

# William Robson Schwartz

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## Education


- 2005-2010 **Ph.D.** in Computer Science, University of Maryland, College Park (Advisor: Dr. Larry S. Davis)
- 2003-2005 **M.Sc.** in Computer Science, Federal University of Parana, Brazil (Advisor: Dr. Helio Pedrini)
- 1999-2003 **B.Sc.** in Computer Science, Federal University of Parana, Brazil

## Research & Professional Experience


- 2012- **Associate Professor** at the Federal University of Minas Gerais in the Computer Science Department
- 2010-2011 **Postdoctoral Researcher** at the University of Campinas in the Institute of Computing (Supervisor: Prof. Helio Pedrini)
- 2005-2010 **Research Assistant** at the University of Maryland, Department of Computer Science (Supervisor: Prof. Larry S. Davis)




## Publications

### Book











- 2007 | Pedrini, H. and Schwartz, W. R. (2007). *Análise de Imagens Digitais: Princípios, Algoritmos e Aplicações*. Editora Thomson Learning. **(selected among 10 finalists for the Jabuti Award 2008, category Exact Sciences, Technology and Informatics) (in Portuguese)** 

### Book Chapters











- 2014 | Schwartz, W. R. (2014). *Computer Vision: A Reference Guide*, chapter Appearance-Based Human Detection, pages 36–38. Springer US. 

- 2011 Gopalan, R., Schwartz, W. R., Chellappa, R., and Srivastava, A. (2011). *A Guide to Visual Analysis of Humans: Looking at People*, chapter Face Detection, pages 71–90. Springer. 
- 2005 Minetto, R., da Silva, R. D., Schwartz, W. R., and Pedrini, H. (2005a). *Séries em Ciências Geodésicas*, volume 5, chapter Abordagem Espectral para Segmentação de Imagens Baseada em Transformadas Wavelet e de Fourier, pages 204–218. Imprensa Universitária, Curitiba-PR (in Portuguese). 
- 2001 Schwartz, W. R. and Pedrini, H. (2001). *Séries em Ciências Geodésicas*, volume 1, chapter Análise de Visibilidade em Modelos Digitais de Terrenos, pages 333–345. Imprensa Universitária, Curitiba-PR (in Portuguese). 




## Journals


- 2018 da Silva Luz, E. J., Moreira, G. J. P., Oliveira, L. S., Schwartz, W. R., and Menotti, D. (2018). Learning Deep Off-the-Person Heart Biometrics Representations. *IEEE Transactions on Information Forensics and Security*, 13(5):1258–1270. 
- Jordao, A., Torres, L. A. B., and Schwartz, W. R. (2018b). Novel Approaches to Human Activity Recognition based on Accelerometer Data. *Signal, Image and Video Processing*, 12(7):1387–1394. 
- Prates, R. and Schwartz, W. R. (2018). Kernel Multiblock Partial Least Squares for a Scalable and Multicamera Person Reidentification System. *Journal of Electronic Imaging*, 27(3):1–33. 
- 2017 Colque, R. M., Caetano, C., Toledo, M., and Schwartz, W. R. (2017). Histograms of optical flow orientation and magnitude and entropy to detect anomalous events in videos. *IEEE Transactions on Circuits and Systems for Video Technology*, 27(3):673–682. 
- 2016 da S. Luz, E. J., Schwartz, W. R., Chavez, G. C., and Menotti, D. (2016). Ecg-based heart-beat classification for arrhythmia detection: A survey. *Computer Methods and Programs in Biomedicine*, 127:144–164. 
- Rodrigues, M. T. A. N., de Mesquita, D. B., Nascimento, E. R., and Schwartz, W. R. (2016). Change detection based on feature invariant to monotonic transforms and spatially constrained matching. *Journal of Electronic Imaging*, 25(1):1–10. 
- Caetano, C., Avila, S., Schwartz, W. R., Guimaraes, S. J. F., and de A. Araujo, A. (2016a). A mid-level video representation based on binary descriptors: A case study for pornography detection. *Neurocomputing*, 213:102–114. 
- dos Santos Jr., C. E., Kijak, E., Gravier, G., and Schwartz, W. R. (2016). Partial least squares for face hashing. *Neurocomputing*, 213:34–47. 
- Jr., A. C. N. and Schwartz, W. R. (2016). A scalable and flexible framework for smart video surveillance. *Computer Vision and Image Understanding*, 144(C):258–275. 
- Goncalves, G. R., da Silva, S. P. G., Menotti, D., and Schwartz, W. R. (2016a). Benchmark for license plate character segmentation. *Journal of Electronic Imaging*, 25(5):1–11. 


