+1 (669) 294-6761
vahid.ganjalizadeh@gmail.com

CURRICULUM VITAE
VAHID GANJALIZADEH

Google Scholar
/vahidganjalizadeh

EDUCATION

Ph.D. candidate in Electrical Engineering, 2016-current
"Optofluidics and its applications" *University of California, Santa Cruz, USA*
M.S. in Electrical Engineering, Dec 2019
Non-terminating master degree *University of California, Santa Cruz, USA*
M.S. in Electrical Engineering, Microsystems Technology Sep 2013
"Optofluidic Microring Resonator on PDMS Substrate" *University of Tabriz, Iran*
B.S. in Electrical Engineering, Electronics Sep 2011
"CORDIC Processor on FPGA for EEG Signals Processing" *University of Tabriz, Iran*

EXPERIENCE

Applied Optics Group (Professor Holger Schmidt's lab) Sep 2016 - Current
Research&Teaching Assistant *University of California, Santa Cruz, USA*

- **Speckle Pattern Analysis using Deep-Learning:** Developing a deep-learning model with multiple CNN layers followed by a regression layer to map speckle patterns seen in scattered light from waveguide to a 1D array. I'm using *Scikit-Image*, *TensorFlow*, and *H5py* libraries to pre-process, train and inference, and store the image data respectively (on-going project).
- **Real-Time Multiplexed Detection on the Edge:** Developed an *Edge-TPU* classifier using *Tensorflow* and implemented on *Google Coral Dev Board* for real-time multiplexed event detection in optofluidic devices. It utilizes a fast wavelet-based event detector (called *PCWA* also developed by me) followed by a quantized DNN model to classify detected events. Due to limited resourced available in the edge device, various *parallel-processing* schemes including multi-processing, multi-threading, data sharing via queues, etc were utilized to achieve real-time performance. A *Plotly Dash App* is also implemented as a browser-based GUI to run on the edge device as a server and let the user monitor real-time data plot plus event detection results. A manuscript has been submitted to *Scientific Reports* and is under review.
- **Fast Wavelet Analysis Technique for Single Molecule Detection and Identification:** Developed a *CWT*-based event detection algorithm with pattern matching capability in multi-scale and parallel clustering scheme to group local maxima found in each level into a single event localization independently and in parallel. It is implemented in *Python* and available at my github repository (PCWA).
- **Real-Time Closed-Loop Optofluidic Chip Excitation System:** In this project, I have utilized a single-photon-counting-module (*SPCM*) to read-out real-time photon counts from the chip and adjust input laser power accordingly. Due to limitations of *TimeHarp* photon counter, I've developed a real-time binning system implemented in *Digilent Arty-A7 FPGA* board to bin, buffer, and transfer binned photon counts to the PC via Ethernet (*UDP socket protocol*). This is and on-going project and a manuscript is under preparation.
- **Photonic Chip Design, Simulation, and Characterization:** Collaborating with Brigham Young University (BYU) on designing, characterizing and optimizing optofluidic devices for point-of-care application. I'm experienced with waveguide-based photonic chip simulation with *FIMMWAVE/FIMMPROP-Photon Design* software especially in creating *Python* scripts to communicate and run a batch/routine of *FIMMWAVE* simulations. Also, I'm experienced on building optical setups (imaging, single-molecule fluorescence detection with *SPCM*, and optofluidic chip handling and running the experiment (a couple of second author papers).
- **3D Atomic deposition simulation:** Developed a 3D atomic deposition model done in *Python* with *PyOpenGL* library as the 3D visualization tool. This was a project for EE216 (Fall 2017) (Atomic Deposition).
- **PDMS Optofluidic Chip Design and Fabrication:** Well experienced with PDMS chip design and fabrication from mask to final device. I've done numerous fabrications from the scratch: device simulation with *FIMMWAVE/FIMMPROP*, chrome mask design with *AutoCAD*, photolitography, testing, and characterizing final chips. A couple of publications based on these PDMS chips. Have developed an *AutoCAD* script in *Lisp* to ease and automate design rule check (*DRC*) publicly availablle in my github repository (PolyHatch).
- **Mode Analyzer:** Application specific program developed in *Python* for fluorescent and chip facet waveguide mode image analysis (Mode Analyzer).
- Teaching Assistant for EE101 (Fall 2020).
- Teaching Assistant for EE103 (Fall 2018).
- Mentoring undergraduate students for summer research program.

