

# David Güera

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## Research Interests

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Machine Learning, Image and Video Manipulation Detection, Image and Video Source Identification

## Education

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- **PhD Student, Electrical & Computer Engineering** Aug 2016 – Sep 2019  
(Expected)  
*Purdue University, West Lafayette, IN*
- **BSc Telecommunications Systems Engineering** Sep 2012 – Jul 2016  
*Polytechnic University of Catalonia (TelecomBCN), Barcelona, Spain*

## Experience

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- **Graduate Research Assistant** Aug 2016 – Present  
*VIPER Lab, Purdue University, West Lafayette, IN* - Advisor: Edward J. Delp  

Developed multiple machine learning approaches for image and video manipulation detection for the DARPA/MediFor project. This work has led to several winning entries in the NIST Media Forensics Challenges and has been featured on Purdue News: <http://bit.ly/detect-deepfakes>

Visiting Researcher at the Image and Sound Processing Laboratory (ISPLab) at Politecnico di Milano from January to March 2019.
- **Intern** May 2018 – Aug 2018  
*Google, Pixel Camera Team, Mountain View, CA*  

Redesigned the face-assisted AWB software pipeline to use an end-to-end machine learning approach, with a subsequent decrease in the estimated illuminant's error.
- **Deep Learning Research Intern** May 2017 – Aug 2017  
*NVIDIA, Metropolis Deep Learning Architecture Team, Santa Clara, CA*  

Increased average accuracy of image classification pipeline without additional training data by implementing a custom generative adversarial network (GAN).
- **Undergraduate Research Assistant** Feb 2016 – Jul 2016  
*VIPER Lab, Purdue University, West Lafayette, IN*  

Reduced logo recognition error rate by 80% using a novel CNN architecture with domain-specific data augmentation methods, leading to its deployment in a HP Labs project.
- **Undergraduate Research Assistant** Feb 2015 – Jul 2015  
*NanoSat Lab, UPC BarcelonaTech, Barcelona, Spain*  

Implemented real-time star tracking algorithms and prototyped the OBC-Payload communication driver for the CubeCat-2 nanosatellite.

## Key Competencies

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- **General Purpose Programming** – Python, Java, C/C++, HTML5, JavaScript, Bash
- **Libraries/Frameworks** – PyTorch, TensorFlow, Keras, Caffe, Numpy, OpenCV, Docker, MATLAB
- **OS/Management** – GNU/Linux, Mac, Windows, Git, LaTeX
- **Languages** – Catalan (Native), Spanish (Native), English (Proficiency), Italian (Beginner) and German (Beginner)
- **Courses** – Full Stack Deep Learning – UC Berkeley. Instructors: Pieter Abbeel, Sergey Karayev, Josh Tobin

## Honors and Professional Activities

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- Invited speaker at the AI Foundation. Title talk: *Fake It 'Til You Make It: Detecting Deepfakes and Manipulated Media*
- Invited speaker at the Information Science Technology Institutes' Seminar Series at Los Alamos National Laboratory. Title talk: *The Adversarial Landscape: Satellite Imagery Forgery Detection and Counter-Forensic CNNs*
- Chair of the Oral Session VII: Sensors and Security at the AVSS 2018 Conference
- Poster presenter at the Google Ph.D. Intern Research Conference (PIRC)
- Reviewer for the IEEE International Workshop on Information Forensics and Security (WIFS 2018)
- Reviewer for the European Signal Processing Conference (EUSIPCO 2018)
- Reviewer for the IEEE Transactions on Information Forensics and Security (TIFS)
- BSc - Graduated with honors (Ranked 2nd/60)

## Publications

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- [12] **"Locating Objects Without Bounding Boxes"**, J. Ribera, **D. Güera**, Y. Chen, E. J. Delp. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR - Oral)*, June 2019, Long Beach, CA.
- [11] **"Shadow Removal Detection And Localization For Forensics Analysis"**, S. K. Yarlagadda, **D. Güera**, D. Mas Montserrat, F. Zhu, P. Bestagini, S. Tubaro, E. J. Delp. *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2019, Brighton, UK.
- [10] **"Splicing Detection And Localization In Satellite Imagery Using Conditional GANs"**, E. R. Bartusiak, S. K. Yarlagadda, **D. Güera**, F. Zhu, P. Bestagini, S. Tubaro, E. J. Delp. *IEEE International Conference on Multimedia Information Processing and Retrieval (MIPR)*, March 2019, San Jose, CA.
- [9] **"Deepfake Video Detection Using Recurrent Neural Networks"**, **D. Güera**, E. J. Delp. *IEEE International Conference on Advanced Video and Signal-based Surveillance (AVSS)*, November 2018, Auckland, New Zealand.
- [8] **"Fooling PRNU-Based Detectors Through Convolutional Neural Networks"**, N. Bonettini, L. Bondi, **D. Güera**, S. Mandelli, P. Bestagini, S. Tubaro, E. J. Delp. *IEEE European Signal Processing Conference (EUSIPCO) - Special Session: Adversarial Multimedia Forensics*, September 2018, Rome, Italy.
- [7] **"Reliability Map Estimation for CNN-Based Camera Model Attribution"**, **D. Güera**, S. K. Yarlagadda, P. Bestagini, F. Zhu, S. Tubaro, E. J. Delp. *IEEE Winter Conference on Applications of Computer Vision (WACV)*, March 2018, Lake Tahoe, NV.
- [6] **"Satellite Image Forgery Detection and Localization Using GAN and One-Class Classifier"**, S. K. Yarlagadda, **D. Güera**, P. Bestagini, F. Zhu, S. Tubaro, E. J. Delp. *IS&T International Symposium on Electronic Imaging (EI)*, January 2018, Burlingame, CA.
- [5] **"Quality-adaptive Deep Learning for Pedestrian Detection"**, K. Tahboub, **D. Güera**, A. R. Reibman, E. J. Delp. *IEEE International Conference on Image Processing (ICIP)*, September 2017, Beijing, China.
- [4] **"A Counter-Forensic Method for CNN-Based Camera Model Identification"**, **D. Güera**, Y. Wang, L. Bondi, P. Bestagini, S. Tubaro, E. J. Delp. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Workshop on Media Forensics*, July 2017, Honolulu, HI.
- [3] **"Tampering Detection and Localization Through Clustering of Camera-Based CNN Features"**, L. Bondi, S. Lameri, **D. Güera**, P. Bestagini, E. J. Delp, S. Tubaro. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Workshop on Media Forensics*, July 2017, Honolulu, HI.
- [2] **"A Preliminary Study on Convolutional Neural Networks for Camera Model Identification"**, L. Bondi, **D. Güera**, L. Baroffio, P. Bestagini, E. J. Delp, S. Tubaro. *IS&T International Symposium on Electronic Imaging (EI)*, January 2017, Burlingame, CA.
- [1] **"First Steps Toward Camera Model Identification with Convolutional Neural Networks"**, L. Bondi, L. Baroffio, **D. Güera**, P. Bestagini, E. J. Delp, S. Tubaro. *IEEE Signal Processing Letters (SPL)*, December 2016.