

# Rogério Schmidt Feris

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## Current Position

- Full-time Research Staff Member at IBM T. J. Watson Research Center, New York
- Affiliate Assistant Professor, University of Washington

Research Area: Computer Vision for Intelligent Video Surveillance

## Education

**Ph.D. degree in Computer Science** 01/2002-08/2006

University of California, Santa Barbara. (GPA: 3.98/4.0)

Thesis title: Detection and analysis of depth discontinuities with lighting and viewpoint variation

Advisor: Dr. Matthew Turk

Thesis Committee: Steve Seitz, Ramesh Raskar, Tobias Hollerer, Yuan-Fang Wang and Matthew Turk

**M.S. degree in Computer Science** (GPA: 4.0/4.0) 03/1999-05/2001

University of Sao Paulo, Brazil

Thesis title: Efficient real-time face tracking in wavelet subspace  
(*Awarded thesis in nationwide competition*)

Advisor: Dr. Roberto Marcondes Cesar Jr.

**B.S. degree in Computer Engineering** (GPA: 9.4/10.0) 03/1994-12/1998

University of Rio Grande (FURG), Brazil

## Awards and Distinctions

- **IBM Emerging Leader in Multimedia** – I was among eight students selected from top universities by IBM - July 2005.
- **NSF Grant** – I co-wrote with my PhD advisor an NSF proposal on my thesis topic which was awarded funding - Detection and Analysis of Discontinuities in Computer Vision – Matthew Turk, Rogério Feris and Ramesh Raskar, 2005.
- **Best Computer Science MSc Thesis in Brazil – 2<sup>nd</sup> Prize, 2002** (*Nationwide Competition*). Award received at the Congress of Brazilian Computer Society

- Various Scholarships, including UCSB fellowship (PhD funding), FAPESP (MSc funding), CNPQ-PIBIC (undergraduate research scholarship).
- Undergraduate Scientific Awards - Software for Animation of Wave Spectrums in 3D (CIC'97 regional contest – 2<sup>nd</sup> prize) and Heuristic Search for Best Path Estimation (CRICTE'97 regional contest – 1<sup>st</sup> prize), 1997
- Nationwide Computer Science competition for high school students – 1<sup>st</sup> place in the regional phase with software for face sketching from witness descriptions, 1994.

## Professional Experience

**IBM Watson Research  
(Research Staff Member)**  
Hawthorne, NY  
September 2006 – present

Currently working on intelligent video analytics as part of the IBM Smart Surveillance Solution. Specific projects include: automatic people search in surveillance video, activity analysis, and near-field / far-field object classification.

**Affiliate Assistant  
Professor, University of  
Washington**  
July 2008 - present

As part of this affiliate faculty appointment, I am the co-advisor of Haowei Liu PhD thesis, which is related to unsupervised activity recognition in video surveillance (Electrical Engineering Department).

**Adjunct Professor  
Columbia University**  
Manhattan, NY  
January – May, 2008

I co-taught a graduate course E6998-007 “Automatic Video Surveillance” at Columbia University (Spring Semester, 2008)

**IBM Global Technology  
Services – 2008  
Assignment**

One-year assignment to IBM Global Technology Services, with the goal of helping the commercialization of the IBM Smart Surveillance Solution.

**IBM Watson Research  
(Internship)**  
Hawthorne, NY  
June - September, 2005

*Research intern with Yingli Tian and Arun Hampapur*  
Worked on multi-view face detection for surveillance (PeopleVision project) and for assisting soldiers with wearable cameras (EC-ASSIST project, involving MIT, Georgia Tech, IBM and UC-Irvine). Developed a new method for general object detection using wavelet networks and Adaboost learning.

**Mitsubishi Electric  
Research Labs**  
Cambridge, MA  
June – September, 2003 /  
January 2004

*Research intern with Ramesh Raskar*  
Worked on finding depth discontinuities in real-world scenes (using multi-flash imaging) and gradient domain methods for non-photorealistic rendering.

**Microsoft Research**  
San Francisco CA  
June – September, 2001

*Research intern with Jim Gemmell / Kentaro Toyama*  
Worked with computer vision and graphics in a gaze-aware videoconferencing system. Developed a new method for facial feature localization using hierarchical wavelet networks.

**Final Evaluation:** Consistently exceeds all position requirements and expectations. Accomplishments are highly valued and may be well beyond the scope of the position. Demonstrates higher standards of performance excellence relative to individuals with comparable levels of responsibility.

