

Carlos Hinojosa

PH.D. (C) COMPUTER SCIENCE

COMPUTER VISION · COMPUTATIONAL IMAGING · MACHINE LEARNING

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Education

Universidad Industrial de Santander

PH.D IN COMPUTER SCIENCE

- GPA: 4.58/5.0

Colombia

Aug 2017 - May 2022

Universidad Industrial de Santander

MASTER OF SCIENCE IN COMPUTER AND SYSTEM ENGINEERING

- GPA: 4.57/5.0

Colombia

Feb. 2016 - Apr. 2018

Universidad Industrial de Santander

BACHELOR OF SYSTEM ENGINEERING AND INFORMATICS

- GPA: 4.33/5.0

Colombia

Apr. 2011 - Dec. 2015

Research Work Experience

Stanford Vision and Learning LAB (SVL)

RESEARCH INTERNSHIP

- Conducted research in privacy-preserving optical system design to perform computer vision tasks.
- Developed an end-to-end privacy-preserving computer vision pipeline to perform human pose estimation.
- Developed an adversarial optimizing framework to perform robust privacy-preserving human action recognition.

Stanford University, USA

March 2020 - May 2022

High Dimensional Signal Processing (HDSP) Research Group

RESEARCHER

- Conducted and participated in different research projects. The research topics include Computer vision, Computational Imaging, Compressive Sensing, Compressive Spectral Imaging, and Image/Video Processing.

Colombia

March 2014 - May 2022

Universidad Industrial de Santander (UIS) - Ecopetrol

RESEARCH ENGINEER

- Designed an algorithm for the conversion of 3D RMS time velocities to 3D interval velocities in depth using Image rays.
- Implemented the designed algorithm using the NVIDIA Cuda parallel computing platform.
- Validated the algorithm using 3D real seismic image datasets.

Colombia

January 2019 - February 2020

MinCiencias

RESEARCHER

- Determined the distribution of pixels in a coded aperture responsible for saturation of a multispectral sensor and to analyze how these saturated compressed measures affect the reconstruction of the multispectral image.
- Identified the pixels of the coded aperture responsible for saturation in each of the pixels of the sensor used by analyzing the mathematical model of a compressive acquisition system of multispectral images.
- Designed and implemented an adaptive computational algorithm to generate grayscale coded apertures and reduce the saturation in the sensor of a compression acquisition system of multispectral images.
- Validated, the grayscale coded apertures generated by the developed algorithm, to analyze its impact on the dynamic range of multispectral image reconstructions.

Colombia

May 2017 - May 2018

HDSP Research Group | UIS - Ecopetrol

RESEARCHER

- Implemented the image ray method as a module for the DecisionSpace (DSG) software using the JAVA language.
- Designed and implemented an algorithm based on the fast marching method for time to depth conversion of seismic images.
- Implemented a full seismic images' time to depth conversion module for the SeisSpace ProMAX software.

Colombia

March 2016 - March 2017

CPS Research Group | UIS - Ecopetrol

RESEARCHER

- Researched in acquisition, design, modeling, and processing issues that support the 2D and 3D Seismic programs in the Ecopetrol research programs.

Colombia

April 2016 - August 2016

CPS Research Group

RESEARCH ASSISTANT

- Designed and implemented an algorithm for detecting and eliminating Ground Roll noise in Seismic Images using the Curvelet transform.
- Developed a module, in C/C++ programming language, for the SeisSpace ProMAX software that implements the developed algorithm.

