

Missael Garcia

me@missaelgarcia.com | +1 314 824 8477

EDUCATION

Washington University in St. Louis | Ph.D. in Computer Engineering

Dec. 2017 | St. Louis, MO | GPA: 3.9/4.0

- Dissertation: Bio-Inspired Multi-Spectral and Polarization Imaging Sensors for Image-Guided Surgery.
- Advisor: Prof. Viktor Gruev.

Southern Illinois University Edwardsville (SIUE) | M.S. in Electrical Engineering

Jul. 2013 | Edwardsville, IL | GPA: 4.0/4.0

- Thesis: Buccal Prosthesis for Quadriplegic Controls.

Monterrey Institute of Technology and Higher Education (ITESM) | B.S. in Mechatronics Engineering

Dec. 2011 | Cuernavaca, Mexico | GPA: 3.9/4.0

RESEARCH EXPERIENCE

Bio-sensors Lab | Postdoctoral Researcher

ECE and Bioengineering Depts., U. of Illinois at Urbana-Champaign, Urbana, IL | Jan. 2018 – Present

- Advisors: Shuming Nie and Viktor Gruev
- Research and development of multi/hyper-spectral imagers for image-guided surgery in patients with breast and prostate cancer. Recently developed technology that has undergone clinical trials for the mapping of sentinel lymph nodes in patients with breast cancer.

Advanced Sensors Research Lab | Graduate Research Assistant

CSE Dept., Washington U. in St. Louis, St. Louis, MO | May 2013 – Dec. 2017

- Researched and developed scientific imaging systems for polarization and near-infrared fluorescence for image-guided surgery. Developed medical imaging systems that underwent clinical trials at Barnes-Jewish Hospital. Tested polarization systems in the field in collaboration with multiple research groups.

SKILLS

MATLAB/Python/LabVIEW/C/C++/Wolfram Math.

- Imaging processing/Computer Vision
- System development

CAD Software

Embedded system design

- FPGA/Verilog/Firmware design
- Microcontroller software
- PCB design

Integrated circuits design

- CMOS/CCD image sensors

Camera calibration

- Geometric calibration
- Multi-dimensional signal calibration

Optical design

- Extensive optical lab-bench experience
- Laser optics

Cleanroom experience

- SEM
- Etching, deposition, and lithography instrumentation

Applied robotics and mechatronics

Automation and industrial control

Biomedical research

- Wetlab experience
- Small animal models
- Experience with preclinical and clinical studies

AWARDS AND HONORS

- IEEE ISCAS Best Paper Award in the Sensory Circuits and Systems track | Florence, Italy | May 2018
- IEEE ISCAS Best Student Paper Award | Baltimore, MD | May 2017
- IEEE ISCAS Best Paper Award in the Sensory Circuits and Systems track | Baltimore, MD | May 2017
- IEEE ISCAS Best Paper Award in the Sensory Circuits and Systems track | Lisbon, Portugal | May 2015
- SIUE Outstanding Thesis Award | Edwardsville, IL | Oct. 2013
- SIUE Outstanding Graduate Student Award | Edwardsville, IL | Jan. 2013
- ITESM University's Science Fair: 1st place – Adv. Electronics and 2nd place – Comp. Science | Cuernavaca, Mexico | May 2011
- ITESM Highest single period GPA | Cuernavaca, Mexico | Jan. 2011
- ITESM Dean's List | Cuernavaca, Mexico | Held Aug. 2007 – Dec. 2011
- S. Lefschetz National Mathematical Championship for Engineers: 3rd place | Mexico City, Mexico | Apr. 2009
- ITESM Scholarship of Excellence for Undergraduate Studies | Cuernavaca, Mexico | Aug. 2007

