Andrés Marrugo

Curriculum Vitæ

Parque tecnológico Carlos Vélez Pombo
Km 1. Vía Turbaco, Cartagena (Colombia)
✆ *(57)-314-559-1212*
☎ *(57)-653-5200 ext. 306*
✉ *agmarrugo@utb.edu.co*
🖥 *opilab.utb.edu.co*

Personal Information

Full Name:	Andrés Guillermo Marrugo Hernández
Passport No.:	AS246474
Gender:	Male
Nationality:	Colombian
Birth Date:	October 28th, 1984.
Place of birth:	Cartagena, Colombia.
Marital status:	Married.
ORCID:	orcid.org/0000-0003-2413-7645

Education

2008-2013 **Ph.D. in Optical Engineering**, *Universidad Politécnica de Cataluña*, Barcelona, Spain, *Cum laude.*
Thesis title: "Retinal image analysis: image processing and feature extraction."

2008-2009 **M.Sc. in Photonics**, *Universidad Politécnica de Cataluña*, Barcelona, Spain, *9.8/10.*
Thesis title: "Image analysis algorithms for feature extraction in eye fundus images"

2003-2008 **B.E. in Mechatronics Engineering**, *Universidad Tecnológica de Bolívar*, Cartagena, Colombia, *5.0/5.0.*
Thesis title: "Guava fruit ripening optic inspection system by means of digital image analysis"

Awards and Scholarships

2012 Honors Diploma: Young Researchers, Spanish Optical Society.

2009 FPU doctoral scholarship, Spanish Ministerio de Educación.

2008 Laureate Undergraduate Thesis, Universidad Tecnológica de Bolívar.

2008 Egresado de Honor: Premio Alcatraz de Oro, Universidad Tecnológica de Bolívar.

2008 Summa Cum Laude, Universidad Tecnológica de Bolívar.

Experience

Jan 2016 – present **Associate Professor**, *Faculty of Engineering*, Universidad Tecnológica de Bolívar, Colombia.

Jan 2014 – Dec 2015 **Assistant Professor**, *Faculty of Engineering*, Universidad Tecnológica de Bolívar, Colombia.

May 2013 – Dec 2013 **Assistant Professor**, *Faculty of Basic Sciences*, Universidad Tecnológica de Bolívar, Colombia.

Sep 2008 – Feb 2013 **Research Assistant**, *Grupo de Óptica Aplicada y Procesado de Imagen*, Universitat Politècnica de Catalunya, Spain.

Jul 2007 – Dec 2007 **Research Assistant - Intern**, *Grupo de Química Cuántica y Teórica*, Universidad de Cartagena, Colombia.

Jan 2005 – May 2007 **Teacher Assistant**, *Physics Department*, Universidad Tecnológica de Bolívar, Colombia.

Participation in R+D projects

Sep 2018 – Jun 2019 **Sistema de imagen médica multimodal 3D mediante proyección de franjas y ultrasonido**, funded by Universidad Tecnológica de Bolívar (Colombia). **Principal Investigator.**

Jun 2017 – Mar 2018 **Fotogrametría 3D mediante vehículos aéreos no-tripulados para el análisis de drenajes pluviales**, funded by Universidad Tecnológica de Bolívar (Colombia).

May 2017 – Abr 2018 **Técnicas de Imagen ocular con incidencias en la práctica clínica**, funded by Centro de Cooperación y Desarrollo de la Universidad Politécnica de Cataluña (Spain).

Jul 2016 – Jul 2019 **Diseño y desarrollo de un dispositivo para el diagnóstico digital 3D de alergias mediante prueba cutánea**, funded by Colciencias (Colombia). Universidad Tecnológica de Bolívar, Universidad de Cartagena, Universidad Industrial de Santander. **Principal Investigator.**

Jul 2016 – Mar 2017 **Desarrollo de un dispositivo óptico de reconstrucción 3D para la medición de deformaciones en tuberías de oleoductos con abolladuras.**, funded by Universidad Tecnológica de Bolívar (Colombia). **Principal Investigator**.

Jul 2016 – May 2017 **Evaluación motora y comportamental del efecto antipsicótico de Cariprazina en el modelo animal Zebrafish.**, funded by Universidad Tecnológica de Bolívar (Colombia).

