

Curriculum Vitae

Massoud Louis Khraiche

EDUCATION

- **Post Doctoral Fellowship**, Institute of Engineering in Medicine (IEM), UC San Diego, Department of Bioengineering and Department of Electrical Engineering and Computer Science, 2009-2013. University of California San Diego. La Jolla, CA 2009-2013
Project title: “Nanoengineered Retinal Prosthesis”
- **Doctor of Philosophy (PhD)**, Bioengineering. Fulton School of Engineering. Arizona State University, Tempe, AZ, June, 2009
Dissertation title: “lab-on-a-chip platform for monitoring focal adhesion quantitatively in real-time”
- **Master of Science in Engineering**, Bioengineering. Fulton School of Engineering. Arizona State University, Tempe, AZ, May 2004
Thesis title "Acoustic sensor for monitoring adhesion of Neuro-2A cells in real-time”
- **Bachelor of Science in Engineering**, Bioengineering. College of Engineering and Applied Sciences. Arizona State University, Tempe, AZ, May 2002
Research topic: “Novel sensor for monitoring antibody immobilization and neurotransmitter GABA in real-time”

EXPERIENCE

- ❖ **Assistant Professor, Biomedical Engineering Program, American University of Beirut (2015-2017).**
- ❖ **Principal R&D Engineer, Biotechnology, CBRITE, Inc, San Diego (2015- 2017).**
- ❖ **Senior Scientist, Department of Computer and Electrical Engineering, UC San Diego, (2015-2017)**
- ❖ **Faculty, *Project Scientist II*, Department of Ophthalmology, UC San Diego, (2013-2015)**
- ❖ **Senior Device Development Engineer, Nanovision Biosciences, La Jolla, CA. (2012-2015)**
- ❖ **Postdoc Fellowship, UC San Diego, Institute of Engineering in Medicine and Silva Group (2009-2012)**

PATENTS

- **Patent Application** filed August 2013: “*Integrated Nanowire Array Devices For Recording And/Or Stimulating Excitable pTissue*”. Application No. PCT/US11/41293.
- **Patent Application** filed Oct 2012: “*Ultra-High Sensitivity Nanowires for Retina Prosthesis*”. PCT/US13/ 1805788. Application No. PCT/US13/806,089. (5 disclosures in one patent application).
- **Invention Disclosure**: “Distributed localized processing layer for nanowire retinal implant device”. UCSD Docket No. SD2012-135. *Filled*.
- **Invention Disclosure**: “Multi-modal biochip for simultaneous, real-time measurement of adhesion and electrical activity of neurons in culture”. AzTE Case Number M12-034L. *Filled 2015 by Arizona State University*.
- **Invention Disclosure**: “*High Density Thin Film Transistor Array for Enumerating CTCs*”. *Licensed by CBRITE Inc.*

PUBLICATIONS

“Design and Development of Microscale Thickness Shear Mode (TSM) Resonators for Sensing Neuronal Adhesion” **M L Khraiche**, J Rogul, J Muthuswamy. *Frontiers in Neuroscience*,13:518, June 2019. **IF=3.65**

“Point-of-Care Heart Failure Diagnostic Platforms: BNP Biosensors” Hussein Alawieh; Trishia El Chemaly; Samir Alam, MD, **M L Khraiche**, *Sensors*, 2019, 19 (22). Dec, 2019. **Impact Factor = 3.6**.

“Towards A Biomechanical Model for Ultrasound Effect on Neural Excitability” Rima El Hassan, T El Chemaly, **M. L. Khraiche** - 2018 IEEE International Multidisciplinary Conference on Engineering Technology (IMCET).

“Circulating Tumor Cell Detection Technologies and Clinical Utility” Z Habli, W AlChamaa, R Saab, H Kadara, **M L Khraiche**. *Cancers* 12 (7), 1930. **Impact Factor = 6.1**.