## Publications

### *Journal and Book Chapter Publications*

- R. S. Feris, R. Raskar, L. Chen, K. Tan and M. Turk. “Multi-Flash Stereopsis: Depth Edge Preserving Stereo with Small Baseline Illumination”. *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, vol. 30, no. 1, pp. 147-159, 2008.
- Y. Tian, A. Hampapur, L. Brown, R. S. Feris, M. Lu, A. Senior, C. Shu and Y. Zhai. “Event Detection, Query, and Retrieval for Video Surveillance”. *Artificial Intelligence for Maximizing Content Based Image Retrieval*, 2008. (**Book Chapter**).
- Y. Zana, R. Cesar, R. S. Feris and M. Turk. “Local Approach for Face Verification in Polar Frequency Domain”. *Image and Vision Computing Journal*, vol. 24, no. 8, pp. 904-913, 2006.
- R. S. Feris, M. Turk, R. Raskar and K. Tan. “Specular Highlights Detection and Reduction with Multi-Flash Photography”. *International Journal of the Brazilian Computer Society*, vol. 1, no. 12, pp. 35-42, 2006.
- Y. Chang, C. Hu, R. S. Feris and M. Turk. “Manifold-Based Analysis of Facial Expressions”. *Image and Vision Computing Journal*, vol. 24, no. 6, pp. 605-614, 2006.
- R. S. Feris, M. Turk, R. Raskar, K. Tan and G. Ohashi. “Recognition of Isolated Fingerspelling Gestures Using Depth Edges”. B. Kisacanin, V. Pavlovic and T. Huang (eds.), *Real-time Vision for Human-Computer Interaction*, Springer-Verlag, 2005. (**Book Chapter**)
- R. Raskar, K. Tan, R. S. Feris, J. Kobler, J. Yu and M. Turk. “Harnessing Real-World Depth Edges with Multi-Flash Imaging”. *IEEE Computer Graphics and Applications (IEEE CG&A)*, vol. 25, no. 1, pp. 32-38, January 2005.

- R. S. Feris, V. Krueger and R. Cesar. “A Wavelet Subspace Method for Real-time Face Tracking”. *Journal of Real-time Imaging*, vol. 10, pp. 339-350, 2004.
- R. Raskar, K. Tan, R. S. Feris, J. Yu and M. Turk. “Non-photorealistic Camera: Depth Edge Detection and Stylized Rendering using Multi-Flash Imaging”. *ACM Transactions on Graphics (SIGGRAPH 2004)*, Vol. 23, Issue 3, August 2004. Also accepted in SIGGRAPH Emergent Technologies, 2004

### *Conference Publications*

- R. S. Feris, Y. Tian, Y. Zhai and A. Hampapur. “Facial Image Analysis Using Local Feature Adaptation Prior to Learning” *IEEE International Conference on Automatic Face and Gesture Recognition*, Amsterdam, Netherlands, 2008.
- Y. Tian, R. S. Feris and A. Hampapur, “Real Time Detection of Abandoned and Removed Objects in Complex Environments”. *IEEE International Workshop on Visual Surveillance*, 2008 (in conjunction with ECCV 2008).
- D. Vaquero, R. S. Feris, M. Turk and R. Raskar. “Characterizing the Shadow Space of Camera-Light Pairs”. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR’08)*, Anchorage, Alaska, June 2008.
- L. Chen, R. S. Feris, Y. Zhai, L. Brown and A. Hampapur. “An Integrated System for Moving Object Classification in Surveillance Videos”, *IEEE International Conference on Advanced Video and Signal-Based Surveillance*, Santa Fe, New Mexico, September 2008.
- L. Chen, R. S. Feris and M. Turk. “Efficient Partial Shape Matching Using the Smith-Waterman Algorithm”. *CVPR Workshop on Non-Rigid Shape Analysis and Deformable Image Alignment*, Anchorage, Alaska, June 2008.
- A. Hampapur, L. Brown, R. S. Feris, A. Senior, C. Shu, Y. Tian, Y. Zhai and M. Lu, “Searching Surveillance Video”. *IEEE International Conference on Advanced Video and Signal-Based Surveillance*, London, UK, September 2007.
- A. Senior, L. Brown, A. Hampapur, C. Shu, Y. Zhai, R. S. Feris, Y. Tian, S. Borger and C. Carlson, “Video Analytics for Retail: the IBM Smart Surveillance Retail Solution”. *IEEE International Conference on Advanced Video and Signal-Based Surveillance*, London, UK, September 2007.
- R. S. Feris, Y. Tian and A. Hampapur. “Capturing People in Surveillance Video”. *IEEE International Workshop on Visual Surveillance*, 2007.
- R. S. Feris, R. Raskar and M. Turk. “Dealing with Multi-scale Depth Changes and Motion in Depth Edge Detection”. *Proceedings of SIBGRAPI’06 Brazilian Symposium on Computer Graphics and Image Processing*, Manaus, Brazil, October 2006. IEEE Computer Society press. **Awarded "One of the Best Image Processing and Computer Vision Papers"**