- 2015 Paiva, J., Schwartz, W. R., Pedrini, H., and Minghim, R. (2015). An Approach to Supporting Incremental Visual Data Classification. *IEEE Transactions on Visualization and Computer Graphics*, 21(1):4–17. [↗](#)
- de Paulo Carlos, G., Pedrini, H., and Schwartz, W. R. (2015). Classification schemes based on partial least squares for face identification. *Journal of Visual Communication and Image Representation*, 32:170–179. [↗](#)
- Hu, S., Choi, J., Chan, A. L., and Schwartz, W. R. (2015). Thermal-to-visible Face Recognition using Partial Least Squares. *Journal of the Optical Society of America A*, 32(3):431–442. [↗](#)
- da Silva, R. D., Schwartz, W. R., Pedrini, H., Pulido, J., and Hamann, B. (2015). A Topology-Based Approach to Computing Neighborhood-of-Interest Points Using the Morse Complex. *Journal of Visual Communication and Image Representation*, 30:299–311. [↗](#)
- Pinto, A., Pedrini, H., Schwartz, W. R., and A, R. (2015a). Face spoofing detection through visual codebooks of spectral temporal cubes. *IEEE Transactions on Image Processing*, 24(12):4726–4740. [↗](#)
- Pinto, A., Schwartz, W. R., Pedrini, H., and Rocha, A. R. (2015b). Using Visual Rhythms for Detecting Video-Based Facial Spoof Attacks. *IEEE Transactions on Information Forensics and Security*, 10(5):1025–1038. [↗](#)
- Menotti, D., Chiachia, G., Pinto, A., Schwartz, W. R., Pedrini, H., Falcao, A. X., and Rocha, A. (2015). Deep Representations for Iris, Face, and Fingerprint Spoofing Detection. *IEEE Transactions on Information Forensics and Security*, 10(4):864–879. [↗](#)
- 2014 Luz, E. J., Menotti, D., and Schwartz, W. R. (2014). Evaluating the use of ECG Signal in Low Frequencies as a Biometry. *Expert Systems with Applications*, 31:2309–2315. [↗](#)
- Valenzuela, R. E. G., Schwartz, W. R., and Pedrini, H. (2014). Linear Dimensionality Reduction Applied to Scale Invariant Feature Transformation and Speeded up Robust Feature Descriptors. *Journal of Electronic Imaging*, 23(3):033017. [↗](#)
- 2013 Prates, R. F., Camara-Chavez, G., Schwartz, W. R., and Menotti, D. (2013). Brazilian License Plate Detection Using Histogram of Oriented Gradients and Sliding Windows. *International Journal of Computer Science and Information Technology*, 5:39–52. [↗](#)
- Junior, C. S. and Schwartz, W. R. (2013). Detecção de Indivíduos não Registrados em Galerias de Faces. *Revista Eletrônica de Iniciação Científica*, 13:1–15 (in Portuguese). [↗](#)
- Schwartz, W. R., de Melo, V. H. C., Pedrini, H., and Davis, L. S. (2013). A Data-Driven Detection Optimization Framework. *Neurocomputing*, 104:35–49. [↗](#)
- de Siqueira, F. R., Schwartz, W. R., and Pedrini, H. (2013). Multi-Scale Gray Level Co-Occurrence Matrices for Texture Description. *Neurocomputing*, 120:336–345. [↗](#)
- Jr., P. R. C., dos Santos, M. C., Schwartz, W. R., and Pedrini, H. (2013). An Improved View Frustum Culling Method using Octrees for 3D Real-Time Rendering. *International Journal of Image and Graphics*, 13(3):9–30. [↗](#)