JOURNAL PUBLICATIONS

- [1] **Garcia, M.**, Blair, S., Davis, T., Konopka, C., & Gruev, V. Hexachromatic bio-inspired camera for image-guided cancer surgery. *Manuscript submitted for publication.*
- [2] **Garcia, M.**, Davis, T., Blair, S., Cui, N., & Gruev, V. (2018). Bioinspired polarization imager with high dynamic range. *Optica*, 5(10), 1240-1246.
- [3] **Garcia, M.**, Edmiston, C., York, T., Marinov, R., Mondal, S., Zhu, N., ... & Liang, R. (2018). Bio-inspired imager improves sensitivity in near-infrared fluorescence image-guided surgery. *Optica*, 5(4), 413-422.
- [4] Cronin, T. W., **Garcia, M.**, & Gruev, V. (2018). Multichannel spectrometers in animals. *Bioinspiration & biomimetics*, 13(2), 021001.
- [5] **Garcia, M.**, Edmiston, C., Marinov, R., Vail, A., & Gruev, V. (2017). Bio-inspired color-polarization imager for real-time in situ imaging. *Optica*, 4(10), 1263-1271.
- [6] **Garcia, M.**, Zayed, M. A., Park, K. M., & Gruev, V. (2017). Near-infrared angiography for critical limb ischemia in a diabetic murine model. *Journal of biomedical optics*, 22(4), 046006.
- [7] **Garcia, M.**, & Gruev, V. (2017). Optical characterization of rigid endoscopes and polarization calibration methods. *Optics Express*, 25(14), 15713-15728.
- [8] Marinov, R., Cui, N., **Garcia, M.**, Powell, S. B., & Gruev, V. (2017). A 4-megapixel cooled CCD division of focal plane polarimeter for celestial imaging. *IEEE Sensors Journal*, 17(9), 2725-2733.
- [9] **Garcia, N. M.**, de Erasquin, I., Edmiston, C., & Gruev, V. (2015). Surface normal reconstruction using circularly polarized light. *Optics express*, 23(11), 14391-14406.
- [10] Charanya, T., York, T., Bloch, S., Sudlow, G., Liang, K., **Garcia, M.**, ... & Achilefu, S. (2014). Trimodal color-fluorescence-polarization endoscopy aided by a tumor selective molecular probe accurately detects flat lesions in colitis-associated cancer. *Journal of biomedical optics*, 19(12), 126002.

CONFERENCE PRESENTATIONS

- [1] Blair, S., **Garcia, M.**, Konopka, C., Dobrucki, L., & Gruev, V. (2019, March). A 27-band snapshot hyperspectral imaging system for label-free tumor detection during image-guided surgery. In *Label-free Biomedical Imaging and Sensing (LBIS) 2019* (Vol. 10890, p. 108900G). International Society for Optics and Photonics.
- [2] Blair, S., **Garcia, M.**, Cui, N., & Gruev, V. (2018, October). A 120 dB, Asynchronous, Time-Domain, Multispectral Imager for Near-Infrared Fluorescence Image-Guided Surgery. In *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*(pp. 1-4). IEEE.
- [3] Gruev, V., **Garcia, M.**, Powell, S., Cui, N., & Davis, T. (2018, August). Bioinspired Sensors for Underwater Geolocalization. In *2018 IEEE Research and Applications of Photonics In Defense Conference (RAPID)*(pp. 1-1). IEEE.
- [4] **Garcia, M.**, Kauffman, K., Davis, T., Marinov, R., & Gruev, V. (2018, May). A 1280 by 720 by 3, 250 mW, 24 fps Hexachromatic Imager for Near-Infrared Fluorescence Image-Guided Surgery. In *Circuits and Systems (ISCAS), 2018 IEEE International Symposium on* (pp. 1-5). IEEE.
- [5] **Garcia, M.**, Davis, T., Marinov, R., Blair, S., & Gruev, V. (2018, May). Biologically inspired imaging sensors for multi-spectral and polarization

imagery. In *Polarization: Measurement, Analysis, and Remote Sensing XIII* (Vol. 10655, p. 106550C). International Society for Optics and Photonics.