“COVID-19 in-vitro Diagnostics: State-of-the-Art and Challenges for Rapid, Scalable, and High-Accuracy Screening” Zeina Habli, Sahera Saleh, Hassan Zaraket, **M L Khraiche** *Frontiers in Bioengineering and Biotechnology* 8, 1562. **IF=3.7**

“Three-Dimensional Nanostructures for Intracellular Recordings from Electrogenic Cells” **M L Khraiche**, RH El Hassan. *Journal of Science: Advanced Materials and Devices*. **Impact Factor =3.65**.

“All Inkjet Printed PEDOT:PSS/Graphene Neural Interface on a Bioresorbable Backbone”, Reem Almasri, Ali Tahrani, **M L Khraiche**. *In Review*, Submitted to *ACS Applied Materials and Interfaces* , 2020. **Impact Factor =8.7**

“Low Frequency Ultrasound for Suppressing Pain Related Potentials in the Reflex Arc” R Elhassan, Al-Chaer and **M L Khraiche**. *In Review*, Submitted to *Brain Stimulation*. **Impact Factor=7.1**.

“Finite Element Modeling of Intracortical Implants: Investigation of the Induced Strain due to Brain Micromotion”, Ali Al Abed, Jason Amaury and **M L Khraiche**. *In Review*, Submitted to *Journal of Micro/Nanolithography, MEMS, and MOEMS*. **Impact Factor = 2.3**.

“Inkjet Printed of Flexible Piezoresistive Strain Gauge” Dalia Bekdache, Samir Mustapha, **M L Khraiche**. *In Review*, Submitted to *Journal of Micro/Nanolithography, MEMS, and MOEMS*. **Impact Factor = 2.3**.

“Methods for Inkjet Printing Neural Interfaces” Sahera Saleh, Reem Almasri, W Al-Chamaa, **M L Khraiche**. *Micromachine*. **IF=2.2**

“The Effect of Temperature on the Electrical and Thermal Conductivity of Graphene-based Polymer Composite Films” Ali Tarhini, W AlChamaa, **M L Khraiche** and Ali Tahrani. *In preparation*.

“Neural Retinal Stimulation by High Quantum Efficiency Optoelectronic Nanowires”, **M L Khraiche**, Yi Jing, William R. Freeman, Gert Cauwenberghs, Yuhwa Lo, Gabriel A. Silva. *Journal of Neuromodulation* In review. **IF=2.614**

“High Density Individually Addressable Nanowire Arrays Record Intracellular Activity from Primary Rodent and Human Stem Cell Derived Neurons.” Liu R, Chen R, Elthakeb AT, Lee SH, Hinckley S, **M L Khraiche**, Scott J, Pre D, Hwang Y, Tanaka A, Ro YG, Matsushita AK, Dai X, Soci C, Biesmans S, James A, Nogan J, Jungjohann KL, Pete DV, Webb DB, Zou Y, Bang AG, Dayeh SA. *Nano Lett*, 17(5):2757-2764. April 2017. **IF= 12.1**

“Sustained Elevation of Neural Activity of Developing Cultures in Response to Ultrasound Exposure” **M L Khraiche**, W. B. Phillips, N. Jackson and J. Muthuswamy, *Journal of Microsystem Technologies*, 23(8):3671–3683, October 2016. **IF= 1.89**

"Towards High-resolution Retinal Prostheses with Direct Optical Addressing and Inductive Telemetry" by Sohmyung Ha, **M L Khraiche**, Abraham Akinin, Yi Jing, Yuhwa Lo, Freeman, William; Silva, Gabriel, Gert Cauwenberghs. *Journal of Neural Engineering*, 13(5), August 2016. **IF= 6.1**

“Nanotechnologies for recording and stimulating from excitable cells”, Gabriel Silva, **M L Khraiche**, *Journal of Hopkins Discovery Medicine*. June 2013. **IF= 2.4**

“Multi-modal biochip for simultaneous, real-time measurement of adhesion and electrical activity of neurons in culture”, **M. L. Khraiche** and J. Muthuswamy, *Lab on a chip*, 2012. **IF= 7**