- de Lima, V., Schwartz, W. R., and Pedrini, H. (2013). 3D Searchless Fractal Video Encoding at Low Bit Rates. *Journal of Mathematical Imaging and Vision*, 45(3):239–250. 
- da Silva, R. D., Minetto, R., Schwartz, W. R., and Pedrini, H. (2013). Adaptive Edge-Preserving Image Denoising Using Wavelet Transforms. *Pattern Analysis and Applications*, 16(4):567–580. 
- 2012 Paiva, J. G., Schwartz, W. R., Pedrini, H., and Minghim, R. (2012). Semi-Supervised Dimensionality Reduction based on Partial Least Squares for Visual Analysis of High Dimensional Data. *Computer Graphics Forum*, 31(3):1345–1354. 
- Schwartz, W. R., Guo, H., Choi, J., and Davis, L. S. (2012). Face Identification Using Large Feature Sets. *IEEE Transactions on Image Processing*, 21(4):2245–2255. 
- Schwartz, W. R. and Pedrini, H. (2012). Evaluation of Feature Descriptors for Texture Classification. *Journal of Electronic Imaging*, 21(2):023016–1–023016–17. 
- 2011 Schwartz, W. R. and Pedrini, H. (2011). Improved Fractal Image Compression Based on Robust Feature Descriptors. *International Journal of Image and Graphics*, 11(4):571–587. 
- da Silva, R. D., Schwartz, W. R., Minghim, R., and Pedrini, H. (2011a). Construction of Triangle Meshes from Images at Multiple Scales. *Chilean Journal of Statistics*, 2(2):61–68. 
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- Schwartz, W. R. (2011). Human Detection Based on Large Feature Sets Using Graphics Processing Units. *Informatica*, 35(4):473–479. 
- 2001 Pedrini, H. and Schwartz, W. R. (2001a). Detection of Topographic Characteristics in Digital Images Approximated by Triangular Surfaces. *Image Processing and Communications Journal*, 7(3-4):25–34. 


## Conferences


- 2018 Nazare, A. C., Costa, F., and Schwartz, W. R. (2018). Content-Based Multi-Camera Video Alignment using Accelerometer Data. In *Advanced Video and Signal Based Surveillance (AVSS), 2018 15th IEEE International Conference on*, pages 1–6. 
- Reis, R. O., Dias, I. H., and Schwartz, W. R. (2018). Neural Network Control for Active Cameras using Master-slave Setup. In *International Conference on Advanced Video and Signal-based Surveillance (AVSS)*, pages 1–6. 
- Bastos, I. L. O., Melo, V. H. C., Gonçalves, G. R., and Schwartz, W. R. (2018). MORA: A Generative Approach to Extract Spatiotemporal Information Applied to Gesture Recognition. In *15th International Conference on Advanced Video and Signal-based Surveillance (AVSS)*, pages 1–6. 


Kloss, R. B., Jordao, A., and Schwartz, W. R. (2018). Face Verification: Strategies for Employing Deep Models. In *2018 13th IEEE International Conference on Automatic Face Gesture Recognition (FG 2018)*, pages 258–262. 


Sena, J., Santos, J. B., and Schwartz, W. R. (2018). Multiscale DCNN Ensemble Applied to Human Activity Recognition Based on Wearable Sensors. In *26th European Signal Processing Conference (EUSIPCO)*, pages 1202–1206. 


Sales, A. L. C., Vareto, R. H., Schwartz, W. R., and Chavez, G. C. (2018). Single-Shot Person Re-Identification Combining Similarity Metrics and Support Vectors. In *Conference on Graphic, Patterns and Images (SIBGRAPI)*, pages 1–8. 


de Melo, V. H. C., Santos, J. B., Caetano, C., Sena, J., Penatti, O. A. B., and Schwartz, W. R. (2018). Object-based Temporal Segment Relational Network for Activity Recognition. In *Conference on Graphic, Patterns and Images (SIBGRAPI)*, pages 1–8. 


Gonçalves, G. R., Diniz, M. A., Laroca, R., Menotti, D., and Schwartz, W. R. (2018). Real-time Automatic License Plate Recognition Through Deep Multi-Task Networks. In *Conference on Graphic, Patterns and Images (SIBGRAPI)*, pages 1–8. 

Laroca, R., Severo, E., Zanlorensi, L. A., Oliveira, L. S., Gonçalves, G. R., Schwartz, W. R., and Menotti, D. (2018). A Robust Real-Time Automatic License Plate Recognition Based on the YOLO Detector. In *2018 International Joint Conference on Neural Networks (IJCNN)*, pages 1–10. 


Caetano, C., dos Santos, J. A., and Schwartz, W. R. (2018). Statistical Measures from Co-occurrence of Codewords for Action Recognition. In *13th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP)*, pages 301–308. 


