

# Meltem Demirkus

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## OBJECTIVE

To obtain a research position in the area of statistical pattern recognition and its applications in biometrics, computer vision and image processing.

## EDUCATION

<b>August 2005– May 2008</b>	<b>M.S.</b> in Department of Computer Science and Engineering, Michigan State University, East Lansing, MI [GPA: 3.80 over 4.00] <b>Advisor: Dr. Anil K. Jain</b>
<b>September 1999– July 2004</b>	<b>B.S.</b> in Computer Science and Engineering, Isik University, Istanbul, TURKEY [GPA: 3.92 over 4.00]

## EXPERIENCE

<b>August 2005– Present</b>	<p>Graduate Research Assistant, Pattern Recognition &amp; Image Processing Lab, Department of Computer Science and Engineering, Michigan State University</p> <p><b>Projects:</b></p> <ul style="list-style-type: none"><li>• <b>(Current Project) <i>Palmpoint Matching Using High-Resolution Palmar Features:</i></b> During a latent palmpoint comparison, a forensic expert investigates the palmar friction ridges in conjunction with the palmar flexion creases. On the other hand, the palmpoint identification systems introduced in the literature are more appropriate for the commercial applications which utilize low resolution (less than 100ppi) palmpoint images. These systems only use palmar flexion creases for identification. Thus, a high resolution (500ppi) palmpoint matching system utilizing the palmar friction ridge information (i.e. minutiae) and palmar flexion creases (i.e. principle lines, wrinkles and creases) is being developed.</li><li>• <b><i>Matching Multispectral Palmpoint Images:</i></b> A whole-hand multibiometric sensor based on multispectral imaging system is designed and built by our collaborator Lumidigm, Inc. Both fingerprints and palmpoint are utilized for identification purpose. Algorithms are developed to define a common coordinate system and align the hand images according to it. From each hand spectrum image, major characteristics of the palm, such as principle lines and wrinkles, are extracted. Matching of palmpoint images is basically done by utilizing the normalized Hamming distance.</li><li>• <b><i>Matching Multispectral Fingerprint Images:</i></b> Poor fingerprint image</li></ul>
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	<p>quality and inability to recognize a spoof finger are some of the drawbacks of conventional fingerprint sensors. These problems can be resolved to a great extent by employing a multispectral imaging (MSI) system. Multispectral fingerprint imaging systems use different wavelengths of light to illuminate the surface and the subsurface of finger skin and capture the rejected light. In order to determine which representation (features) would be good for multispectral fingerprint images, the performances of three different fingerprint matching algorithms are examined: minutiae-based, texture-based and local correlation-based.</p> <ul style="list-style-type: none"> <li>• <b>High-Resolution (1,000ppi) Fingerprint Matching Using Level 3 Features:</b> To assist in identification, latent print examiners frequently use Level 3 (pore and ridge contour) features in conjunction with Level 1 (pattern) and Level 2 (minutia) features. Automated Fingerprint Identification Systems (AFIS), on the other hand, currently rely only on Level 1 and Level 2 features. Thus, a hierarchical matching system that utilizes Level 1, Level 2 and Level 3 features is designed and developed. Pores and ridge contours are automatically extracted using Gabor filters and wavelet transform. Iterative Closest Point (ICP) algorithm is used for matching.</li> </ul>
<p><b>May 2006 - August 2006</b></p>	<p>Research Intern - Lumidigm, Inc., New Mexico, USA.</p> <ul style="list-style-type: none"> <li>• <b>Evaluation of Commercial Fingerprint Matching Algorithms:</b> Performance evaluation of the leading commercial fingerprint matching algorithms is done on different multispectral fingerprint image databases. The matching results are analyzed to understand the weaknesses and strengths of the algorithm and find the most suitable algorithm for multispectral fingerprint images. The necessary implementations are also done during this process.</li> </ul>
<p><b>August 2004 - June 2005</b></p>	<p>Research Intern - Internship, Siemens Corporate Research, NJ Intelligent Vision &amp; Reasoning Department</p> <p><b>Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Ligand-WW Domain Binding:</b> Siemens Corporate Research and Cytogen Collaboration; Bioinformatics research project to detect specific ligands binding to specific WW Domains.</li> <li>• <b>Data Mining and Decision Support System:</b> Bioinformatics research project aims to response to the emerging need in pre-clinical research and to create a standardized modular framework where all knowledge discovery steps are integrated. - Algorithm development and object-oriented programming.</li> <li>• <b>PowerPlot:</b> Siemens Corporate Research; Worked on object-oriented design and Java implementation of a sensor visualization tool with ultra resolution.</li> </ul>

<b>August 2003 - September 2003</b>	Intern - Siemens AG, Istanbul -Turkey. Department of Information and Knowledge (IK)
<b>March 2002 - February 2003</b>	Junior Programmer Intern - Momentum Digital Media Technologies , Istanbul, Turkey  Worked on the design and implementation of some projects and involved in a 3D game development project
<b>September 2000 - August 2003</b>	Library Assistant at Isik University Library  Worked at the circulation desk, maintained the periodical collection, made online cataloging, and worked in the project of 'Photographs of ISIK: Archiving and Scanning'.