Colombia

November 2014 - December 2015

JOURNAL ARTICLES [9]

- C-3SPCD: coded aperture similarity constrained design for spatio-spectral classification of single-pixel measurements**
 Carlos Hinojosa, Karen Sanchez, Hans Garcia, Henry Arguello
Appl. Opt. 61.8 (Mar. 2022) E21–E32. Optica Publishing Group
 DOI: 10.1364/AO.445326 2022
- CX-DaGAN: Domain Adaptation for Pneumonia Diagnosis on a Small Chest X-ray Dataset**
 Karen Sanchez, Carlos Hinojosa, Henry Arguello, Denis Kouamé, Olivier Meyrignac, Adrian Basarab
IEEE Transactions on Medical Imaging (June 2022). IEEE
 DOI: 10.1109/TMI.2022.3182168 2022
- A Fast and Accurate Similarity-Constrained Subspace Clustering Algorithm for Hyperspectral Image**
 Carlos Hinojosa, Esteban Vera, Henry Arguello
IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing 14 (2021) pp. 10773–10783
 DOI: 10.1109/JSTARS.2021.3120071 2021
- Hyperspectral image segmentation using 3D regularized subspace clustering model**
 Carlos A. Hinojosa, Fernando Rojas, Sergio Castillo, Henry Arguello
Journal of Applied Remote Sensing 15.1 (2021) pp. 1–17. SPIE
 DOI: 10.1117/1.JRS.15.016508 2021
- Efficient subspace clustering of hyperspectral images using similarity-constrained sampling**
 Jhon Lopez, Carlos Hinojosa, Henry Arguello
Journal of Applied Remote Sensing 15.3 (2021) pp. 1–16. SPIE
 DOI: 10.1117/1.JRS.15.036507 2021
- Adaptive grayscale compressive spectral imaging using optimal blue noise coding patterns**
 Nelson Diaz, Carlos Hinojosa, Henry Arguello
Optics & Laser Technology 117 (2019) pp. 147–157
 DOI: <https://doi.org/10.1016/j.optlastec.2019.03.038> 2019
- Supervised spatio-spectral classification of fused images using superpixels**
 Karen Sanchez, Carlos Hinojosa, Henry Arguello
Appl. Opt. 58.7 (2019) B9–B18. OSA
 DOI: 10.1364/AO.58.0000B9 2019
- Coded Aperture Design for Compressive Spectral Subspace Clustering**
 Carlos Hinojosa, Jorge Bacca, Henry Arguello
IEEE Journal of Selected Topics in Signal Processing 12.6 (2018) pp. 1589–1600
 DOI: 10.1109/JSTSP.2018.2878293 2018
- Multiple snapshot colored compressive spectral imager**
 Claudia V. Correa, Carlos A. A. Hinojosa, Gonzalo R. Arce, Henry Arguello Sr.
Optical Engineering 56.4 (2016) pp. 1–10. SPIE
 DOI: 10.1117/1.OE.56.4.041309 2016

CONFERENCE PROCEEDINGS [13]

- PrivHAR: Recognizing Human Actions From Privacy-preserving Lens**
 Carlos Hinojosa, Miguel Marquez, Henry Arguello, Ehsan Adeli, Li Fei-Fei, Juan Carlos Niebles
arXiv preprint arXiv:2206.03891 (2022) 2022
- Learning Privacy-Preserving Optics for Human Pose Estimation**
 Carlos Hinojosa, Juan Carlos Niebles, Henry Arguello
Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) 2021
- Fast Subspace Clustering Algorithm with Efficient Similarity-Constrained Sampling for Hyperspectral Images**
 Jhon Lopez, Carlos Hinojosa, Henry Arguello
2021 IEEE 31st International Workshop on Machine Learning for Signal Processing (MLSP)
 DOI: 10.1109/MLSP52302.2021.9596507 2021
- Subspace-based Domain Adaptation Using Similarity Constraints for Pneumonia Diagnosis within a Small Chest X-ray Image Dataset**
 Karen Sanchez, Carlos Hinojosa, Henry Arguello, Simon Freiss, Nicolas Sans, Denis Kouamé, Olivier Meyrignac, Adrian Basarab
2021 IEEE 18th International Symposium on Biomedical Imaging (ISBI)
 DOI: 10.1109/ISBI48211.2021.9434173 2021
- Compressed-domain Classification Algorithm for Spectral Imaging Based on Designed Single-Pixel Camera Codification**
 Karen Sanchez, Carlos Hinojosa, Hans Garcia, Henry Arguello, Sergio Castillo
OSA Imaging and Applied Optics Congress 2021 (3D, COSI, DH, ISA, pcAOP)
 DOI: 10.1364/COSI.2021.CTu2F.5 2021
- Accurate Deep Learning-based Gastrointestinal Disease Classification via Transfer Learning Strategy**
 Jessica Escobar, Karen Sanchez, Carlos Hinojosa, Henry Arguello, Sergio Castillo
2021 XXIII Symposium on Image, Signal Processing and Artificial Vision (STSIVA)
 DOI: 10.1109/STSIVA53688.2021.9591995 2020
- Single-Pixel Camera Sensing Matrix Design for Hierarchical Compressed Spectral Clustering**
 Carlos Hinojosa, Jorge Bacca, Edwin Vargas, Sergio Castillo, Henry Arguello
2019 IEEE 29th International Workshop on Machine Learning for Signal Processing (MLSP)
 DOI: 10.1109/MLSP.2019.8918856 2019