Jun 2014 – May 2017 **Sistemas de profundidad de foco extendida y lentes intraoculares multifocales para la salud visual**, funded by Ministerio de Economía y Competitividad (Spain). Universidad Politécnica de Cataluña.

Jan 2010 – Dec 2012 **Procesado de la información óptica con aplicaciones a la industria, la salud visual y la seguridad**, funded by Ministerio de Ciencia e Innovación (Spain), Plan Nacional de Diseño y Producción Industrial. Fondos FEDER, Universidad Politécnica de Cataluña.

Oct 2008 – Sep 2009 **Dispositivos y procesadores para la interacción avanzada entre sistemas de visión humana y visión artificial**, funded by Ministerio de Educación y Ciencia (MEC, convocatoria 2006, Spain), Plan Nacional de Diseño y Producción Industrial. Fondos FEDER, Universidad Politécnica de Cataluña.

Research Stays

May 2016 – Jun 2016 **Modelling retinal image quality**, *Department of Optics and Optometry*, Universidad Politécnica de Cataluña, Barcelona, España.

Apr 2016 – Apr 2016 **High-speed acquisition of melt spinning**, *Laboratorio de sólidos amorfos*, Universidad de Buenos Aires, Buenos Aires, Argentina.

May 2010 – Aug 2010 **Retinal image restoration**, *Image Processing Department*, Institute of Information Theory and Automation, Czech Academy of Science, Prague, Czech Republic.

Nov 2009 – Dec 2009 **Image quality estimation**, *Grupo de Modelado de Visión y Procesado de Imagen*, Instituto de Óptica, Consejo Superior de Investigaciónes Científicas, Madrid, Spain.

Academic Service and Community Outreach

Since I started my position at the Universidad Tecnológica de Bolívar in 2013, I have served in different academic committees in my department. I have been in the graduate advisory committee for the Master's degree for the past 3 years. I was the head of the scientific committee for the International Congress in Mechatronics Engineering held in Cartagena in 2014.

I am also a member of several scientific societies listed below, and a regular reviewer of scientific journals like, Journal of Electronic Imaging, Journal of Biomedical Optics, Optics Express, Transactions on Medical Imaging, Acta Ophthalmologica, Computers in Medicine and Biology, among others, as well as scientific conferences.

I have also served as an advisor for the ONDAS program in Colombia, in which K-12 students develop research projects with the aid of their teachers and advised by university professors.

Patents

Marrugo, A., Romero, L., Meneses, J. and Marrugo, J. (2018). Dispositivo y método de reconstrucción 3D para la medición de pápulas en la piel. Filed 18 jul 2018, Colombia NC2018/0007546, Patent Pending.

Publications

Books

Pagnola M, Useche J., Marrugo A. G. (co-editor) New Uses of Micro and Nanomaterials, IntechOpen, ISBN:978-1-78984-174-9, (2018).

Book chapters

Andres G. Marrugo, J. Pineda, L.A. Romero, R. Vargas, and J. Meneses, Fourier Transform Profilometry in LabVIEW, Digital Systems, Asadpour Vahid (Ed.), Publisher: IntechOpen, in press, DOI: dx.doi.org/10.5772/intechopen.78548, (2018)

M. Pagnola, J. Useche, Andrés G. Marrugo. Magnetic Materials by Melt Spinning Method, Structural Characterization, and Numerical Modeling, New Uses of Micro and Nanomaterials, Pagnola M, Useche J., Marrugo A.G. (Ed.), Publisher: IntechOpen, DOI: 10.5772/intechopen.77368, (2018).

Invited Technical Articles

Andrés G Marrugo, María S Millan, Gabriel Cristóbal, Salvador Gabarda, Michal Sorel, and Filip Sroubek. Toward computer-assisted diagnosis and telemedicine in ophthalmology. *SPIE Newsroom*, (doi: 10.1117/2.1201205.004256), 2012.

Journal Articles

Maria S Millan, Andrés G Marrugo, and Francisco Alba-Bueno. Quality Changes in Fundus Images of Pseudophakic Eyes. *Opt. Pura Apl.*, 51:In press, December 2018.