## COMPUTER SKILLS

Computer Languages, Tools & Packages : MATLAB, C/C++, JAVA, OpenCV, JavaScript, PHP, PERL  
Operating Systems : Windows, Linux, and Unix

## TEACHING EXPERIENCE

- **CSE 205 Data Structures and Algorithms** (February 2004– June 2004)  
Lecturing in laboratory section and assisting students' laboratories
- **CSE 245 Computer Organization** (September 2003–January 2004)  
Grading homework and quizzes

## RESEARCH INTERESTS

Statistical Pattern Recognition and Analysis, Biometrics, Computer Vision, Image Processing and Machine Learning.

## PUBLICATIONS

- R. K. Rowe, U. Uludag, **M. Demirkus**, S. Parthasaradhi and A. K. Jain, "A Multispectral Whole-hand Biometric Authentication System," *Biometric Symposium, Biometric Consortium Conference*, Baltimore, MD, September 2007.
- A. Jain, Y. Chen, and **M. Demirkus**, "Pores and Ridges: Fingerprint Matching Using Level 3 Features," *IEEE Trans. Pattern Analysis and Machine Intelligence*, vol. 29, no. 1, pp. 15-27, January 2007.
- A. Jain, Y. Chen, and **M. Demirkus**, "Pores and Ridges: Fingerprint Matching Using Level 3 Features," in *Proc. of IEEE International Conf. on Pattern Recognition (ICPR)*, Hong Kong, August 20-24, 2006.

- Z. Cataltepe, **M. Demirkus**, C. Yuan, C. Neubauer , "A Robust Method to Identify Faults in Correlated Sensors in Machine Condition Monitoring", *European Signal Processing Conference (EUSIPCO)*, Antalya, Turkey, September 4-16, 2005.
- **M. Demirkus**, "Simulation of Forward-Viewing Intravascular Ultrasound Imaging Using Ring Annular Arrays", *B.S. Thesis*, Isik University, 2004. (Advisor: Prof. Dr. Mustafa Karaman)

## HONORS AND AWARDS

- Graduate Poster Award, first place in Research Category, Department of Computer Science and Engineering, Michigan State University, 2006.  
Poster Title: Multispectral Fingerprint Imaging (MSI)
- B.S. Graduation with the **Rank 1** from Computer Science and Engineering Department, Isik University, 2004.
- Distinguished academic achievement award, Isik University, 1999 -2004.
- Fellowship from Turkish Ministry of Education and Isik University, 1999-2004.

## PROFESSIONAL ACTIVITIES

- Student member of **IEEE** and IEEE Computer Society.
- **Reviewer** for ICB(2007), IEEE Transactions on Image Processing (2007), IEEE Signal Processing Letters (2007), ICASSP (2007, 2008) and M-CRA (2007).
- Poster presentation on "1000 DPI Fingerprint Matching Using Level 3 Features" at the **Center for Identification Technology Research (CITeR)** Fall 2005 meeting, West Virginia, November 2005.
- **Leader of the Organization Team**, "ISIK 2003 International Workshop: New Challenges in Biomedical Engineering", Isik University, July 14-16, 2003.

### Major Speakers:

**Prof. John G. Webster**, Department of Biomedical Engineering, University of Wisconsin, USA

**Prof. Peter I. Lelkes**, School of Biomedical Engineering, Drexel University, USA

**Prof. Izzet Kale**, University of Westminster, Department of Electronic Systems, UK

## RELATED CSE AND ECE COURSES

Pattern Recognition and Analysis, Computer Vision, Data Mining, Analysis of Stochastic Systems, Theory of Probability and Statistics I and II.

## EXTRA CURRICULA ACTIVITIES

- In the Organization Team, "Celebrating Rumi in the 21st Century: A Conference and Cultural Event on His 800th Birthday", Department of History and Department of English, Michigan State University, November 3, 2007.  
Website: <http://rumi.history.msu.edu/>
- Photography, Formula 1, Traveling and Tango (dance).
- Giving Darkroom Seminars for the Photography Club (2003)

## REFERENCES

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