“Acoustic sensor for monitoring adhesion of Neuro-2A cells in real-time” **M L Khraiche**, A. Zhou and J. Muthuswamy. *Journal of Neuroscience Methods*. 144 (1), 1-10, May 2005. **IF= 2.7**

“Bidirectional neural interface: Closed-loop feedback control for hybrid neural systems”, Zane Chou, Jeffrey Lim, Sophie Brown, Melissa Keller, Joseph Bugbee, **M L Khraiche**, Frédéric D. Broccard, Gabriel A. Silva, and Gert Cauwenberghs. 37th Annual International Conference of the IEEE EMBS. March 2015.

“Visual Evoked Potential Characterization of Rabbit Animal Model For Retina Prosthesis Research”, **M L Khraiche**, Sharif el emam, Abraham Akinin, Gert Cauwenberghs, William freeman and Gabriel a. Silva, 35th Annual International Conference of the IEEE EMBS, Osaka, Japan, July, 2013

“Ultra-High Photosensitivity Silicon Nanophotonics for Retinal Prosthesis: Electrical Characteristics”, **M L Khraiche**, Yuhwa Lo, Deli Wang, Gert Cauwenberghs, William Freeman and Gabriel A. Silva, 31th Annual International IEEE EMBS Conference, Boston, Massachusetts, USA, August 2011.

“Direct inductive stimulation for energy-efficient wireless neural interfaces”, Sohmyung Ha, **M L Khraiche**, Gabriel A. Silva and Gert Cauwenberghs, 34th Annual International Conference of the IEEE EMBS, San Diego, California, USA, September 2011.

“Early Onset of Electrical Activity in Developing Neurons Cultured on Carbon Nanotube Immobilized Microelectrodes”, **M L Khraiche**, N. Jackson and Jit Muthuswamy, 31th Annual International IEEE EMBS Conference, Minneapolis, Minnesota, USA, October 2009.

“Ultrasound induced increase in excitability of single neurons” **M L Khraiche**, W. B. Phillips, N. Jackson and J. Muthuswamy, 30th Annual International IEEE EMBS Conference, Vancouver, Canada, September 2008.

“Acoustic sensors for monitoring neuronal adhesion in real-time” **M L Khraiche**, A. Zhou and J. Muthuswamy, Proceedings of the 25th Annual International Conference of the IEEE EMBS, 2003, Cancun, Mexico, September 2003.

AWARDS

Funding at AUB (Funding: # of awards 15 in three years)

Total amount of awards: \$670,000

- Medical Practice Program (MPP) Khraiche (PI) 12/2019, 6/2022
Title: “Multimodal platform for high sensitivity electronic enumeration of circulating cancer cells from blood”
Co-investigator: Raya Saab, Director, Children’s Cancer Institute, American University of Beirut, Beirut, Lebanon. (\$120,000)
- Farouk Jabre Research Award Khraiche (PI) 6/2018, 6/2020
Title: “Flexible, high-density, photovoltaic penetrating retinal interface”
Co-investigator: Shadi Dayeh, Prof. UC San Diego, Elie Al Chaer, Prof and Chair of the department of Cell Biology and physiology AUB. (\$25,000)
- University Research Board Khraiche (PI) 6/2018, 6/2020
Title: “Point of Care Platform for Rapid High-Sensitivity Tracking of Cardiac Biomarker in Blood”
Co-investigator: Samir Alam, Chief of Staff, Internal Medicine (Cardiology), AUB medical center. (\$22,000)
- Lebanese innovation research award Khraiche (PI) 5/2019, 10/2020
Title: “Bimodal platform for high sensitivity electronic enumeration of circulating cancer cells from blood”
Co-investigator: Raya Saab, Director, Children’s Cancer Institute, American University of Beirut, Beirut, Lebanon. November 2017 - present.
- Research initiative seed grant Khraiche (PI) 12/2017, 12/2019
American University of Beirut
(\$5,000)
- University Research Board Khraiche (PI) 6/2020, 6/2022
Title: “Ultrastructural and Electrophysiological Investigation of Optoelectronic Nanoneural Interfaces”
(\$15,000)
- Farouk Jabre Khraiche (PI) 6/2018, 6/2020
Title: “” Biodegradable Optoelectronic Neural Prosthesis”
Co-investigator: Elie Al Chaer, Prof and Chair of the department of Cell Biology and physiology AUB. (\$25,000)
- Title:** “Inkjet printed Micro and Nano devices”
Co-investigator: Ali Tahrani, Prof Chemical Engineering AUB.
- University Research Board Ramzi Alameddine (PI) 6/2019, 6/2020
Title: “Upper eyelid Surgery and Dryness”
Co-investigator: M L Khraiche
(\$30,000)
- Research initiative MSFEA: Time buyout grant. Jan, 2020. Khraiche (PI)
Research initiative MSFEA: Equipment grant. Aug, 2018. \$110,000. Khraiche (PI)
Research initiative MSFEA: Time buyout grant. Aug, 2018, 2019. Khraiche (PI)
Travel Award from the DTSSP. Dec 2018. \$10,000. Khraiche (PI)