Jhacson Meza, Andrés G Marrugo, Enrique Sierra, Milton Guerrero, Jaime Meneses, and Lenny A Romero. A Structure-from-Motion Pipeline for Topographic Reconstructions Using Unmanned Aerial Vehicles and Open Source Software. *Communications in Computer and Information Science*, 885:213–225, 2018.

Raúl Vargas, Andrés G Marrugo, Jesus Pineda, Jaime Meneses, and Lenny A Romero. Camera-Projector Calibration Methods with Compensation of Geometric Distortions in Fringe Projection Profilometry: A Comparative Study. *Opt. Pura Apl.*, 51(3):50305:1–10, 2018.

E Sierra, Andrés G Marrugo, and María S Millan. Dust Particle Artifact Detection and Removal in Retinal Images. *Opt. Pura Apl.*, 50(4):379–387, December 2017.

Andrés G Marrugo and María S Millan. Retinal Image Analysis: Image Processing and Feature Extraction Oriented to the Clinical Task. *Opt. Pura Apl.*, 50(1):49–62, March 2017.

Andrés G Marrugo and María S Millan. Retinal Image Analysis Oriented to the Clinical Task. *Electronic Letters on Computer Vision and Image Analysis*, 13(2):54–55, 2014.

Andrés G Marrugo, María S Millán, Michal Sorel, and Filip Sroubek. Restoration of retinal images with space-variant blur. *Journal of Biomedical Optics*, 19(1):016023, 2014.

Andrés G Marrugo, María S Millan, Gabriel Cristóbal, Salvador Gabarda, and Héctor C Abril. Anisotropy-based robust focus measure for non-mydriatic retinal imaging. *Journal of Biomedical Optics*, 17(7):076021, 2012.

Andrés G Marrugo, Michal Sorel, Filip Sroubek, and María S Millan. Retinal image restoration by means of blind deconvolution. *Journal of Biomedical Optics*, 16(11):116016, Nov 2011.

Andrés G Marrugo and María S Millan. Retinal image analysis: preprocessing and feature extraction. *Journal of Physics: Conf. Series*, 274(1):012039, 2011.

Andrés G Marrugo and María S Millan. Optic disc segmentation in retinal images. *Opt. Pura Apl.*, 43(2):79–86, May 2010.

Ricardo Vivas-Reyes, Luz Mercado, Jorge Anaya-Gil, Andrés G Marrugo, and Emiliano Martinez. Theoretical study to evaluate polyfuran electrical conductivity and methylamine, methoxy substituent effects. *Journal of Molecular Structure: THEOCHEM*, 861(1-3):137–141, 2008.

Peer Reviewed Conference Proceedings

Enrique Sierra, Laura Clavé, Andrés G Marrugo, and María S Millan. Segmentación del disco óptico en imágenes del fondo de ojo mediante morfología matemática en color y contornos activos. In *XII Reunión Nacional de Óptica*, page 76, Castellón, Spain, July 2018.

Hernando Altamar-Mercado, Alberto Patiño-Vanegas, and Andrés G Marrugo. Adaptive Filtering of Interference Fringes by Polar Transformation and Empirical Mode Decomposition. In *Latin America Optics and Photonics Conference*, 2018.

Hernando Altamar-Mercado, Alberto Patiño-Vanegas, and Andrés G Marrugo. Microscopic Shape from Focus using White Light Interferometric Fringes. In *Imaging and Applied Optics 2018*, page JTu4A.19, Orlando, Florida, 2018. Optical Society of America.

Nelson Forero, Andrés G Marrugo, Raúl Vargas, Jesus Pineda, Jairo Useche, and Lenny A Romero. An Experimental Study on Deformation Analysis of an Indented Pipe via Fringe Projection Profilometry and Digital Image Correlation. In *Latin America Optics and Photonics Conference*, 2018.

Jesus Pineda, Jhacson Meza, Andrés G Marrugo, Raúl Vargas, and Lenny A Romero. A Particle Swarm Optimization Approach to Log-Gabor Filtering in Fourier Transform Profilometry. In *Latin America Optics and Photonics Conference*, 2018.

Raúl Vargas, Andrés G Marrugo, Jesus Pineda, Jaime Meneses, and Lenny A Romero. Evaluating the Influence of Camera and Projector Lens Distortion in 3D Reconstruction Quality for Fringe Projection Profilometry. In *Imaging and Applied Optics 2018*, page 3M3G.5, Orlando, Florida, 2018. Optical Society of America.