Spectral-Spatial Classification from Multi-Sensor Compressive Measurements Using Superpixels

Carlos Hinojosa, Juan Marcos Ramirez, Henry Arguello

2019 IEEE International Conference on Image Processing (ICIP)

DOI: 10.1109/ICIP.2019.8803266

2019

Spectral Imaging Subspace Clustering with 3-D Spatial Regularizer

Carlos A. Hinojosa, Jorge Bacca, Henry Arguello

Imaging and Applied Optics 2018 (3D, AO, AIO, COSI, DH, IS, LACSEA, LS&C, MATH, pcAOP)

DOI: 10.1364/3D.2018.JW5E.7

2018

Supervised Classification of Hyperspectral Images using Side Information

Karen Sanchez, Carlos Hinojosa, Henry Arguello

Imaging and Applied Optics 2018 (3D, AO, AIO, COSI, DH, IS, LACSEA, LS&C, MATH, pcAOP)

URL: <http://www.osapublishing.org/abstract.cfm?URI=COSI-2018-JW5E.5>

2018

Kernel Sparse Subspace Clustering with Total Variation Denoising for Hyperspectral Remote Sensing Images

Jorge Bacca, Carlos A. Hinojosa, Henry Arguello

Imaging and Applied Optics 2017 (3D, AIO, COSI, IS, MATH, pcAOP)

DOI: 10.1364/MATH.2017.MTu4C.5

2017

Compressive spectral imaging using multiple snapshot colored-mosaic detector measurements

Carlos A. Hinojosa, Claudia V. Correa, Henry Arguello, Gonzalo R. Arce

Computational Imaging

URL: <https://doi.org/10.1117/12.2224369>

2016

Analysis of Matrix Completion algorithms for spectral image estimation from compressive coded projections

Henry Arguello Fuentes, Hoover Rueda Chacón, Carlos Alberto Hinojosa Montero

2015 20th Symposium on Signal Processing, Images and Computer Vision (STSIVA)

DOI: 10.1109/STSIVA.2015.7330441

2015

Patents and Patent Applications

PENDING PATENTS [1]

Systems and Methods for Privacy Preserving Optical Systems

Carlos Hinojosa, Juan Carlos Niebles, Henry Arguello

US Patent App. 63/212,528, 2021

Teaching Experience

Universidad Industrial de Santander (UIS)

Colombia

ASSISTANT PROFESSOR

June 2016 - December 2016

- Taught computer programming using C and C++ languages.
- Single instructor. I taught 50 students distributed in two groups.

Engineering Work Experience

Universidad Industrial de Santander

Remote

RESEARCH/SOFTWARE ENGINEER - CONSULTANT

November 2021 - December 2021

- Consulted for developing a web-based platform for chronic wounds detection and segmentation in skin lesion medical images.

Universidad Industrial de Santander

Remote

SOFTWARE ENGINEER

June 2021 - December 2021

- Designed compressive seismic reconstruction algorithms and implemented them in Python programming language.
- Incorporated the implemented algorithms in a graphical user interface.