Highlighted Awards

- Won two Center for Brain Activity Mapping (CBAM) research grants (2014)
 - Neural interface realization through in vivo validation and optimization [\$30,000]
 - Active biocompatible multifunctional and implantable neural probes [\$30,000]
- Startup I helped Co-found was awarded coolest company in San Diego (30 companies were chosen)
- Mentored team of undergraduate won the Eugene H. Mead Memorial award for best design project in Jacobs School of Engineering, August 2012
- Winner of the 2011 TATRC/Qualcomm Wireless Health Innovation Challenge funding of \$75,000
- Graduate Research Grant provided by the Graduate & Professional Student Association at Arizona State University 2004
- Won seed grant funded through the bioengineering department at Arizona state university. Grant topic was “investigating the effect of Nogo and Mag proteins on neuronal adhesion” [\$50,000].
- Finalist in the 2003 EMBS Student Paper Competition and winner of region 6 for work on tracking neuron adhesion using acoustic sensor technology
- First Place for Distinguished Oral Presentation at the Nanotechnology session of the 10th Annual University of California System-wide Bioengineering Symposium, held at Merced June 19-21, 20

SELECTED ACHIEVEMENTS AND RECOGNITIONS

- **Winner of the TATRC (Telemedicine & Advanced Technology Research Center) Wireless Health Innovation award:** The award is given to selected wireless health technologies developed in Southern California that have the greatest potential to improve healthcare delivery to U.S. military personnel and their families.
- **First Place for Distinguished Oral Presentation at the Nanotechnology session of the 10th Annual University of California System-wide Bioengineering Symposium, held at Merced June 19-21, 20.** The talk and research highlighted the impact of nanotechnology on neural recovery from injury.
- **Helped found and raise funds for Nanovision Biosciences.** The start up aims at producing a retinal implant to restore sight based on a technology I patented during my postdoctoral fellowship.
- **Nanovision Biosciences licensed my IP from UCSD (2012-present day)** for > \$250,000/year. The company funds my research at UC San Diego.
- **Biocom San Diego Airport Cell Art Exhibit winning entry:** “SEM of neurons on optoelectronics nanowires”.
- **Popular mechanics published an article about my work on high-resolution retinal implant.** <http://www.popularmechanics.com/how-to/blog/supervision-new-retinal-implants-could-push-human-sight-further-14227784>
- **Won two Center for Brain Activity Mapping (CBAM) research grants (2014-2015)** as part team of faculty at UC San Diego
 - Neural interface realization through in vivo validation and optimization [\$30,000]
 - Active biocompatible multifunctional and implantable neural probes [\$30,000]