Andrés G Marrugo, E Sierra, and María S Millan. Dust Particle Detection and Correction in Retinal Images . In P Moraga and C Saavedra, editors, *RIAO-OPTILAS 2016*, page 268, Pucón, Chile, November 2016.

Andrés G Marrugo, M Barone, J Useche, and Marcelo Pagnola. Experimental investigation of High-Speed Melt Spinning by Means of Digital Image Analysis. In *Latin America Optics and Photonics Conference*, 2016.

Andrés G Marrugo, R Vargas, J Pineda, and Lenny A Romero. Background Intensity Removal in Fourier Transform Profilometry: A Comparative Study. In *Latin America Optics and Photonics Conference*, 2016.

Raúl Vargas, Jesus Pineda, Andrés G Marrugo, and Lenny A Romero. Background intensity removal in structured light three-dimensional reconstruction. In *2016 XXI Symposium on Signal Processing, Images and Artificial Vision (STSIVA*, pages 1–6. IEEE, 2016.

Andrés G Marrugo, María S Millan, Michal Sorel, Jan Kotera, and Filip Sroubek. Improving the blind restoration of retinal images by means of point-spread-function estimation assessment. In Eduardo Romero and Natasha Lepore, editors, *Tenth International Symposium on Medical Information Processing and Analysis*, page 92871D. SPIE, January 2015.

Andrés G Marrugo, María S Millan, and H C Abril. Implementation of an image based focusing algorithm for non-mydriatic retinal imaging. In *Engineering Mechatronics and Automation (CIIMA), 2014 III International Congress of*, Cartagena, Colombia, October 2014. IEEE.

W Marrugo, E Sierra, J Marrugo, C Camacho, L A Romero, and Andrés G Marrugo. A vision-based system for the dynamic measurement of in-plane displacements. In *Engineering Mechatronics and Automation (CIIMA), 2014 III International Congress of*. IEEE, October 2014.

Andrés G Marrugo, María S Millán, Sorel Michal, and Sroubek Filip. Blind restoration of retinal images degraded by space-variant blur with adaptive blur estimation. In *8th Ibero-American Conference on Optics 11th Latin-American Meeting on Optics, Lasers and Applications (RIAO)*, Porto, July 22–26 2013.

Andrés G Marrugo, María S Millan, Gabriel Cristóbal, Salvador Gabarda, Michal Sorel, and Filip Sroubek. Image analysis in modern ophthalmology: from acquisition to computer assisted diagnosis and telemedicine **Invited Paper**. In *SPIE Photonics Europe, Proceedings SPIE*, volume 8436, page 84360C, July 2012.

Andrés G Marrugo, María S Millan, and Héctor C Abril. Implementation of an Image Based Focusing Algorithm for Retinal Imaging. In *X Reunión Nacional de Óptica*, pages 40–43, Zaragoza, 2012.

Andrés G Marrugo, María S Millan, Gabriel Cristóbal, Salvador Gabarda, and H C Abril. No-reference Quality Metrics for Eye Fundus Imaging. *CAIP'11, Lecture Notes in Computer Science*, 6854:486–493, 2011.

Andrés G Marrugo, Filip Sroubek, Michal Sorel, and María S Millan. Multichannel blind deconvolution in eye fundus imaging. In *ISABEL '11-Proceedings of the 4th International Symposium on Applied Sciences in Biomedical and Communication Technologies*, pages 7:1–7:5. New York, NY, USA, 2011.

Andrés G Marrugo and María S Millan. Efectos de Compresión en Imágenes de la Retina Para la Evaluación del Riesgo Glaucomatoso. In *IX Reunión Nacional de Óptica*, page 140, Orense (Spain), September 2009.

Language Knowledge

Spanish:	Native
English:	Excellent (Toefl: 111/120)
French:	Basic (Delf A6)
Catalan:	Basic (A2)

Scientific Societies

- Sociedad Red Colombiana de Óptica (SRCO)
- Optical Society of America (OSA)
- International Society for Optics and Photonics (SPIE)
- Institute of Electrical and Electronics Engineers (IEEE)