- H. Guan, J. Chang, L. Chen, R. Feris, and M. Turk. “Multi-view Appearance-based 3D Hand Pose Estimation”. IEEE Workshop on Vision for Human Computer Interaction (in conjunction with CVPR’06), New York, NY, June 2006.
- H. Guan, R. S. Feris and M. Turk. “The Isometric Self-Organizing Map for Hand Pose Estimation”. International Conference on Face and Gesture Recognition, Southampton, UK, 2006.
- R. S. Feris, L. Chen, M. Turk, R. Raskar and K. Tan. “Discontinuity Preserving Stereo with Small Baseline Multi-Flash Illumination”. International Conference on Computer Vision (ICCV’05), - **oral presentation** (4% acceptance), Beijing, China, 2005.
- Y. Zana, R. Cesar, R. S. Feris and M. Turk. “Face Verification in Polar Frequency Domain: a Biologically Motivated Approach”. International Symposium on Visual Computing, Lake Tahoe, NV, 2005.
- R. S. Feris, R. Raskar, K. Tan and M. Turk. “Specular Reflection Reduction with Multi-Flash Imaging”. Proceedings of SIBGRAPI’04 Brazilian Symposium on Computer Graphics and Image Processing, Curitiba, Brazil, October 2004. IEEE Computer Society press – also accepted as a poster in SIGGRAPH 2004.
- R. S. Feris, M. Turk, R. Raskar, K. Tan and G. Ohashi. “Exploiting Depth Discontinuities for Vision-based Fingerspelling Recognition”. IEEE Workshop on Real-Time Vision for Human-Computer Interaction (in conjunction with CVPR’04), Washington DC, USA, June 2004
- K. Tan, J. Kobler, R. S. Feris, P. Dietz and R. Raskar. “Shape Enhanced Surgical Visualizations and Medical Illustrations with Multi-flash Imaging”. International Conference on Medical Imaging Computing and Computer Assisted Intervention (MICCAI’04), Rennes, France 2004.
- C. Hu, Y. Chang, R. S. Feris and M. Turk. “Manifold Based Analysis of Facial Expression”. IEEE Workshop on Face Processing in Video (in conjunction with CVPR’04), Washington DC, USA, June 2004.
- C. Hu, R. S. Feris and M. Turk. “Real-time View-Based Face Alignment Using Active Wavelet Networks”. Workshop on Analysis and Modeling of Faces and Gestures (in conjunction with ICCV’03), Nice, France, October 2003.
- C. Hu, R. S. Feris and M. Turk. “Active Wavelet Networks for Face Alignment”. In Proceedings of British Machine Vision Conference, Norwich, 2003.
- M. Turk, C. Hu, R. S. Feris, F. Lashkari and A. Beall. “TLA Based Face Tracking”. In Proceedings of the 15<sup>th</sup> International Conference on Vision Interfaces, Calgary, Canada, 2002.
- R. S. Feris, J. Gemmell, K. Toyama and V. Krueger. “Hierarchical Wavelet Networks for Facial Feature Localization”. International Conference on Automatic Face and Gesture Recognition, Washington D.C., USA, May 20-21, 2002.