SELECT INVITED TALKS

- **UC San Diego, ECE Seminar series. OCT. 2019.**
- **UC San Diego, Bioengineering Seminar series. May. 2019.**
- **UCSF, Bioengineering Seminar series May 2017 .**
- **UC San Diego, Bioengineering Seminar series. May. 2012.** “Ultrahigh Photosensitivity Silicon Nanowires Towards Nanoengineered Retinal Prosthesis”
- **Arizona State University, Bioengineering Seminar series. Nov. 2013.** “Optoelectronics Nanowires for Neural Interfaces”
- **Biomedical Engineering Society Professional Development Seminar Series – Phoenix Chapter, Nov. 2013,** “Road to Startup Success”

JUDGING THE WORK OF OTHERS

Session Chair:

- Chair: of the visual prosthesis session, The Engineering in medicine and biology society, August, 2012.
- Co-chair: of the Microelectrodes and Microsystems. August, 2012.
- Co-chair: Electrical Impedance Imaging and Personal Health Systems II. August, 2012.
- Chair: the biotechnology session: 2018 IEEE International Multidisciplinary Conference on Engineering Technology (IMCET).

Regular Reviewer for:

- IEEE Transactions on Circuits and Systems
- Frontiers in Computational Neuroscience
- Neuroscience Letters
- IEEE Transactions in Bioengineering Conference Proceedings
- Biomedical Engineering Society (BMES)
- Research Seed Grants at the American University of Beirut

TECHNICAL SKILLS

Cell Culture (10 years)

- Extensive experience with primary neural cultures: harvesting and culturing rodent hippocampal and cortical neurons.
- Extensive experience with continuous or various immortal cell lines.
- Imaging: real-time lapse imaging of hippocampal and cortical rat neurons.
- Extensive experience with histology and western blot technique assay.

Optical Setups

- Experience with assembly, optical alignment, optimization, characterization and testing, and documentation.
- Expert in characterization of active and passive optical components: filters, lenses, attenuators, photodiodes, and laser diodes.
- Demonstrated ability in developing setups and experiments involving lasers on an optical bench, integrated into a complex physiological recording or for imaging purposes.
- Familiar with optical measurement instrumentation (spectrometer), beam profiler etc.
- Working experience in optical component manufacturing, assembly and test.

Electrophysiology

- Extensive experience collecting and sorting neuronal electrical activity.
- Experience using Plexon and Tucker Davis Technologies for extracellular spike recording.
- Experience design and building custom circuitry for neurophysiology recordings.
- Extensive experienced in patch clamp, Microelectrode arrays (MEA) extracellular recordings using cell, tissue and animal models and calcium imaging.

Semiconductor fabrication (+12 years)

- I have almost 12 years experience in *nano and microfabrication that includes* nanoimprinting, microfabrication process development, electrical, optical and mechanical characterization, lithography, wet etching, plasma etch, thin film chemical vapor deposition, metal sputtering, silicon epitaxy, furnace oxidation, rapid thermal anneal, silicon deep reactive ion etching, metrology, dicing, wire-bonding, packaging.

Surgical techniques

- Craniotomy in rats for implanting cortical recording electrodes.
- Retina tissue extraction and isolation.

- Rodent brain tissue extraction and dissection.

Micro-fluidics and Soft lithography

- Experience with photopatternable polymers for fabrication of micron size channels for lab-on-a-chip and cell patterning applications

Medical Instrumentation

- Experience building physiological diagnostic devices; Electrocardiograms (EMG), Electrocardiogram (ECG), Electro-oculography (EOG) and Voice recognition.
- Hardware: includes signal conditioning circuits and battery power supply for mobile operation.
- Software: signal acquisition and display purposes

Electrochemical techniques

- Experience with electrochemistry of charge transfer in fluid and experience with performing and analyzing various related experiments such cyclic voltammetry, chronoamperometry and electrochemical impedance spectroscopy.

Thin Film Deposition

- Electroplating, sputtering and thermal annealing for several materials such as Iridium Oxide in all its forms (SIROF, IROF and EROF), carbon nanotubes and platinum black.