TIP - CISLAB

Remote

SOFTWARE ENGINEER

January 2021 - April 2021

- Implemented the image-ray-based 3D conversion algorithm in the DSG software using the development kit (SDK).
- Implemented the image-ray-based algorithm for converting RMS 3D velocities in the time domain to 3D interval velocities in depth using the SDK of DSG.

TIP - CISLAB

Remote

SOFTWARE ENGINEER

October 2020 - December 2020

- Developed user tests for the time-to-depth conversion (ImageRayTZ 2D) and interactive picking (IPickingTZ 2D) modules for DecisionSpace Geoscience (DSG).
- Developed a training workshop for Ecopetrol S.A users on geophysics concepts and software development for the DSG software using the software development kit (SDK).
- Tested the 3D time-to-depth conversion algorithm in a production environment.

Universidad Industrial de Santander

Remote

CONSULTANT

March 2020 - May 2020

- Designed and developed an algorithm for converting RMS 3D velocities in the time domain to 3D interval velocities in depth using the image-ray method.

- Developed a plugin in the Halliburton software DecisionSpace Geosciences (DSG) for 2D interactive picking in time and depth domains.
- Developed unit test cases for the 2D interactive picking plug-in in DecisionSpace Geoscience and elaborated a report.
- Developed a training workshop on the plug-in tool for Ecopetrol S.A users.
- Developed a technical document of the productive version of the 2D interactive picking plug-in.

Mentorship

2018-2019 **Jhon Lopez**, Undergraduate thesis, Universidad Industrial de Santander

Colombia

Honors & Awards

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| 2022 | Laureate Thesis Award , For my doctoral thesis titled "Efficient, Robust, And Similarity-constrained Algorithm For Subspace Learning And Clustering With Applications In Compressive Imaging" | Colombia |
| 2021 | ICCV2021 Oral Presentation , For the paper titled "Learning Privacy-preserving Optics for Human Pose Estimation", awarded to top (3%) 201 papers out of 6236 submissions in ICCV 2021. | ICCV 2021, USA |
| 2021 | Best Oral Poster Presentation , For outstanding presentation of submission entitled "Learning Privacy-preserving Optics for Human Pose Estimation" (Poster version), in the LXCV workshop at ICCV. | ICCV 2021, USA |
| 2017 | Young Researcher , Winner of the young researchers and innovators scholarship 2016, awarded by the administrative department of science, technology, and innovation (MinCiencias). | Colombia |
| 2016 | Academic Excellence as a Researcher , Distinction awarded by the high dimensional signal processing group (HDSP) of the Industrial University of Santander. | Colombia |

Technical Skills

Machine Learning Libraries	Pytorch, Tensorflow, Keras, Tensorlayer, PyTorch Lightning, OpenCV, Scipy, Scikit-learn, Pandas, MXNet
Programming Languages	Python, C/C++, C#, Java, MATLAB, R, Javascript (JS), Typescript, Bash
Cloud Computing Platform	Google Cloud, Amazon Web Services (AWS), Microsoft Azure
Parallel Computing Libraries	CUDA, OpenMP, OpenCL
Web & Hybrid Mobile Development	Angular JS, Ionic Framework, PhoneGap, Cordova, Node JS, HTML, PHP
OS Platform	Windows, Linux
Specialized Softwares	Halliburton DecisionSpace Geoscience (DSG)
Other Tools/Libraries	LaTeX

Invited Talks

Systems and Methods for Privacy-preserving Computer Vision (2021)

- Stanford Vision and Learning LAB (SVL) Research Group - Stanford University
- High Dimensional Signal Processing (HDSP) Research Group - Universidad Industrial de Santander

PrivHAR: Recognizing Human Actions From Privacy-preserving Lens (2022)

- Stanford Vision and Learning LAB (SVL) Research Group - Stanford University

Academic Services

Reviewer: CVPR, ICCV, TPAMI, TIP, TCI, IJRS, OPTICA (formerly OSA) journals.

Program Committee Chair in LatinX in CV (LXCV) Research workshop at ICCV 2021, CVPR 2022 and ECCV 2022.

Thesis committee member (evaluator) of two undergraduate thesis at Universidad Industrial de Santander.