SAPNA.Co ™ Aug 2015 - Sep 2016
R&D Engineer *Tabriz, Iran*

- Designing and fabrication of microfluidic chips based on PMMA material
- Designing and developing 3D holographic displays
- Developing compact CNC machine for microfluidic applications

Microfabrication Laboratory Sep 2012 - Sep 2014
Research Assistant *University of Tabriz, Iran*

- Experience in masked and maskless photolithography processes
- Softlithography and replica molding processes in microfluidic and optofluidic devices
- Free-space optics, imaging systems and realtime image processing

Tabriz University Robotic Group (TURG) Apr 2010 - Mar 2012
Team Member *University of Tabriz, Iran*

- VHDL codes for robots central processing unit (Xilinx Spartan-3A FPGA chipset)
- Implementation of ZigBee communication between PC-based strategy AI and robots

TECHNICAL STRENGTHS

Code and Data Analysis	C, C#, HDL, Matlab
Python (Libraries)	Data analysis & ML, Software Dev. (multi-processing/threading, socket, instruments) Numpy/Scipy, TensorFlow, Scikit-Learn, Scikit-Image, Matplotlib, Pandas, H5py, Tk, PySide, PyOpenGL, Plotly Dash
Finite Elements	ANSYS APDL, CFX/Fluent, COMSOL Multiphysics
CAD and Graphics	AutoCAD, Inventor/Fusion 360, Blender, Illustrator, GIMP
Electronics and PCB	Altium Designer, OrCAD, Eagle Soft, HSPICE, KiCad
Optics & Photonics	PhotonDesign (FIMMWAVE & FIMMPROP), Code V, MEEP (FDTD), TracePro
Board & μC	Coral Dev Board (EdgeTPU), Raspberry Pi, Arduino, Arty A7 (Xilinx: MicroBlaze, Vivado, HLS, AXI-4, Stream)
Script & Tool	Bash, LaTeX, VS Code, Jupyter NB/Lab, Google Colab, MS Office, MS Windows, Linux
Language	Persian (*Mother tongue*), Turkish (*Proficient*), English (*Proficient*), German (*Elementary*)

AWARDS AND HONORS

★ Received gift from the Cisco University Research Program Winter 2020
★ Received EE department fellowship from University of California, Santa Cruz Spring 2017
★ Received full scholarship from University of Tabriz for B.S. 2007
★ Top 0.67% ranked among 311,000 participants in the nation-wide entrance examination of state universities 2007

PUBLICATIONS

[1] V. Ganjalizadeh, G. G. Meena, T. A. Wall, M. A. Stott, A. R. Hawkins, and H. Schmidt, "Fast custom wavelet analysis technique for single molecule detection and identification," *Nature Communications*, vol. 13, no. 1, pp. 1–9, 2022. DOI: 10.1038/s41467-022-28703-z.

[2] M. N. Amin, V. Ganjalizadeh, M. Hamblin, A. R. Hawkins, and H. Schmidt, "Free-space excitation of optofluidic devices for pattern-based single particle detection," *IEEE Photonics Technology Letters*, vol. 33, no. 16, pp. 884–887, 2021. DOI: 10.1109/lpt.2021.3069673.

[3] G. Meena, A. Stambaugh, V. Ganjalizadeh, M. Stott, A. Hawkins, and H. Schmidt, "Ultrasensitive detection of SARS-CoV-2 RNA and antigen using single-molecule optofluidic chip," *Apl Photonics*, vol. 6, no. 6, p. 066 101, 2021. DOI: 10.1063/5.0049735.

[4] M. Amin, V. Ganjalizadeh, M. Hamblin, A. Hawkins, and H. Schmidt, "Multiplexed single particle sensing in optofluidic sensors using free space excitation," in *2020 IEEE Photonics Conference (IPC)*, IEEE, 2020, pp. 1–2. DOI: 10.1109/IPC47351.2020.9252341.

[5] E. S. Hamilton, V. Ganjalizadeh, J. G. Wright, H. Schmidt, and A. R. Hawkins, "3D hydrodynamic focusing in microscale optofluidic channels formed with a single sacrificial layer," *Micromachines*, vol. 11, no. 4, p. 349, 2020. DOI: 10.3390/mi11040349.