Colque, R. M., Caetano, C., de Melo, V. C., Chavez, G. C., and Schwartz, W. R. (2018). Novel Anomalous Event Detection based on Human-object Interactions. In *13th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP)*, pages 293–300. 














Jordao, A., Kloss, R., and Schwartz, W. R. (2018a). Latent HyperNet: Exploring the Layers of Convolutional Neural Networks. In *2018 International Joint Conference on Neural Networks (IJCNN)*, pages 1–7. 

Ferreira, G. S., Padua, F. L. C., Schwartz, W. R., and Rodrigues, M. T. A. N. (2018). Mapping Sports Interest with Social Network. In *XV Encontro Nacional de Inteligencia Artificial e Computacional (ENIAC)*, pages 1–12. 














2017


Vareto, R., Silva, S., Costa, F., and Schwartz, W. R. (2017a). Towards Open-Set Face Recognition using Hashing Functions. In *IEEE International Joint Conference on Biometrics (IJCB)*, pages 634–641. **(IAPR/IEEE Best Paper Runner-up Award)** 


Caetano, C., de Melo, V. H. C., dos Santos, J. A., and Schwartz, W. R. (2017). Activity Recognition based on a Magnitude-Orientation Stream Network. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 47–54. **(Best Computer Vision/Image Processing/Pattern Recognition Main Track Paper Award)** 


- Vareto, R. H., da Silva, S. S., de Oliveira Costa, F., and Schwartz, W. R. (2017b). Face Verification based on Relational Disparity Features and Partial Least Squares Models. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 209–215. 
- Bastos, I. L. O. and Schwartz, W. R. (2017). Assigning Relative Importance to Scene Elements. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 413–420. 
- Santos, A. B., d. A. Araujo, A., dos Santos, J. A., Schwartz, W. R., and Menotti, D. (2017). Combination techniques for hyperspectral image interpretation. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, pages 3648–3651. 
- de Lima, V., Moreira<sup>1</sup>, T. P., Pedrini<sup>1</sup>, H., and Schwartz, W. R. (2017). Fast Scalable Coding Based on a 3D Low Bit Rate Fractal Video Encoder. In *12th International Conference on Computer Vision Theory and Applications (VISAPP)*, pages 24–33. 
- Bastos, I. L. O., Soares, L. R., and Schwartz, W. R. (2017). Pyramidal Zernike Over Time: A spatiotemporal feature descriptor based on Zernike Moments. In *Iberoamerican Congress on Pattern Recognition (CIARP 2017)*, pages 77–85. 
- Peixoto, S., Goncalves, G., Bianchi, A., Brito, A. D. S., Schwartz, W. R., and Menotti, D. (2017). Noisy Character Recognition using Deep Convolutional Neural Networks. In *Iberoamerican Congress on Pattern Recognition (CIARP 2017)*, pages 499–507. 
- Kloss, R. B., Jordão, A., and Schwartz, W. R. (2017). Boosted Projection: An Ensemble of Transformation Models. In *22nd Iberoamerican Congress on Pattern Recognition (CIARP)*, pages 331–338. 
- 2016 Prates, R., Oliveira, M., and Schwartz, W. R. (2016). Kernel Partial Least Squares for Person Re-Identification. In *13th International Conference on Advanced Video and Signal-Based Surveillance (AVSS)*, pages 249–255. 
- de C. Prates, R. F., Dutra, C. R. S., and Schwartz, W. R. (2016). Predominant Color Name Indexing Structure for Person Re-Identification. In *IEEE International Conference on Image Processing (ICIP)*, pages 779–783. 
- Correia, A. J. L. and Schwartz, W. R. (2016). Oblique Random Forest based on Partial Least Squares Applied to Pedestrian Detection. In *IEEE International Conference on Image Processing (ICIP)*, pages 2931–2935. 
- Correia, A. J. L., de Souza Sena, J., and Schwartz, W. R. (2016). A Late Fusion Approach to Combine Multiple Pedestrian Detectors. In *23rd International Conference on Pattern Recognition (ICPR)*, pages 4250–4255. 
- Caetano, C., dos Santos, J. A., and Schwartz, W. R. (2016b). Optical Flow Co-occurrence Matrices: A Novel Spatiotemporal Feature Descriptor. In *23rd International Conference on Pattern Recognition (ICPR)*, pages 1947–1952. 
- Nogueira, K., Mura, M. D., Chanussot, J., Schwartz, W. R., and dos Santos, J. A. (2016). Learning to Semantically Segment High-Resolution Remote Sensing Images. In *23rd International Conference on Pattern Recognition (ICPR)*, pages 3566–3571. 