- [6] **Garcia, N. M.**, Davis, T., Kauffman, K., Marinov, R., & Gruev, V. (2018, April). A Six-channel Multispectral Imager for Simultaneous In Vivo Imaging of Multiple Near-Infrared Fluorescent Markers. In *Optics and the Brain* (pp. JTU3A-3). Optical Society of America.
- [7] Gruev, V., **Garcia, M.**, Cui, N., & Li, Q. (2018, March). Bio-inspired near infrared fluorescence sensors: from the ocean to the operating room (Conference Presentation). In *Molecular-Guided Surgery: Molecules, Devices, and Applications IV* (Vol. 10478, p. 104780D). International Society for Optics and Photonics.
- [8] **Garcia, M.**, Gruev, V., Marinov, R., Kauffman, K., & Davis, T. (2018, March). Hexachromatic imager for near-infrared fluorescence image-guided surgery (Conference Presentation). In *Molecular-Guided Surgery: Molecules, Devices, and Applications IV* (Vol. 10478, p. 104780F). International Society for Optics and Photonics.
- [9] **Garcia, M.**, Zayed, M., Park, K. M., & Gruev, V. (2017, May). A 1600 by 1200, 300 mW, 40 fps multi-spectral imager for near-infrared fluorescence image-guided surgery. In *Circuits and Systems (ISCAS), 2017 IEEE International Symposium on* (pp. 1-4). IEEE.
- [10] **Garcia, M.**, & Gruev, V. (2017, February). Optical characterization and polarization calibration for rigid endoscopes. In *Endoscopic Microscopy XII* (Vol. 10040, p. 1004008). International Society for Optics and Photonics.
- [11] Gao, S., **Garcia, M.**, Edmiston, C., York, T., Marinov, R., Mondal, S. B., ... & Liang, R. (2016, April). A compact bio-inspired visible/NIR imager for image-guided surgery (Conference Presentation). In *Molecular-Guided Surgery: Molecules, Devices, and Applications II* (Vol. 9696, p. 96960A). International Society for Optics and Photonics.
- [12] **Garcia, M.**, Gao, S., Edmiston, C., York, T., & Gruev, V. (2015, May). A 1300x 800, 700 mW, 30 fps spectral polarization imager. In *Circuits and Systems (ISCAS), 2015 IEEE International Symposium on* (pp. 1106-1109). IEEE.

PATENT

Gruev, V. & **Garcia, M.** Snap shot multispectral imaging sensor. Patent filed and pending.

MEDIA COVERAGE OF MY WORK

- Inspired by the visual system of the mantis shrimp—among the most complex found in nature—we created a new type of camera that could greatly improve the ability of cars to spot hazards in challenging imaging conditions. You can read more about this work here: [Optical Society of America](#), [Interesting Engineering](#), [Science Daily](#), [Business Wire](#), [eeNews Europe](#), and others.
- We developed a bioinspired multispectral imaging sensor and clinically translated it in the operating room to assist during surgeries on patients with breast cancer. You can read more about this work here: [Fox News](#), [CNET](#), [Business Wire](#), [Science Daily](#), [Optical Society of America](#), [eHealthNews](#), [Express](#), [Daily Mail](#), [The Engineer](#), and others
- By mimicking the eye of the mantis shrimp, we have developed an ultra-sensitive camera capable of sensing both color and polarization. The work was covered by: [Discovery Channel](#), [Photonics Online](#), [Phys.org](#), [The Engineer](#), [Optics and Photonics](#), and others.

SERVICE

Reviewer

2019 | Biomedical Optics Express
2017 – 2018 | Optical Society of America A
2017 | IEEE Sensors Journal
2016 – 2017 | IEEE ISCAS
2016 | Journal of Modern Optics
2016 | NGCAS
2016 | TBioCAS

Washington U. in St. Louis CSE Department

Representative

2015 – 2016 | Graduate Council
2014 – 2015 | Graduate Student Association

Professional Membership

Institute of Electrical and Electronics Engineers (IEEE)

Advancing Chicanos/Hispanics & Native Americans in Science (SACNAS)

Student groups & Volunteering

SACNAS U. of Illinois at Urbana-Champaign Chapter | Outreach coordinator,
Cena y Ciencias | Outreach coordinator