[6] V. Ganjalizadeh, G. Meena, M. Stott, H. Schmidt, and A. Hawkins, "Single particle detection enhancement with wavelet-based signal processing technique," in *CLEO: Science and Innovations*, Optical Society of America, 2019, STu3H–4.

[7] E. S. Hamilton, V. Ganjalizadeh, J. G. Wright, W. G. Pitt, H. Schmidt, and A. R. Hawkins, "3D hydrodynamic focusing in microscale channels formed with two photoresist layers," *Microfluidics and Nanofluidics*, vol. 23, no. 11, pp. 1–8, 2019. DOI: 10.1007/s10404-019-2293-z.

[8] E. S. Hamilton, J. G. Wright, V. Ganjalizadeh, H. Schmidt, and A. R. Hawkins, "Three-dimensional hydrodynamic focusing designs for integrated optofluidic detection enhancement," in *2019 IEEE Photonics Conference (IPC)*, IEEE, 2019, pp. 1–2. DOI: 10.1109/IPCon.2019.8908414.

[9] J. A. Black, V. Ganjalizadeh, J. W. Parks, and H. Schmidt, "Multi-channel velocity multiplexing of single virus detection on an optofluidic chip," *Optics letters*, vol. 43, no. 18, pp. 4425–4428, 2018. DOI: 10.1364/ol.43.004425.

[10] M. A. Stott, V. Ganjalizadeh, G. Meena, J. McMurray, M. Olsen, M. Orfila, H. Schmidt, and A. R. Hawkins, "Buried rib SiO 2 multimode interference waveguides for optofluidic multiplexing," *IEEE Photonics Technology Letters*, vol. 30, no. 16, pp. 1487–1490, 2018. DOI: 10.1109/lpt.2018.2858258.

[11] M. A. Stott, V. Ganjalizadeh, M. H. Olsen, M. Orfila, J. McMurray, H. Schmidt, and A. R. Hawkins, "Optimized ARROW-based MMI waveguides for high fidelity excitation patterns for optofluidic multiplexing," *IEEE journal of quantum electronics*, vol. 54, no. 3, pp. 1–7, 2018. DOI: 10.1109/jqe.2018.2816120.

[12] M. A. Stott, V. Ganjalizadeh, M. Olsen, M. Orfila, J. McMurray, H. Schmidt, and A. R. Hawkins, "High fidelity MMI excitation patterns for optofluidic multiplexing," in *CLEO: QELS_Fundamental Science*, Optical Society of America, 2018, JW2A–24.

[13] M. A. Stott, V. Ganjalizadeh, H. Schmidt, and A. R. Hawkins, "High fidelity MMI-based multi-spot excitation for optofluidic multiplexing," in *2017 IEEE Photonics Conference (IPC)*, IEEE, 2017, pp. 703–704. DOI: 10.1109/ipcon.2017.8116287.

[14] T. Wall, J. McMurray, G. Meena, V. Ganjalizadeh, H. Schmidt, and A. R. Hawkins, "Optofluidic lab-on-a-chip fluorescence sensor using integrated buried ARROW (bARROW) waveguides," *Micromachines*, vol. 8, no. 8, p. 252, 2017. DOI: 10.3390/mi8080252.

[15] V. Ganjalizade, N. Talebzadeh, and H. Veladi, "Simulation and optimization of a novel structure for capacitive pressure sensor based on out of plane electrodes," 2014.

[16] V. Ganjalizadeh, N. Talebzadeh, and H. Veladi, "Design, analysis and optimization of a novel capacitive pressure sensor based on vertical comb-grid configuration," in *2014 Second RSI/ISM International Conference on Robotics and Mechatronics (ICRoM)*, IEEE, 2014, pp. 498–502. DOI: 10.1109/icrom.2014.6990951.

[17] V. Ganjalizadeh, H. Veladi, and R. Yadipour, "A novel pressure sensor based on optofluidic micro-ring resonator," in *2014 International Conference on Optical MEMS and Nanophotonics*, IEEE, 2014, pp. 133–134. DOI: 10.1109/omn.2014.6924556.

[18] N. Talebzadeh, S. A. Chorsi, V. Ganjalizadeh, M. R. Malekshahi, and H. Veladi, "Investigation of voltage phase shift effect on microfluidic electroosmotic mixer," 2014.

[19] N. Talebzadeh, V. Ganjalizadeh, M. R. Malekshahi, and H. Veladi, "Time analyses of an active micromixer and effect of frequency and voltage on mixing time," 2014.