- Prates, R. F. and Schwartz, W. R. (2016). Kernel Hierarchical PCA for Person Re-Identification. In *23rd International Conference on Pattern Recognition (ICPR)*, pages 2091–2096. 
- Goncalves, G. R., Menotti, D., and Schwartz, W. R. (2016b). License Plate Recognition based on Temporal Redundancy. In *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, pages 2577–2582. 
- Vareto, R. H., Costa, F., and Schwartz, W. R. (2016). Face identification in large galleries. In *Workshop on Face Processing Applications*, pages 1–4. 
- 2015 Jr., C. E. S., Kijak, E., Gravier, G., and Schwartz, W. R. (2015b). Learning to hash faces using large feature vectors. In *Content-Based Multimedia Indexing (CBMI), 13th International Workshop on*, pages 1–6. 
- Kloss, R. B., Silva, S., Cirne, M. V. M., Pedrini, H., and Schwartz, W. R. (2015). Partial least squares image clustering. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 41–48. 
- Colque, R. V. H. M., Caetano, C., and Schwartz, W. R. (2015). Histograms of optical flow orientation and magnitude to detect anomalous events in videos. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 126–133. 
- Nogueira, K., Schwartz, W. R., and dos Santos, J. A. (2015). Coffee Crop Recognition Using Multi-scale Convolution Neural Networks. In *14th Iberoamerican Congress on Pattern Recognition (CIARP)*, pages 67–74. 
- dos Santos, C. E., Gravier, G., and Schwartz, W. R. (2015). Ssig and irisa at multimodal person discovery. In *Working Notes Proceedings of the MediaEval 2015 Workshop*, pages 1–3. 
- Pessoa, R. F., Schwartz, W. R., and dos Santos, J. A. (2015). A Study on Low-Cost Representations for Image Feature Extraction on Mobile Devices. In *14th Iberoamerican Congress on Pattern Recognition (CIARP)*, pages 424–431. 
- Peixoto, S., Gonçalves, G. R., Camara-Chavez, G., Schwartz, W. R., and Gomes, D. M. (2015). Brazilian License Plate Character Recognition using Deep Learning. In *Workshop em Visao Computacional (WVC)*, pages 1–5. 
- Correia, A. J. L., de Melo, V. H. C., and Schwartz, W. R. (2015). A Study of Filtering Approaches for Sliding Window Pedestrian Detection. In *Workshop em Visao Computacional (WVC)*, pages 1–8. 
- Rodrigues, M. T. A., Balbino, D., Nascimento, E. R., and Schwartz, W. R. (2015). A Non-Parametric Approach to Detect Changes in Aerial Images. In *14th Iberoamerican Congress on Pattern Recognition (CIARP)*, pages 116–124. 
- de C. Prates, R. F. and Schwartz, W. R. (2015b). CBRA: Color-Based Ranking Aggregation for Person Re-Identification. In *IEEE International Conference on Image Processing (ICIP)*, pages 1975–1979. 

Santos, A. B., Araujo, A. A., Schwartz, W. R., and Menotti, D. (2015). Hyperspectral Image Interpretation based on Partial Least Squares. In *IEEE International Conference on Image Processing (ICIP)*, pages 1885–1889. 


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Schwartz, W. R., de Rezende, P. J., and Pedrini, H. (2015). Faster Approximations of Shortest Geodesic Paths on Polyhedra Through Adaptive Priority Queue. In *10th International Conference on Computer Vision Theory and Applications (VISAPP)*, pages 371–378. 


Jr., A. C. N., Rodrigues, M. T., Melo, V. H., Correia, A. J. L., Goncalves, G. R., Nogueira, K., Caetano, C. A., Jr., E. F., dos Santos, J. A., and Schwartz, W. R. (2015a). A computational infrastructure model for research on computer vision. In *Brazilian e-Science Workshop*, pages 1–6. 


