused brain stimulation and simplify the facilities by lowering the number of current sources. Here, the concept of spatial spectra of the desired pattern is used.

- **Reconfigurable magnetic field pattern synthesis by means of the special spectrum (*MSc thesis*)** 2016-2017

We aimed to spatially shape the perpendicular magnetic fields over a 2D plane as well a 1D line with a novel analytical design method. The structure was implemented to be used for magnetic drug targeting. Results were validated in practice.

- **Review of recent advances in magnetic actuation of magnetic nanoparticles (*MSc seminar*)** 2016

Recent advances and challenges in hyperthermia and magnetic drug delivery were studied and classified with an interdisciplinary viewpoint, regarding magnetic actuators, mechanical challenges and drug/carrier interactions.

- **Action potential blockade (anesthesia) by patterned subwavelength electric fields (MSc Course: Electromagnetic Complex Media)** 2016-2017

A setup of coils placed above a complex electromagnetic medium was designed to manipulate and spatially pattern the electric field incident on motor neurons to create a controlled blockage point in the spinal cord. Results were verified by full wave simulations and nerve modelling.

- **A graphical user interface for an optimal coil-based magnetic separator (MSc Course: Bio-Electromagnetics)** 2016

A MATLAB graphical user interface was developed to realize an efficient, easy to install magnetic separator compared to traditional devices.

- **Design of a personalized magnetic drug targeting scenario and implementation of an adaptable coil setup (BSc thesis)** 2015

An algorithm to produce extremely high gradient magnetic fields for drug delivery, which is personalized for patient's cardiovascular system. In-vitro experiments conducted on a designed setup mimicking human muscular vessels verified the applicability of the proposed algorithm and the coil scheme.

REFERENCES

- **Prof. Ali Abdolali, Associate Professor, IUST (abdolali@iust.ac.ir)**
- **Prof. Seungyoung Ahn, Associate Professor, KAIST (sahn@kaist.ac.kr)**
- **Prof. Mohammad Razavizadeh, Associate Professor, IUST (smrazavi@iust.ac.ir)**