Statistical techniques

- Expertise in statistical analysis of data, DOE and related software packages.

Software

- MATLAB, Ansys, Femlab, Solidworks (Finite Element Analysis), Minitab, Stat Graphics, AutoCAD.

Biosensor Modification

- Developed a process for surface modification of gold and ITO electrodes with single walled carbon nano-tubes (SWCNT) for the purpose of improving neuronal adhesion and signal to noise ratio.

Liquid Biopsy

- Extensive experience with dielectrophoresis for both cell and DNA separation and collection and electrowetting for sample preparation.

SELECT CONFERENCE ORAL PRESENTATIONS

“Neural interface realization through in vivo validation and optimization” Symposium of Center for Brain Activity Mapping, UC San Diego, Nov, 10, 2016

“Active biocompatible multifunctional and implantable neural probes” Symposium of Center for Brain Activity Mapping, UC San Diego, Nov, 10, 2016.

“Evaluation of High-efficiency Optoelectronic Nanowires in Rabbits”, Biomedical Engineering Society Annual Meeting scheduled for October 22, 2015.

“*Functional and histological evaluation of a high-density optoelectronic nanowires in rabbits.*” 15th annual UC Bioengineering symposium, Irvine, California, Systems biology, neurobiology, synthetic biology in Engineering Session. June, 15, 2014

“Optoelectronic Silicon Nanowires for High-resolution Neurostimulation *In vivo* and *In vitro*” M. L. Khraiche, W. Freeman, G. Cauwenberghs, G. A. Silva. Annual meeting of the society of neuroscience, San Diego, November, 2013.

“Silicon Nanophotonics for the Replacements of the Damaged Photoreceptors in Diseased retinas” M. L. Khraiche, Y. Jing, S. Ha, Y. Lo, W. Freeman, E. Chichilnisky, D. Wang, G. Cauwenberghs, G. A. Silva. Annual meeting of the society of neuroscience, New Orleans, October, 2012.

“Monitoring integrin-mediated adhesion and electrical activity of neurons simultaneously using a multi-modal biochip in neuronal cultures” M. L. Khraiche and Jit Muthuswamy, Annual meeting of the Biomedical Engineering Society, Atlanta, GA, USA, October, 2012. *Talk*.

“Carbon Nanotubes lead to early Onset of Electrical Activity in Developing Hippocampal Neurons Cultured on Silicon Microelectrodes”. M. L. Khraiche, N. Jackson, J. Muthuswamy, 10th Annual University of California Systemwide Bioengineering Symposium, held at Merced June 19-21, 20.

TEACHING EXPERIENCE

- Developed a Minor in Bioengineering Design. Developed 2 courses for the minor (44 students enrolled).
- Regular mentor for senior design groups at UC San Diego (5 senior design groups).
- Lab section (lecture and instrumentation lab) for three semesters for BME470 (Microcomputer Application in Bioengineering). Aim of the class was to guide students to develop, test and build systems for medical monitoring and diagnostic purposes. Class had three sections totaling 80 students.

MENTORING

Students AUB

PhD Students:

Zeina Habli, “Multimodal platform for high sensitivity electronic enumeration of circulating cancer cells from blood”

Sahera Saleh “Flexible, high-density, photovoltaic penetrating retinal interface”

MS Students:

Jessica Mitri, “High intensity focused ultrasound (HIFU) for thermal ablation of neural tissue”

Rima El Hassan, “Biomechanical model of ultrasound effect on neural excitability”

Reem Almasri, “Biodegradable inkjet printed neural interface”

Trishia El Chemaly “Penetrating neural interfaces for retinal prosthesis”

Rima Lahoud “The effect of nano-roughness on neural adhesion”

Arij El Hawary “Wireless Optoelectronic implant”

Walid Alchama “Point of Care Platform for Rapid High-Sensitivity Tracking of Cardiac Biomarker in Blood”

Anthony Freije “High intensity focused ultrasound (HIFU) for thermal ablation of neural tissue”

Medical Students

Huriyeh Moussa

FYP (AUB)

2019/2020

Dania Itani, Daniel Maher, Taha Dani, Yara Ghamlouche. Flexible blood pressure monitoring wearable device.