2014


de Melo, V. H. C., Leao, S., Menotti, D., and Schwartz, W. R. (2014). An Optimized Sliding Window Approach to Pedestrian Detection. In *IAPR International Conference on Pattern Recognition (ICPR)*, pages 4346–4351. 


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Jr., A. C. N., Ferreira, R., and Schwartz, W. R. (2014b). Scalable Feature Extraction for Visual Surveillance. In *Iberoamerican Congress on Pattern Recognition (CIARP)*, volume 8827 of *Lecture Notes in Computer Science*, pages 375–382. Springer International Publishing. 













Rodrigues, M., Milen, L., Nascimento, E., and Robson Schwartz, W. (2014). Change Detection based on Features Invariant to Monotonic Transforms and Spatial Constrained Matching. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 4334–4338. 




dos Santos Jr., C. E. and Schwartz, W. R. (2014). Extending Face Identification to Open-Set Face Recognition. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 188–195. 














Mora-Colque, R. V., Camara-Chavez, G., and Schwartz, W. R. (2014). Detection of Groups of People in Surveillance Videos Based on Spatio-Temporal Clues. In *Iberoamerican Congress on Pattern Recognition (CIARP)*, volume 8827 of *Lecture Notes in Computer Science*, pages 948–955. Springer International Publishing. 













Dutra, C. R. S., Rocha, M. C., and Schwartz, W. R. (2014). Person Re-Identification Based on Weighted Indexing Structures. In *Iberoamerican Congress on Pattern Recognition (CIARP)*, volume 8827 of *Lecture Notes in Computer Science*, pages 359–366. Springer International Publishing. 



















- Prates, R. C., Camara-Chavez, G., Schwartz, W. R., and Menotti, D. (2014). An Adaptive Vehicle License Plate Detection at Higher Matching Degree. In *Iberoamerican Congress on Pattern Recognition (CIARP)*, volume 8827 of *Lecture Notes in Computer Science*, pages 454–461. Springer International Publishing. 
- Silva, S., Schwartz, W. R., and Camara-Chavez, G. (2014). Spatial Pyramid Matching for Finger Spelling Recognition in Intensity Images. In *Iberoamerican Congress on Pattern Recognition (CIARP)*, volume 8827 of *Lecture Notes in Computer Science*, pages 629–636. Springer International Publishing. 
- Souza, J. S., Ferreira, C. A. M., Santos Junior, C., Melo, V. H. C., and Schwartz, W. R. (2014). Self-Organizing Traffic Lights: A Pedestrian Oriented Approach. In *Workshop de Visão Computacional (WVC)*, pages 1–6. 
- 2013 de Melo, V. H. C., Leao, S., Campos, M., Menotti, D., and Schwartz, W. R. (2013). Fast Pedestrian Detection based on a Partial Least Squares Cascade. In *IEEE International Conference on Image Processing (ICIP)*, pages 4146–4150. 
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- Dutra, C. R. S., Souza, T., Alves, R., Oliveira, L., and Schwartz, W. R. (2013). Re-identifying People based on Indexing Structure and Manifold Appearance Modeling. In *Conference on Graphics, Patterns and Images (SIBGRAPI)*, pages 218–225. 
- Chingovska, I., Yang, J., Lei, Z., Yi, D., Kahm, O., Glaser, C., Damer, N., Kuijper, A., Nouak, A., Komulainen, J., and S. Gupta, T. P., Khandelwal, S., Bansal, S., Rai, A., Krishna, T., Goyal, D., Waris, M. A., Zhang, H., Ahmad, I., Kiranyaz, S., and R. Tronci, M. G., Pili, M., Sirena, N., Roli, F., Galbally, J., Fierrez, J., Pinto, A., Pedrini, H., Schwartz, W. R., Rocha, A., Anjos, A., and Marcel, S. R. (2013). The 2nd Competition on Counter Measures to 2D Face Spoofing Attacks. In *International Conference on Biometrics*, pages 1–6. 
- Buzin, R. K. and Schwartz, W. R. (2013). Action Recognition Applied to Monitor Domestic Animals. In *IX Workshop de Visão Computacional*, pages 1–6. 
- Siqueira, F. R., Schwartz, W. R., and Pedrini, H. (2013). Adaptive Detection of Human Skin in Color Images. In *IX Workshop de Visão Computacional*, pages 1–6. 
- Estrela, B., Camara-Chavez, G., Campos, M. F. M., Schwartz, W. R., and Nascimento, E. R. (2013). Sign Language Recognition using Partial Least Squares and RGB-D Information. In *IX Workshop de Visão Computacional*, pages 1–6. 
- Melo, V. H. C., Leao, S., and Schwartz, W. R. (2013). Pedestrian Detection Optimization Based on Random Filtering. In *Workshop of Woks in Progress (WIP) in SIBGRAPI - Conference on Graphics, Patterns and Images*, pages 1–4. 
- Luz, E. J. S., Gomes, D. M., and Schwartz, W. R. (2013). Análise do Uso do Sinal de ECG em Baixas Frequências como Biometria. In *Workshop of Woks in Progress (WIP) in SIBGRAPI - Conference on Graphics, Patterns and Images*, pages 1–4 (in Portuguese). 