- R. S. Feris, V. Krueger and R. M. Cesar Jr. “Efficient Real-Time Face Tracking in Wavelet Subspace”. Workshop on Recognition, Analysis and Tracking of Faces and Gestures in Real-Time Systems (in conjunction with ICCV’01), Vancouver, BC, 2001.
- R. S. Feris and R. M. Cesar Jr. “Locating and Tracking Facial Landmarks Using Gabor Wavelet Networks”. Lecture Notes in Computer Science, vol. 2013, pp. 311-320. ICAPR’2001 International Conference on Advances in Pattern Recognition, Rio de Janeiro, Brazil, May 2001. The International Association for Pattern Recognition, Springer-Verlag press.
- V. Krueger and R. Feris. “Wavelet Subspace Method for Real-time Face Tracking. Proc. Pattern Recognition”, 23<sup>rd</sup> DAGM Symposium, Munich, Germany 2001.
- R. S. Feris, T. E. Campos and R. M. Cesar Jr. “A Project for Face Recognition from Video Sequences Using GWN and Eigenfeature Selection”. In Proceedings of WAICV’2000 Workshop in Artificial Intelligence and Computer Vision, pp. 141-145, Atibaia, Brazil, November 2000.
- R. S. Feris and R. M. Cesar Jr. “Tracking Facial Features Using Gabor Wavelet Networks”. In Proceedings of SIBGRAPI’2000 Brazilian Symposium on Computer Graphics and Image Processing, pp. 22-27, Gramado, Brazil, October 2000. IEEE Computer Society press.
- T. E. Campos, R. S. Feris, R. M. Cesar Jr. “Improved Face versus Non-Face Discrimination Using Fourier Descriptors through Feature Selection”. In Proc. of SIBGRAPI’2000 Brazilian Symposium on Computer Graphics and Image Processing, pp. 28-35, Gramado, Brazil, October 2000. IEEE Computer Society press.
- R. S. Feris, T. E. Campos, R. M. Cesar Jr. “Detection and Tracking of Facial Features in Video Sequences”. Lecture Notes on Artificial Intelligence, vol. 1793, pp. 127-135. Proc. MICAI-2000, Acapulco, Mexico, April 2000. Springer-Verlag press.
- T. E. Campos, R. S. Feris, R. M. Cesar Jr. “Eigenfaces versus Eigeneyes: First Steps Towards Performance Assessment of Representations for Face Recognition”. Lecture Notes on Artificial Intelligence, vol. 1793, pp. 193-201. Proceedings of MICAI-2000, Acapulco, Mexico, April 2000. Springer-Verlag press.
- R. S. Feris, W. F. Lages. “Stereo Image Matching Using Correlation and Relaxation Labeling”. IV Congress for Scientific Initiation and Postgraduation at Aeronautics Institute of Technology, pp. 193-199, Sao Jose dos Campos-SP, Brazil, October 1998 (in portuguese).

### ***Theses and Reports***

- R. S. Feris. “Detection and Analysis of Depth Discontinuities with Lighting and Viewpoint Variation”, PhD thesis, University of California, Santa Barbara, 2006.
- R. S. Feris, J. Gemmell, K. Toyama and V. Krueger. “Facial Feature Detection using

a Hierarchical Wavelet Face Database”. Microsoft Research Technical Report MSR-TR-2002-05, January 2002.

- R. S. Feris, R. Cesar Jr. “Efficient Real-time Face Tracking in Wavelet Subspace”. MSc. thesis, University of Sao Paulo, May 2001. **Awarded as the Second Best Computer Science MSc. Thesis in Brazil (Nationwide Competition, 2002)**

### *Demos and Posters*

- A. Agrawal, V. Branzoi, R. Chellappa, R. S. Feris, R. Raskar, K. Tan and M. Turk. “Depth Edges in Real-Time Using a Multi-Flash Camera”. CVPR DEMO, 2005
- R. Raskar, K. Tan, R. S. Feris, J. Yu and M. Turk. “Non-photorealistic Camera: Automatic Stylization with Multi-Flash Imaging”. SIGGRAPH Emergent Technologies, 2004.
- R. S. Feris, R. Raskar, K. Tan and M. Turk. “Specular Reflection Reduction Using a Multi-Flash Camera”. To appear as a SIGGRAPH poster, 2004.

### **Patents and Disclosures**

- A. Hampapur, R. S. Feris, “System and Method for Searching People in Video Images Based on Physical Attributes”, Disclosure filed with IBM Watson Research Center, April 2008.
- R. S. Feris, L. Chen, Y. Zhai, L. Brown, “System and Method for Visual Object Classification with Calibration”, Disclosure filed with IBM Watson Research Center, February 2008.
- Y. Tian, R. S. Feris, M. Lu, A. Hampapur, “Detection of Abandoned and Removed Objects in a Video Stream”, US Patent Pending, 2008.
- Y. Tian, R. S. Feris, M. Lu, A. Hampapur, “Real-time Processing of Video Frames for Triggering an Alert Related Application”, US Patent Pending, 2008.
- R. S. Feris, Y. Tian and A. Hampapur, “Rule-Based Combination of a Hierarchy of Classifiers for Smart Surveillance”, US Patent Pending, 2007.
- R. S. Feris, Y. Tian and A. Hampapur, “Efficient Training Method and Accurate Object Detection System Based on Learning Style and Content Features”, US Patent Pending, 2007.
- R. Raskar, K. Tan and R. S. Feris, “Stylized Rendering Using a Multi-Flash Camera”. Filed with Mitsubishi Electric Research Labs, US Patent pending, Application Number 10/847, May 2004.

