Mahmut Karakaya

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BACKGROUND

Computer Vision, Digital Image Processing, Machine Learning, and Visual Sensor Networks, Biometrics, Iris Recognition, Hyperspectral Image Processing, and Automatic Target Recognition.

EDUCATION

- **PhD in Computer Engineering,** August 2011
  University of Tennessee, Knoxville, TN GPA: 3.89/4.00
  Dissertation Topic: Collaborative Solutions to Visual Sensor Networks
- **M.S. in Electrical Engineering,** May 2007
  University of South Alabama, Mobile, AL GPA: 4.00/4.00
  Thesis: Enhanced SEM Algorithm for Object Detection in Hyperspectral Imagery
- **B.S. in Electronics Engineering,** June 2005
  Fatih University, Istanbul, TURKEY GPA: 3.77/4.00

PROFESSIONAL EXPERIENCE

- **Postdoctoral Research Associate** **11/2011 – present**
  Oak Ridge Associated Universities (ORAU)
  Imaging Science and Machine Learning Group at Oak Ridge National Laboratory, Oak Ridge, TN
  Research in Biometrics Project to Improve Iris Recognition:
  - Developing an anatomically and optically accurate model of the human eye, collecting iris data by using 12MP, NIR-sensitive, 30-fps imaging device and validating the model versus iris data.
  - Designing image processing and pattern recognition algorithms to improve the performance of iris recognition in the presence of refractive distortion and/or pupil dilation.

  Research in Live Cell Imaging Project with Biological and Nano-scale Systems Group:
  - Focusing on using genomics and live cell imaging tools to understand the function of proteins and networks in living cells.
  - Developing algorithms for comprehensive characterization of live cells to collect information about molecular interactions, environment, and physical properties.

  Conducted all software, algorithms and GUI by programing in Matlab and C++ with OpenCV.
- **Research Assistant & Coordinator** **8/2007 – 11/2011**
  Advanced Imaging & Collaborative Information Processing Lab,
  The University of Tennessee, Knoxville, TN
  Collaborative Solutions to Visual Sensor Network
  - Designed light-weight and energy efficient target detection, localization and tracking algorithms in crowds using a progressive certainty map in visual sensor networks.
  - Proposed a dynamic itinerary for data fusion from multiple cameras.
  - Designed fault detection, correction, and tolerance algorithm for collaborative target localization.
  - Analyzed coverage estimation problem in the presence of occlusions in visual sensor networks.
  - Proposed a closed form solution for the visual coverage estimation in visual sensor networks.
  - Conducted all software, algorithms and GUI by programing in Matlab.

- **Intern Research Engineer** **5/2010 – 8/2010**
  The Imaging, Signals, and Machine Learning Group,
  Oak Ridge National Laboratory, Oak Ridge, TN
  Characterization of Retinal Horizontal Neurons in large-scale 3D confocal images
  - Conducted research to automatically characterize the morphology of retinal horizontal neurons in a large-scale 3-D confocal imagery.
  - Designed an automatic detection, segmentation and classification algorithm to discover morphological features of retinal neurons.
  - Designed a registration algorithm to register high resolution 3D image stacks of neuron images.
- **Visiting Research Assistant** **5/2008 – 8/2008**
  State Key Laboratory of Industrial Control Technology,
  Zhejiang University, Hangzhou/China
  International Research and Education in engineering program, sponsored by NSF
  - Conducted research in collaborative signal processing and its applications.
  - Designed a new version of Mobile Sensor Platform with both 1-D (e.g., acoustic) and 2-D sensing (e.g., imaging) capabilities, powerful on-board processing, mobility.
- **Research Assistant** **8/2005 – 5/2007**
  Vision, Image Proc. and Simulation (VIPS) Lab,
  University of South Alabama, Mobile, AL
  Target Detection in High Dimensional Space Using a Stochastic Expectation Maximization
  - Designed an automatic target detection algorithm in hyperspectral images using enhanced Expectation Maximization and its stochastic version.
  - Conducted all software and algorithms by programing in Matlab.

TEACHING EXPERIENCE

- **Teaching Assistant** **8/2007 – 8/2011**
  Dept. of Electrical Engineering & Computer Science at The University of Tennessee, Knoxville
  Responsibilities: Grading homework, leading laboratory projects, hosting office hours.
  - **ECE 472/572 :** Digital Image Processing(Fall'07-'08-'09-'10)
  - **ECE 471/571 :** Pattern Recognition (Spring'10-'11)
  - **ECE 301 :** Circuits and Electro Mechanical Components (Spring'09)
  - **ECE 206 :** Electrical Engineering Computations (Spring '08)
- **Teaching Assistant** **8/2005 – 5/2007**
  Dept. of Electrical and Computer Engineering at University of South Alabama
  Responsibilities: Grading homework, leading laboratory projects, hosting office hours.
  - **EE 268 :** Digital Logic Design Lab. (Spring'07)
  - **EE 264 :** Microprocessors and Interfacing Lab. (Fall'06, Spring'07)
  - **EE 566 :** Digital Image Processing (Fall'06)