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## Patents

- 2018 **US 16/033,847** - Method and system for sensor data recognition using data enrichment for the learning process (pending).
- BR 10 2017 026251 0** - Metodo e Sistema de Reconhecimento de dados de sensor utilizando o enriquecimento de dados para o processo de aprendizagem (pending). (in Portuguese)

## Research Grants (Principal Investigator)

- 2019-2021 **Making Sense: Robust Approaches for Video Monitoring** - project sponsored by the Brazilian Research Agency (CNPq). This project mainly focus on developing and improving techniques for environment monitoring through visual data obtained from a surveillance cameras network.
- 2018-2020 **SMS: Surveillance Systems and Algorithms for Oil Extraction Platforms** - project developed in partnership with the Petroleo Brasileiro S/A (Brazilian oil company). This project aims at the development of smart surveillance algorithms to monitor workers in oil extraction platforms.
- 2017-2019 **ECV2: Knowledge Extraction on Visual Surveillance** - project sponsored by the Minas Gerais Research Agency (FAPEMIG) within the Minas Gerais State Researcher Program (PPM-XI).
- 2017-2019 **Video Analytics Solutions** - project developed in partnership with Maxtrack Inovation Company. This project aims at the development of algorithms based on computer vision and machine learning for video analytics considering Internet of Things (IoT) scenarios.
- 2016-2018 **HAR - Human Activity Recognition** - project developed in partnership with Samsung. This project focuses on the development of algorithms able to recognize human activities based on visual and sensor information.



2016-2016	<b>Keymaker - Human Activity Recognition based on Contextual Information</b> project developed in partnership with Hewlett-Packard. This project aims the development of new algorithms for activity recognition considering contextual information extracted from the environment.
2015-2019	<b>GigaFrames: Large Scale Approaches to Surveillance and Computer Forensics</b> - project sponsored by the Minas Gerais Research Agency (FAPEMIG). The goal of this project is the development of Computer Vision and Machine Learning techniques to monitor environments and analyze forensics data when vast amounts of data are captured through surveillance cameras.
2015-2017	<b>VER+: Robust and Efficient Methods for Surveillance</b> - project sponsored by the Minas Gerais Research Agency (FAPEMIG) within the Minas Gerais State Researcher Program (PPM-IX).
2014-2020	<b>DeepEyes: Visual Computing and Machine Learning Solutions for Computer Forensics and Electronic Surveillance</b> - project sponsored by the Brazilian Coordination for the Improvement of Higher Education Personnel (CAPES). This project aims at the development of visual computing and machine learning algorithms related to the computer forensics and surveillance.
2013-2015	<b>SmartView: Automatic Monitoring in Sport Competitions</b> - project sponsored by the Brazilian Research Agency (CNPq) and the Brazilian Ministry of Sports. This project's goal is help monitoring, and consequently, improve the safety of sports venues for sports fans.
2013-2016	<b>VER+: Robust and Efficient Methods for Surveillance</b> - project sponsored by the Brazilian Research Agency (CNPq). This project mainly focus on developing and improving techniques for environment monitoring through visual data obtained from a surveillance cameras network.
2013-2016	<b>DET: Efficient Pedestrian Detection Applied to Looking at People</b> - project sponsored by the Minas Gerais Research Agency (FAPEMIG). This project's goal is to propose methods for pedestrian detection with reduced computing cost but without trading off accuracy.
2012-2015	<b>ARDOP: Discriminative and Robust Approaches to Looking at People</b> - project sponsored by the Minas Gerais Research Agency (FAPEMIG). This project aims at solving problems related to people observation, focusing in robust and discriminative approaches to reduce inaccurate results so that high level problems can be solved.

