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PROCEEDINGS

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Media Watermarking, Security, and Forensics 2020

Editors: **Adnan M. Alattar**, Digimarc Corp. (United States),
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and **Gaurav Sharma**, University of Rochester (United States)

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Media Watermarking, Security, and Forensics 2020

Conference overview

The ease of capturing, manipulating, distributing, and consuming digital media (e.g., images, audio, video, graphics, and text) has enabled new applications and brought to the forefront a number of important security challenges. These challenges have prompted significant research and development in the areas of digital watermarking, steganography, data hiding, forensics, media identification, biometrics, and encryption to protect owners' rights, establish provenance and veracity of content, and to preserve privacy. Research results in these areas have been translated into new paradigms and applications for monetizing media while maintaining ownership rights, new biometric and forensic identification techniques, and novel methods for ensuring privacy.

The Media Watermarking, Security, and Forensics Conference is a premier destination for disseminating high-quality, cutting-edge research in these areas. The conference provides an excellent venue for researchers and practitioners to present their innovative work as well as to keep abreast of the latest developments in watermarking, security, and forensics. Early results and fresh ideas are particularly encouraged and supported by the conference review format: only a structured abstract describing the work in progress and preliminary results is initially required and the full paper is requested just before the conference. A strong focus on how research results are applied by industry, in practice, also gives the conference its unique flavor.

Paper authors listed as of 1 January 2020;
refer to manuscript for final authors.
Titles that are not listed with the proceedings
files were presentation-only.

Conference Chairs: **Adnan M. Alattar**, Digimarc Corporation (United States), **Nasir D. Memon**, Tandon School of Engineering, New York University (United States), and **Gaurav Sharma**, University of Rochester (United States)

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MEDIA WATERMARKING, SECURITY, AND FORENSICS 2020

Monday, January 27, 2020

KEYNOTE: Watermarking and Recycling

Session Chair: Adnan Alattar, Digimarc Corporation (United States)

8:55 – 10:00 am

Cypress A

8:55

Conference Welcome

9:00

MWSF-017

Watermarking to turn plastic packaging from waste to asset through improved optical tagging, Larry Logan, chief evangelist, Digimarc Corporation (United States)

Biographies and/or abstracts for all keynotes are found on pages 9–14

10:10 – 10:30 am Coffee Break

Watermark

Session Chair: Robert Ulichney, HP Labs, HP Inc. (United States)

10:30 am – 12:10 pm

Cypress A

10:30

MWSF-021

Reducing invertible embedding distortion using graph matching model, Hanzhou Wu and Xinpeng Zhang, Shanghai University (China)

10:55

MWSF-022

Watermarking in deep neural networks via error back-propagation, Jiangfeng Wang, Hanzhou Wu, Xinpeng Zhang, and Yuwei Yao, Shanghai University (China)

11:20

MWSF-023

Signal rich art: Improvements and extensions, Ajith Kamath, Digimarc Corporation (United States)

11:45

MWSF-024

Estimating watermark synchronization signal using partial pixel least squares, Robert Lyons and Brett Bradley, Digimarc Corporation (United States)

12:30 – 2:00 pm Lunch

PLENARY: Frontiers in Computational Imaging

Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

2:00 – 3:10 pm

Grand Peninsula Ballroom D

Imaging the Unseen: Taking the First Picture of a Black Hole, Katie Bouman, assistant professor, Computing and Mathematical Sciences Department, California Institute of Technology (United States)

For abstract and speaker biography, see page 7

3:10 – 3:30 pm Coffee Break

Deep Learning Steganalysis

Session Chair: Adnan Alattar, Digimarc Corporation (United States)

3:30 – 5:10 pm

Cypress A

3:30

MWSF-075

JPEG steganalysis detectors scalable with respect to compression quality, Yassine Yousfi and Jessica Fridrich, Binghamton University (United States)

3:55

MWSF-076

Detection of malicious spatial-domain steganography over noisy channels using convolutional neural networks, Swaroop Shankar Prasad¹, Ofer Hadar², and Iliia Polian¹; ¹University of Stuttgart (Germany) and ²Ben-Gurion University of the Negev (Israel)

4:20

MWSF-077

Semi-blind image resampling factor estimation for PRNU computation, Miroslav Goljan and Morteza Darvish Morshedi Hosseini, Binghamton University (United States)

4:45

MWSF-078

A CNN-based correlation predictor for PRNU-based image manipulation localization, Sujoy Chakraborty; Binghamton University and Stockton University (United States)

5:00 – 6:00 pm All-Conference Welcome Reception

Tuesday, January 28, 2020

7:30 – 8:45 am Women in Electronic Imaging Breakfast;
pre-registration required

KEYNOTE: Technology in Context

Session Chair: Adnan Alattar, Digimarc Corporation (United States)

9:00 – 10:00 am

Cypress A

MWSF-102

Technology in context: Solutions to foreign propaganda and disinformation, Samaruddin Stewart, technology and media expert, Global Engagement Center, US State Department, and Justin Maddox, adjunct professor, Department of Information Sciences and Technology, George Mason University (United States)

Biographies and/or abstracts for all keynotes are found on pages 9–14

10:00 am – 7:30 pm Industry Exhibition - Tuesday

10:10 – 10:30 am Coffee Break

DeepFakes

Session Chair: Gaurav Sharma, University of Rochester (United States)