## Teaching Experience

### **Adjunct Professor, Columbia University**

- Automatic Video Surveillance, Spring 2008 (Graduate Course)

### **Teaching Assistant, UC-Santa Barbara**

- Introduction to Computer Vision, 2002
- Advanced Computer Graphics, 2002 (Graduate Course)
- Introduction to Artificial Intelligence, 2002

**Guest Lecturer** for Artificial Intelligence (2002) and 3D User Interfaces (2005)

## Professional Activities

- Program Committee Member:
  - 2007 – CVPR, ICCV, and ACCV
  - 2008 – ECCV, AVSS
- Reviewer for major conferences and journals in computer vision/graphics, including ACM SIGGRAPH, IEEE Transactions on PAMI, Pattern Recognition Letters, IVC Journal, CVIU Journal, CVPR, ICCV, Face and Gesture Recognition, Eurographics, ISMAR, and others.
- Member of committee for selection of the best paper award – International Conference in Image Processing (ICIP 2008)

Associate Member of the IEEE and ACM

## Management

- Duan Tran (PhD Student, UIUC) – Project: Large Scale Object Classification. IBM Research Intern. Summer and Fall 2008.
- Haowei Liu (PhD Student, UW) – Project: Activity Analysis. IBM Research/GTS Intern. Summer and Fall 2008.
- Daniel Vaquero (PhD Student, UCSB) – Project: People Search. IBM Research/GTS Intern. Summer and Fall 2008.
- Anil Kongara (MS Student. U. Houston) – Project: Cognitec Face Recognition Integration. IBM Developer Intern. Summer and Fall 2008.
- Longbin Chen (PhD Student, UCSB) – Far-field Object Classification, Structured Learning for Shape Classification. IBM Research Intern - Fall and Winter 2007.
- Lisa Capetola and Blanca Cambi (College Interns) – Data Collection for Learning Classifiers, 2007 - 2008.

## Invited Talks

- Person Identification through Search Based on Physical Attributes. IBM Conference on Maturing and Leveraging Biometrics Analytics, 2008.
- The IBM Smart Surveillance System. **University of Washington**, 2007. Host: Linda Shapiro
- Computer Vision for Digital Photography and Smart Surveillance. **Princeton University**, 2007. Host: Fei-Fei Li
- Multi-Flash Photography and Applications. **Kodak Research**, Intelligent Systems Lab, Rochester, NY, 2007. Host: Jiebo Luo
- Detection and Modeling of Depth Discontinuities with Lighting and Viewpoint Variation. **HP Laboratories**, Computer Vision and Graphics group, Palo Alto, CA, 2007. Host: Bruce Culbertson
- Discontinuity Detection and Modeling with Lighting and Viewpoint Variation. **Adobe Advanced Technology Labs**, Seattle, WA, 2006 (also presented at University of Washington).  
Host: David Salesin
- Detection and Analysis of Depth Discontinuities in Computer Vision. **NASA – Jet Propulsion Laboratory**, 2006.  
Host: Larry Matthies
- What Can We Do With a Multi-Flash Camera? **IBM T.J. Watson Research**, Hawthorne, NY, 2005.  
Host: Deepak Turaga (as part of Emerging Leaders in Multimedia Seminar)
- A Wavelet Subspace Method for Real-time Face Tracking. **Microsoft Research, Redmond, WA**, 2001.  
Host: Kentaro Toyama

## Hosted Talks at IBM

- David Forsyth, 2008.
- Rob Fergus – “Large Image Databases and Small Codes for Recognition”, 2008.
- Tiberio Caetano – “Learning Graph Matching”, 2007.

## Further Information

I have a general background in computer vision and graphics, since I attended various graduate courses on these areas, including: Real-Time Graphics, Computer Vision I, Computer Vision II, Topics in AI – Face Recognition, Advanced Topics in Computer Vision, Pattern Recognition, Mixed Reality Systems, Graph Theory, Probabilistic Reasoning, Partial Differential Equations, and Speech Recognition.

### Media Coverage

My work was reported in several newspapers, magazines, and television programs, including Jornal do SBT, Ciencia Hoje, TV USP and RBS TV.

### Programming Skills

- Experience with C++, C, Assembly, MatLab and Java.
- Experience with Programmable Shaders (Cg language)
- Experience with Windows and Unix programming.

### Organizing Committee of Conferences

- Member of the organizing committee for the 2006 and 2007 “IBM Watson Emerging Leaders in Multimedia Workshop”
- Member of the organizing committee of I Workshop on Artificial Intelligence and Computer Vision, 19-22 November 1997, Atibaia, Brazil.

## References

- **Matthew Turk** (UC-Santa Barbara)  
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- **Yingli Tian** (IBM Research)  
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- **Tobias Hollerer** (UC-Santa Barbara)  
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- **Jim Gemmell, Kentaro Toyama** (Microsoft Research)  
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