Total in grants: BRL 7,640,642.00

## Fellowships

2017-2019	<b>Minas Gerais State Researcher</b> sponsored by the the Minas Gerais Research Agency (FAPEMIG)
2017-2019	<b>Productivity Fellowship (level 2)</b> sponsored by the Brazilian National Research Council (CNPq)

2015-2017	<b>Minas Gerais State Researcher</b> sponsored by the the Minas Gerais Research Agency (FAPEMIG)
2014-2017	<b>Productivity Fellowship (level 2)</b> sponsored by the Brazilian National Research Council (CNPq)
2005-2009	<b>Fulbright PhD. Fellowship</b> at the University of Maryland, Department of Computer Science (Advisor: Prof. Larry S. Davis)
2005	<b>CNPq Technical Fellowship</b> at the Federal University of Parana, Department of Computer Science (Supervisor: Prof. Helio Pedrini)
2003-2005	<b>CNPq MSc. Fellowship</b> at the Federal University of Parana, Department of Computer Science (Advisor: Prof. Helio Pedrini)
2000-2002	<b>CAPES Special Training Program Fellowship</b> at the Federal University of Parana, Department of Computer Science

## Professional Activities

### Professional and Academic Membership

Member of the IEEE, IEEE Computer Society, IEEE Signal Processing Society, and Brazilian Computer Science Society

### Academic Service

Program Chair, SIBGRAPI 2016  
 Program Chair, Brazilian Workshop on Computer Forensics 2014  
 Program Chair, Workshop on Theses and Dissertations 2014  
 Tutorial Chair, IEEE ICB 2019  
 Publicity Chair, IEEE IJCB 2017

### Conference/Workshop Reviewing

Reviewer, IEEE CVPR 2016, 2017, 2019  
 Reviewer, IEEE ICCV 2015, 2017  
 Reviewer, IEEE ECCV 2016, 2018  
 Reviewer, IEEE AVSS 2017  
 Reviewer, IEEE FG 2015, 2017  
 Reviewer, IEEE ICASSP 2015-2017  
 Reviewer, IEEE ICIP 2013-2018  
 Reviewer, IEEE WACV 2017  
 Reviewer, IAPR ICB 2016, 2018  
 Reviewer, IJCB 2017  
 Reviewer, IROS 2016  
 Reviewer, ISBA 2017, 2018  
 Reviewer, SIBGRAPI 2013, 2014, 2015, 2017, 2018  
 Program Committee, ACCV 2012, 2014, 2016  
 Program Committee, IEEE FG 2013, 2018

Program Committee, IEEE BTAS 2015, 2016  
Program Committee, Iberoamerican Congress on Pattern Recognition (CIARP) 2016, 2017, 2018  
Program Committee, Brazilian Workshop on Computer Vision (WVC) 2013-2018

### **Journal Reviewing**

Reviewer, IEEE Transactions on Information Forensics and Security  
Reviewer, IEEE Transactions on Image Processing  
Reviewer, IEEE Signal Processing Letters  
Reviewer, IEEE Transactions on Circuits and Systems for Video Technology  
Reviewer, Computer Vision and Image Understanding  
Reviewer, Journal of Mathematical Imaging and Vision  
Reviewer, Elsevier Pattern Recognition Letters  
Reviewer, Elsevier Pattern Recognition  
Reviewer, Elsevier Neurocomputing  
Reviewer, Elsevier Journal of Visual Communication and Image Representation  
Reviewer, EURASIP Journal on Image and Video Processing  
Reviewer, IET Computer Vision  
Reviewer, Journal of Computer Science and Technology

### **Editorships**

Associate Editor of IEEE Transactions on Information Forensics and Security, 2019 -  
Guest Editor, Elsevier Pattern Recognition Letters, Special Issue on Data Representation and Representation Learning for Video Analysis, 2018.

### **Proposal Review Panels**

Reviewer, Israel Science Foundation, 2016  
Reviewer, Brazilian National Research Council (CNPq) 2014-2018  
Reviewer, Sao Paulo State Research Foundation (FAPESP) 2014-2018  
Reviewer, Pernambuco State Research Foundation (FACEPE) 2015  
Reviewer, University of Sao Paulo/COFECUB 2012

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