AWARDS & HONORS

- Chancellor's Honor for Extraordinary Professional Promise at University of Tennessee, 2010.
- Graduate Student Travel Award at University of Tennessee, 2010.
- Best Paper Award in 3rd ACM/IEEE International Conference on Distributed Smart Cameras, 2009.
- Graduate Research and Teaching Assistantship at The University of Tennessee, (2007-2011).
- Graduate Research and Teaching Assistantship at University of South Alabama, (2005-2007).
- High Honor Student award in College of Engineering at Fatih University, Turkey, 2005.
- Full-scholarship for undergraduate study in Electronics Eng. at Fatih University, Turkey, 2000.
- Ranked 14th among 200,000 technical high school graduates in the nationwide university admissions examination, Turkey, 2000.

JOURNAL PUBLICATIONS

- **M. Karakaya** and H. Qi, "Collaborative Localization in Visual Sensor Networks", under 2nd revision for ACM Transactions on Sensor Networks, 2012.
- **M. Karakaya** and H. Qi, "Coverage Estimation for Crowded Targets in Visual Sensor Networks", accepted by ACM Transactions on Sensor Networks, 2012.
- **M. Karakaya** and H. Qi, "Distributed Target Localization using a Progressive Certainty Map in Visual Sensor Networks", Journal of Ad Hoc Networks, vol. 9, pp. 576–590, 2011.
- R. A. Kerekes, R. A. Martins, D. Davis, **M. Karakaya**, S. S. Gleason and M. Dyer, "Automated Tracing of Horizontal Neuron Processes During Retinal Development", Neurochemical Research, vol. 36, no. 4, pp. 583-593, 2011.
- Rodrigo A. P. Martins, Denise Davis, Ryan Kerekes, Jiakun Zhang, Ildar T. Bayazitov, Daniel Hiler, **Mahmut Karakaya**, Sharon Frase, Shaun Gleason, Stanislav S. Zakharenko, Dianna A. Johnson, and Michael A. Dyer, "Retinoblastoma (Rb) regulates laminar dendritic arbor reorganization in retinal horizontal neurons", Proceedings of the National Academy of Science 108: 21111-21116, 2011.

CONFERENCE PROCEEDINGS

- **M. Karakaya,** D. Barstow, H. S. Villalobos, J. Thompson and C. Boehnen, "Gaze Estimation for ORNL Biometric Eye Model in Off-angle Iris Recognition", submitted to IEEE Workshop on the Applications of Computer Vision (WACV 2013), 2012.
- **M. Karakaya,** D. Barstow, H. S. Villalobos and C. Boehnen, "An Iris Segmentation Algorithm based on Edge Orientation for Off-angle Iris Recognition", submitted to SPIE Electronic Imaging, 2012.
- **M. Karakaya** and H. Qi, "Communication and Energy Efficiency in Visual Sensor Networks for People Localization", submitted to 3rd Future of Instrumentation International Workshop, 2012.
- **M. Karakaya**, R. A. Kerekes, J. L. Morrell-Falvey, C. Foster, and S. T. Retterer, "Analysis of Tight Junction Formation and Integrity", accepted by 34th IEEE International Conference of the Engineering in Medicine and Biology, San Diego CA, 2012.
- H. S. Villalobos, D. Barstow, **M. Karakaya**, E. Chaum, and C. Boehnen, "ORNL Biometric Eye Model for Iris Recognition", accepted by 5th IEEE International Conference on Biometrics, 2012.
- **M. Karakaya** and H. Qi, "Coverage Estimation in Heterogeneous Visual Sensor Networks", 8th IEEE International Conference on Distributed Computing in Sensor Systems, Hangzhou, China, 2012.
- **M. Karakaya** and H. Qi, "Detection-based Tracking for Crowded Targets in Distributed Visual Sensor Networks", 2nd Future of Instrumentation International Workshop, Oak Ridge TN, 2011.
- **M. Karakaya**, R. A. Kerekes, S. S. Gleason, R. A. Martins, and M. Dyer, "Automatic Detection, Segmentation and Classification of Retinal Horizontal Neurons in Large-scale 3D Confocal Imagery", Proceedings of SPIE Medical Imaging Conference, Vol. 7962, Orlando FL, 2011.
- **M. Karakaya** and H. Qi, "Fault Detection, Correction, and Tolerance for Collaborative Target Localization in Visual Sensor Networks", 4th ACM/IEEE International Conference on Distributed Smart Cameras, Atlanta GA, 2010.
- **M. Karakaya** and H. Qi, "Target Detection and Counting in Crowds with a Progressive Certainty Map in Distributed Visual Sensor Networks", 3rd ACM/IEEE International Conference on Distributed Smart Cameras, Como, Italy, 2009. (**Best Paper Award**)
- **M. Karakaya**, M. S. Alam and M. I. Elbakary, "Target Detection in High Dimensional Space Using a Stochastic Expectation Maximization Algorithm", Proceedings of SPIE Defense and Security Symposium, Vol. 6565, 656509, Orlando FL 2007.

REFERENCES

Available upon request