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Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2021

Editors: **David Akopian**, The University of Texas at San Antonio (United States), and
Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)

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Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2021

Conference overview

The goal of this conference is to provide an international forum for presenting recent research results on multimedia for mobile devices, and to bring together experts from both academia and industry for a fruitful exchange of ideas and discussion on future challenges. The authors are encouraged to submit work-in-progress papers as well as updates on previously reported systems. Outstanding papers may be recommended for the publication in the Journal Electronic Imaging or Journal of Imaging Science and Technology.

Paper authors listed as of 1 January 2021; refer to manuscript for final authors. Titles that are not listed with the proceedings files were presentation-only.

Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2021

MONDAY 18 JANUARY 2021

OSINT INVESTIGATION TOOLS

Moderator: Mohammad Nadim, The University of Texas at San Antonio, The University of Texas at San Antonio, San Antonio, TX, US, academic (United States) / **Session Chair:** Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)
10:15 – 11:15

10:15 MOBMU-043
Design of professional laboratory exercises for effective state-of-the-art OSINT investigation tools - Part 1: RiskIQ PassiveTotal, *Klaus Schwarz and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

10:35 MOBMU-044
Design of professional laboratory exercises for effective state-of-the-art OSINT investigation tools - Part 2: Censys, *Klaus Schwarz and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

10:55 MOBMU-045
Design of professional laboratory exercises for effective state-of-the-art OSINT investigation tools - Part 3: Maltego, *Klaus Schwarz and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

DATA ANALYTICS

Moderator: Klaus Schwarz (Germany) / **Session Chair:** Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)
11:45 – 12:45

11:45 MOBMU-020
Comparison of various state-of-the-art OSINT investigation tools, *Klaus Schwarz and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

12:05 MOBMU-021
Advanced citizen tracking and alert system for pandemic scenarios: A data analytics perspective, *Sree Ganesh Thottempudi, Akash Apturkar, Arush Oli, Aqsa Firdaus Khan, and Nidhi Kulkarni, SRH Berlin University of Applied Sciences (Germany)*

12:25 MOBMU-022
Generative design for creators – The impact of data driven visualization and processing in the field of creative business, *Julia Schnitzer, Technische Hochschule Brandenburg (Germany)*

CONFERENCE DEMONSTRATION

12:45 – 13:15

MOBMU-038D

MOBMU DEMO: "IoT-based real-time monitoring system for a smart energy house", *Lukasz Rojek[1,2], Saiful Islam[2], Michael Hartmann[2], and Reiner Creutzburg[2,3]; [1]Beuth Hochschule für Technik Berlin, Fachbereich Geoinformation, [2]SRH Berlin University of Applied Sciences, and [3]Technische Hochschule Brandenburg (Germany)*

The MOBMU demo will augment the oral presentation of the same title by Lukasz Rojek et al.

MONITORING INDOOR SPACES

Moderator: Julia Schnitzer, Technische Hochschule Brandenburg (Germany) / **Session Chair:** Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)

13:15 – 14:15

13:15 MOBMU-037

AI-based real-time monitoring system for a smart energy house, *Saiful Islam[1], Lukasz Rojek[1,2,3], Michael Hartmann[1], and Reiner Creutzburg[1,4]; [1]SRH Berlin University of Applied Sciences, [2]Beuth Hochschule fur Technik Berlin, [3]Ottc-Friedrich-Universitat Bamberg, and [4]Technische Hochschule Brandenburg (Germany)*

13:35 MOBMU-038

IoT-based real-time monitoring system for a smart energy house, *Lukasz Rojek[1,2], Saiful Islam[2], Michael Hartmann[2], and Reiner Creutzburg[2,3]; [1]Beuth Hochschule fur Technik Berlin, [2]SRH Berlin University of Applied Sciences, and [3]Technische Hochschule Brandenburg (Germany)*

13:55 MOBMU-039

Airflow visualization and air purifier positioning optimization in potentially COVID-19 contaminated classrooms, *Thomas Pfeiffer[1], Himanshu Dilip Khadse[1], Het Mehta[1], Michael Hartmann[1], Klaus-Ulrich Neumann[1], and Reiner Creutzburg[1,2]; [1]SRH Berlin University of Applied Sciences and [2]Technische Hochschule Brandenburg (Germany)*

LEARNING AND TEXT TO SPEECH

Moderator: Wencheng Wu, University of Rochester (United States) / **Session Chair:** David Akopian, The University of Texas at San Antonio (United States)

18:15 – 19:15

18:15 MOBMU-034

Characteristic features of the kernel-level rootkit for learning-based detection model training, *Mohammad Nadim[1], Wonjun Lee[2], and David Akopian[1]; [1]The University of Texas at San Antonio and [2]Yeshiva University (United States)*

18:35 MOBMU-035

Integration of NLP and speech-to-text applications with chatbots, *Devasena Inupakutika, Mohammad Nadim, Ganesh Reddy Gunnam, Sahak Kaghyan, and David Akopian, The University of Texas at San Antonio (United States)*