Lara Al Sayyed Saleh, Sarah Hotait, Wissam Malaeb. Reliable RF Shielded Pacemaker.

2018/2019

Ali Hallal Batoul El Hage Rim Cherri. Wireless Powering of Implantable Sensors.

2018/2019

Caren Moussa, Alexandra Mikhael, Raneem Sheronick. Light sensitive polymer for neural stimulation.

2018/2019

Nijad Al Dubayssi, Tara Maria Moubarak, Sami Samaan 3D Printing/Bioprinting in Ophthalmology. **2018/2019**

Students enrolled in the bioengineering program at UC, San Diego

- *Sophie Brown, Joseph Bugbee, Melissa Keller, Jeffrey Lim, Zane Chou* “Bi-directional neural interface: Design and implantation of a closed-loop interface between neuronal cultures and artificial neural networks ” (**Senior Design Group, 2015**).

- George Thomas, Hanbaek Kong, Eric Fossum, Christopher Keefe “A Strategy for Preserving Inner Retinal Health Post Implantation of Retinal Prosthesis” (**Senior Design Group, 2014**). “A Strategy for Preserving Inner Retinal Health Post Implantation of Retinal Prosthesis II”.
- Bin Du, Shreyas Rao, Michael Siu, Lu Yang (**Senior Design Group, 2013**). “A Strategy for Preserving Inner Retinal Health Post Implantation of Retinal Prosthesis”
- Venkata Voleti, “real-time spike sorting software” available as an open source software”
- Trevor Kerth, “Wireless EMG monitoring system”
- Tracey Hong, “Effect of Nanotopography on Intracellular Calcium Concentration of Neurons”
- Tiffany Dai, “Effect of Nanotopography on Intracellular Calcium Concentration of Neurons”
- Samir Damle, “Correcting Spatial Resolution of in vitro Microelectrode Array Recordings with Calcium Fluorescent Imaging”
- Phuong Nguyen, “Ultrasound delivery of Q-dots into neurons”
- Samir Damle, Phuong Nguyen, Samantha Reiss, Sarika Tendon (**Senior Design Group, 2012**) “Optimization of Surface Roughness of Flexible Neural Implants”
- Melissa Yunting Tang, “Biocompatibility of Flexible Optoelectronic Neural Implants”
- Joshua Chu, “Design and Implementation of a Low Cost Contact Angle Measurement System”

Mentored several students enrolled in Arizona State University undergraduate bioengineering program towards the completion of capstone projects and project for the Fulton undergraduate research initiative (FURI).

- *Ali Alnamani*, Low Cost Micro-Polymer-Fluidic Channels for Maintaining Neurons in Culture (Capstone Senior Design Project, 2008)
- *Siddesh Gopal and Rohit Rajan*, Benchtop polymer for cell patterning (High school project, 2008)
- *Masoud Sultani*, Affect of RGD adhesion peptide on neuron function in-vitro model (FURI, 2008)
- *Payal Bhavsar*, Quantitative Assessment of Morphological Changes in Single Neurons using MATLAB based Image Processing Functions (FURI and Capstone Project 2007-2008)
- *David Hunn*, Use of surface acoustic wave devices (SAW) to monitor adhesion of neuroblastoma (Capstone Senior Design Project, 2003)
- *Masoud Sultani*, The Polyethylene Glycol Artificial Nucleus Pulposus (Capstone Project 2008-2009)

OGANIZATIONS

- Member of Society for Neuroscience
- Cofounder of the *Community of Lebanese Scientists (small community)*
- Member of the international microelectronic and packaging society
- Founded the Neural Engineering Journal Club at UC San Diego