10:30 am – 12:10 pm

Cypress A

10:30 MWSF-116
Detecting “deepfakes” in H.264 video data using compression ghost artifacts, Raphael Frick, Sascha Zmudzinski, and Martin Steinebach, Fraunhofer SIT (Germany)

10:55 MWSF-117
A system for mitigating the problem of deepfake news videos using watermarking, Adnan Alattar, Ravi Sharma, and John Scriven, Digimarc Corporation (United States)

11:20 MWSF-118
Checking the integrity of images with signed thumbnail images, Martin Steinebach, Huajian Liu, Sebastian Jörg, and Waldemar Berchtold, Fraunhofer SIT (Germany)

11:45 MWSF-119
The effect of class definitions on the transferability of adversarial attacks against forensic CNNs, Xinwei Zhao and Matthew Stamm, Drexel University (United States)

12:30 – 2:00 pm Lunch

PLENARY: Automotive Imaging

Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

2:00 – 3:10 pm

Grand Peninsula Ballroom D

Imaging in the Autonomous Vehicle Revolution, Gary Hicok, senior vice president, hardware development, NVIDIA Corporation (United States)

For abstract and speaker biography, see page 7

3:10 – 3:30 pm Coffee Break

Identification

Session Chair: Adnan Alattar, Digimarc Corporation (United States)

3:30 – 5:10 pm

Cypress A

3:30 MWSF-215
Score-based likelihood ratios in camera device identification, Stephanie Reinders, Li Lin, Wenhao Chen, Yong Guan, and Jennifer Newman, Iowa State University (United States)

3:55 MWSF-216
Camera unavoidable scene watermarks: A method for forcibly conveying information onto photographs, Clark Demaree and Henry Dietz, University of Kentucky (United States)

4:20 MWSF-217
A deep learning approach to MRI scanner manufacturer and model identification, Shengbang Fang¹, Ronnie Sebro², and Matthew Stamm¹; ¹Drexel University and ²Hospital of the University of Pennsylvania (United States)

4:45 MWSF-218
Motion vector based robust video hash, Huajian Liu, Sebastian Fach, and Martin Steinebach, Fraunhofer SIT (Germany)

5:30 – 7:30 pm Symposium Demonstration Session

Wednesday, January 29, 2020

KEYNOTE: Digital vs Physical Document Security

Session Chair: Gaurav Sharma, University of Rochester (United States)

9:00 – 10:00 am

Cypress A

MWSF-204
Digital vs physical: A watershed in document security, *Ian Lancaster, holography and authentication specialist, Lancaster Consulting (United Kingdom)*

Biographies and/or abstracts for all keynotes are found on pages 9–14

10:00 am – 3:30 pm Industry Exhibition - Wednesday

10:10 – 10:30 am Coffee Break

Physical Object Security

Session Chair: Gaurav Sharma, University of Rochester (United States)

10:30 am – 12:10 pm

Cypress A

10:30 MWSF-398
Smartphone systems for secure documents, *Alan Hodgson, Alan Hodgson Consulting Ltd. (United Kingdom)*

10:55 MWSF-397
Embedding data in the blue channel*, *Robert Ulichney, HP Labs, HP Inc. (United States)*

*Proceedings Note: A proceedings paper related to the Robert Ulichney talk will be found in the proceedings issue for the Color Imaging XXV: Displaying, Processing, Hardcopy, and Applications Conference.

11:20 MWSF-399
Physical object security (TBA), *Gaurav Sharma, University of Rochester (United States)*

11:45 MWSF-219
High-entropy optically variable device characterization – Facilitating multimodal authentication and capture of deep learning data, *Mikael Lindstrand, goniolabs AB (Sweden)*

12:30 – 2:00 pm Lunch

PLENARY: VR/AR Future Technology

Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

2:00 – 3:10 pm

Grand Peninsula Ballroom D

Quality Screen Time: Leveraging Computational Displays for Spatial Computing, *Douglas Lanman, director, Display Systems Research, Facebook Reality Labs (United States)*

For abstract and speaker biography, see page 7

3:10 – 3:30 pm Coffee Break

Steganography

Session Chair: Jessica Fridrich, Binghamton University (United States)

3:30 – 5:10 pm

Cypress A

3:30 MWSF-289
Minimum perturbation cost modulation for side-informed steganography, *Jan Butora and Jessica Fridrich, Binghamton University (United States)*

3:55 MWSF-290
Synchronizing embedding changes in side-informed steganography, *Mehdi Boroumand and Jessica Fridrich, Binghamton University (United States)*

4:20 MWSF-291
Generative text steganography based on adaptive arithmetic coding and LSTM network, *Huixian Kang, Hanzhou Wu, and Xinpeng Zhang, Shanghai University (China)*

4:45 MWSF-292
Analyzing the decoding rate of circular coding in a noisy transmission channel, *Yufang Sun and Jan Allebach, Purdue University (United States)*

DISCUSSION: Concluding Remarks

Session Chairs: Adnan Alattar, Digimarc Corporation (United States) and Gaurav Sharma, University of Rochester (United States)

5:10 – 5:20 pm

Cypress A

5:30 – 7:00 pm EI 2020 Symposium Interactive Posters Session

5:30 – 7:00 pm Meet the Future: A Showcase of Student and Young Professionals Research

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