TUESDAY 19 JANUARY 2021

PLENARY: DEEP INTERNAL LEARNING—DEEP LEARNING WITH ZERO EXAMPLES

Session Chair: Charles Bouman, Purdue University (United States)
10:00 – 11:10

Deep internal learning—Deep learning with zero examples
Michal Irani, *professor, Department of Computer Science and Applied Mathematics, Weizmann Institute of Science (Israel)*

Michal Irani is a professor at the Weizmann Institute of Science. Her research interests include computer vision, AI, and deep learning. Irani's prizes and honors include the Maria Petrou Prize (2016), the Helmholtz "Test of Time Award" (2017), the Landau Prize in AI (2019), and the Rothschild Prize in Mathematics and Computer Science (2020). She also received the ECCV Best Paper Awards (2000 and 2002), and the Marr Prize Honorable Mention (2001 and 2005).

SMART FACTORIES

Moderator: Klaus Schwarz (Germany) / **Session Chair:** David Akopian, The University of Texas at San Antonio (United States)
11:40 – 13:00

11:40 MOBMU-094
The role and importance of key enabling technologies as building blocks for smart factories, *Reiner Creutzburg[1,2], Sören Hirsch[1], Robert Flassig[1], Steffen Doerner[1], Sven Thamm[1], and Andreas Johannsen[1]; [1]Technische Hochschule Brandenburg and [2]SRH Berlin University of Applied Sciences (Germany)*

12:00 MOBMU-095
The importance of the digital twin for the smart factory, *Reiner Creutzburg[1,2], Robert Flassig[1], Steffen Doerner[1], Sören Hirsch[1], and Andreas Johannsen[1]; [1]Technische Hochschule Brandenburg and [2]SRH Berlin University of Applied Sciences (Germany)*

12:20 MOBMU-096
Analysis of IoT security risks based on the exposure of the MQTT protocol, *Daniel Kan[1], Andreas Johannsen[1], and Reiner Creutzburg[1,2]; [1]Technische Hochschule Brandenburg and [2]SRH Berlin University of Applied Sciences (Germany)*

12:40 MOBMU-097
Technical design and operational control of a decentralized microgrid in rural area, *Sanket Shrikant Pati[1], Saiful Islam[1], Goran Rafajlovski[1], and Reiner Creutzburg[1,2]; [1]SRH Berlin University of Applied Sciences and [2]Technische Hochschule Brandenburg (Germany)*

CONFERENCE DEMONSTRATION

13:00 – 13:30

MOBMU-075D
MOBMU DEMO: "Perceptually optimized ABR ladder generation for web streaming", *Yuriy Reznik, Karl Lillevold, and Rahul Vanam, Brightcove, Inc. (United States)*

In the MOBMU demo, augmenting the oral presentation of the same title, Yuriy Reznik will show Brightcove contex:-aware encoping (CAE) technology.

ICS/SCADA SECURITY & ABR LADDER GENERATION

Moderator: Andreas Johannsen, Technische Hochschule Brandenburg (Germany) / **Session Chair:** Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)
13:30 – 14:30

13:30 MOBMU-073
Conception and implementation of professional laboratory exercises in the field of ICS/SCADA security - Part I: Fundamentals, *Maximilian Richter, Klaus Schwarz, and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

13:50 MOBMU-074
Conception and implementation of professional laboratory exercises in the field of ICS/SCADA security - Part II: Red teaming and blue teaming, *Maximilian Richter, Klaus Schwarz, and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

14:10 MOBMU-075
Perceptually optimized ABR ladder generation for web streaming, *Yuriy Reznik, Karl Lillevold, and Rahul Vanam, Brightcove, Inc. (United States)*

WEDNESDAY 20 JANUARY 2021

VISUAL APPLICATIONS

Moderator: Wencheng Wu, University of Rochester (United States) / **Session Chair:** David Akopian, The University of Texas at San Antonio (United States)
10:15 – 11:15

10:15 MOBMU-142
Application scenarios and usability for modern conference rooms with 360 degree video projection, *Reiner Creutzburg[1], Eberhard Hasche[1], Florian Carstens[2], and Michel Tueini[2]; [1]Technische Hochschule Brandenburg and [2]Hotel Park Soltau (Germany)*

10:35 MOBMU-143
The potential of NIR spectroscopy in the separation of plastics for pyrolysis, *Uduak Bassey[1], Reiner Creutzburg[1,2], Lukasz Rojek[1,3,4], and Michael Hartmann[1]; [1]SRH Berlin University of Applied Sciences, [2]Technische Hochschule Brandenburg, [3]Beuth Hochschule fur Technik Berlin, and [4]Ottc-Friedrich-Universitat Bamberg (Germany)*

10:55 MOBMU-144
Optical determination of filter effectiveness in potentially aerosol contaminated classrooms during the COVID-19 pandemic, *Thomas Pfeiffer, Gesa Beck, Michael Hartmann, Dominguez Tellez Batcheva, Himanshu Dilip Khadse, Arantza Ramirez, and Het Mehta, SRH Berlin University of Applied Sciences (Germany)*

APPLICATION STUDIES

Moderator: Klaus Schwarz (Germany) / **Session Chair:** Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)
11:45 – 12:45

12:05 MOBMU-108
Using ACES look modification transforms (LMTs) in VFX environments – Part 2: Gamut mapping, *Eberhard Hasche, Oliver Karaschewski, and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

12:25 MOBMU-109
Task evoked pupillary response for surgical task difficulty prediction via multitask learning, *Beilei Xu, Wencheng Wu, Lei Lin, Rachel Melnyk, and Ahmed Ghazi, University of Rochester (United States)*

CONFERENCE INTERACTIVE POSTER

12:45 – 13:15

MOBMU-117
MOBMU POSTER: Cybersecurity and forensic challenges - A bibliographic review 2021, *Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

MOBMU-119
MOBMU POSTER: Development and prototypical implementation of a user-centered concept for a georeferencing augmented reality application to visualize underground 3D pipeline infrastructure on mobile devices, *Victoria Ung My[1] and Reiner Creutzburg[2,3]; [1]Technische Hochschule Lubeck, [2]Technische Hochschule Brandenburg, and [3]SRH Berlin University of Applied Sciences (Germany)*

SECURITY APPLICATIONS

Moderator: Mohammad Nadim, The University of Texas at San Antonio, The University of Texas at San Antonio, San Antonio, TX, US, academic (United States) / **Session Chair:** David Akopian, The University of Texas at San Antonio (United States)

13:15 – 14:15

13:15 MOBMU-134
Conception and implementation of professional laboratory exercises in the field of ICS/SCADA security - Part I: Fundamental, *Klaus Schwarz[1] and Reiner Creutzburg[1,2]; [1]Technische Hochschule Brandenburg and [2]SRH Berlin University of Applied Sciences (Germany)*

13:35 MOBMU-135
Firmware vulnerability analysis of widely used low-budget TP-link routers, *Franziska Schwarz[1], Daniel Fuchs[1], Klaus Schwarz[1], Reiner Creutzburg[1], and David Akopian[2]; [1]Technische Hochschule Brandenburg (Germany) and [2]The University of Texas at San Antonio (United States)*

13:55 MOBMU-136
Improving detection of manipulated passport photos - Training course for border control inspectors to detect morphed facial passport photos - Part I: Introduction, state-of-the-art and preparatory tests and experiments, *Franziska Schwarz, Klaus Schwarz, and Reiner Creutzburg, Technische Hochschule Brandenburg (Germany)*

THURSDAY 21 JANUARY 2021

PLENARY: THE DEVELOPMENT OF INTEGRAL COLOR IMAGE SENSORS AND CAMERAS

Session Chair: Jonathan B. Phillips, Google Inc. (United States)
10:00 – 11:10

The development of integral color image sensors and cameras
Kenneth A. Parulski, *expert consultant: mobile imaging (United States)*

Kenneth Parulski is an expert consultant to mobile imaging companies and leads the development of ISO standards for digital photography. He joined Kodak in 1980 after graduating from MIT and retired in 2012 as research fellow and chief scientist in Kodak's digital photography division. His work has been recognized with a Technical Emmy and other major awards. Parulski is a SMPTE fellow and an inventor on more than 225 US patents.

MONDAY 25 JANUARY 2021

PLENARY: MAKING INVISIBLE VISIBLE

Session Chair: Jonathan B. Phillips, Google Inc. (United States)
10:00 – 11:10

Making invisible visible
Ramesh Raskar, *associate professor, MIT Media Lab (United States)*

Ramesh Raskar is an associate professor at MIT Media Lab and directs the Camera Culture research group. His focus is on AI and imaging for health and sustainability. They span research in physical (e.g., sensors, health-tech), digital (e.g., automated and privacy-aware machine learning), and global (e.g., geomaps, autonomous mobility) domains. He received the Lemelson Award (2016), ACM SIGGRAPH Achievement Award (2017), DARPA Young Faculty Award (2009), Alfred P. Sloan Research Fellowship (2009), TR100 Award from MIT Technology Review (2004), and Global Indus Technovator Award (2003). He has worked on special research projects at Google [X] and Facebook and co-founded/advised several companies.

WEDNESDAY 27 JANUARY 2021

PLENARY: REVEALING THE INVISIBLE TO MACHINES WITH NEUROMORPHIC VISION SYSTEMS: TECHNOLOGY AND APPLICATIONS OVERVIEW

Session Chair: Radka Tezaur, Intel Corporation (United States)
10:00 – 11:10

Revealing the invisible to machines with neuromorphic vision systems: Technology and applications overview
Luca Verre, *CEO and co-founder, Prophesee (France)*

Luca Verre is co-founder and CEO of Prophesee, the inventor of the world's most advanced neuromorphic vision systems. Verre is a World Economic Forum technology pioneer. His experience includes project and product management, marketing, and business development roles at Schneider Electric. Prior to Schneider Electric, Verre worked as a research assistant in photonics at the Imperial College of London. Verre holds a MSc in physics, electronic and industrial engineering from Politecnico di Milano and Ecole Centrale and an MBA from Institut Européen d'Administration des Affaires, INSEAD.