2021 International Conference on Cyberworlds (CW 2021)

Caen, France
28 – 30 September 2021

IEEE Catalog Number: CFP21314-POD
ISBN: 978-1-6654-1164-6

Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP21314-POD
ISBN (Print-On-Demand):	978-1-6654-1164-6
ISBN (Online):	978-1-6654-4065-3
ISSN:	2642-357X

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

2021 International Conference on Cyberworlds (CW)

CW 2021

Table of Contents

Message from the Program and Track Co-Chairs ..... **xiii**
Organizing Committee ..... **xiv**
International Program Committee ..... **xv**
Sponsors ..... **xviii**

Visual and Interactive Computing

Full Papers

Interactive Multi-Level Stroke Control for Neural Style Transfer 1
Max Reimann (Hasso Plattner Institute, University of Potsdam, Germany), Benito Buchheim (Hasso Plattner Institute, University of Potsdam, Germany), Amir Semmo (Digital Masterpieces GmbH, Germany), Jürgen Döllner (Hasso Plattner Institute, University of Potsdam, Germany), and Matthias Trapp (Hasso Plattner Institute, University of Potsdam, Germany)

Sensor Simulation for Monocular Depth Estimation Using Deep Neural Networks 9
Christon Ragavan Nadar (Fraunhofer IDMT, Germany), Christian Kunert (Ilmenau University of Technology, Germany), Tobias Schwandt (Ilmenau University of Technology, Germany), and Wolfgang Broll (Ilmenau University of Technology, Germany)

Illumination-Aware Digital Image Compositing for Full-Length Human Figures 17
Masaru Ohkawara (Keio University, Japan) and Issei Fujishiro (Keio University, Japan)

Experimental Evaluation of Virtual Pottery Systems 25
Sarah Dashti (Cardiff Metropolitan University, United Kingdom), AA Navarro-Newball (Pontificia Universidad Javeriana, Colombia), Edmond Prakash (Cardiff Metropolitan University, United Kingdom), Fiaz Hussain (Cardiff Metropolitan University, United Kingdom), and Fiona Carroll (Cardiff Metropolitan University, United Kingdom)

COLiER: Collaborative Editing of Raster Images 33
Ulrike Bath (Hasso Plattner Institute, University of Potsdam, Germany), Sumit Shekhar (Hasso Plattner Institute, University of Potsdam, Germany), Jürgen Döllner (Hasso Plattner Institute, University of Potsdam, Germany), and Matthias Trapp (Hasso Plattner Institute, University of Potsdam, Germany)

Fast and Robust Registration of Multiple Depth-Sensors and Virtual Worlds 41
Andre Mühlenbrock (University of Bremen, Germany), Roland Fischer (University of Bremen, Germany), René Weller (University of Bremen, Germany), and Gabriel Zachmann (University of Bremen, Germany)

A Review of Current, Complete Augmented Reality Solutions 49
Ali Samini (Linköping University, Sweden), Karljohan Lundin Palmerius (Linköping University, Sweden), and Patric Ljung (Linköping University, Sweden)

Brain Tumor Segmentation Using Community Detection Algorithm 57
Islem Gammoudi (Université de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Université de Tunis El Manar, Faculté des Sciences Mathématiques Physiques et Naturelles de Tunis, Tunisie) and Mohamed Ali Mahjoub (Université de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie)

Example-Guided 3D Human Face Reconstruction from Sparse Landmarks 64
Jing Yuan (Beijing Normal University, China), Xingce Wang (Beijing Normal University, China), and Zhongke Wu (Beijing Normal University, China)

An Efficient Deep Network in Network Architecture for Image Classification on FPGA Accelerator 72
Alaeddine Hmidi (Monastir University, Tunisia), Malek Jihene (Sousse University, Higher institute of applied sciences and technology of sousse, Tunisia), and Maha Khemaja (PRINCE Research Group, ISITC, Tunisia)

Eye-Tracker-Free Compensation for Metamorphopsia 78
Katsuhito Moritake (University of Yamanashi, Japan), Zhenyang Zhu (University of Yamanashi, Japan), Masahiro Toyoura (University of Yamanashi, Japan), Kentaro Go (University of Yamanashi, Japan), Kenji Kashiwagi (University of Yamanashi, Japan), Issei Fujishiro (Keio University, Japan), and Xiaoyang Mao (University of Yamanashi, Japan)

Foodscover: Eliminating food Waste in the Retail Sector Through Technology 85
Wan Ting Wong (Nanyang Technological University, Singapore), Owen Noel Newton Fernando (Nanyang Technological University, Singapore), Chitra Panchapakesan (Nanyang Technological University, Singapore), and Jessica Kee (Nanyang Technological University, Singapore)

A System for Collaborative Assembly Simulation and User Performance Analysis 93
Simon Kloiber (Graz University of Technology, Austria), Volker Settgast (Fraunhofer Austria Research GmbH, Austria), Christoph Schinko (Fraunhofer Austria Research GmbH, Austria), Martin Weinzerl (AVL List GmbH, Austria), Tobias Schreck (Graz University of Technology, Austria), and Reinhold Preiner (Graz University of Technology, Austria)

End-to-End Inflorescence Measurement for Supporting Table Grape Trimming with Augmented Reality 101
Prawit Buayai (Integrated Graduate School of Medicine, Engineering, and Agricultural Sciences, University of Yamanashi, Japan), Kabin Yok-In (University of Yamanashi, Japan), Daisuke Inoue (University of Yamanashi, Japan), Chee Siang Leow (Integrated Graduate School of Medicine, Engineering, and Agricultural Sciences, University of Yamanashi, Japan), Hiromitsu Nishizaki (University of Yamanashi, Japan), Koji Makino (University of Yamanashi, Japan), and Xiaoyang Mao (University of Yamanashi, Japan)

Short Papers

Anomaly Detection and Segmentation Based on Defect Repaired Image Resynthesis 109
Wenting Dai (Nanyang Technological University, Singapore), Marius Erdt (Nanyang Technological University, Singapore), and Alexei Sourin (Nanyang Technological University, Singapore)

Blending Collision Avoidance Animation in Synthetically Generated Locomotion 113
Konstantinos Kalatzis (University of Patras, Greece) and Konstantinos Moustakas (University of Patras, Greece)

Smoke Diffusion Simulation and Physically-Based Rendering for VR 117
George Psomathianos (University of Patras, Greece), Nikitas Sourdakos (University of Patras, Greece), and Konstantinos Moustakas (University of Patras, Greece)

Virtual Assembling Using Hand Tracking with Leap Motion Controller 121
Siyi Mu (Nanyang Technological University, Singapore) and Alexei Sourin (Nanyang Technological University, Singapore)

Application of Generative Adversarial Networks and Latent Space Exploration in Music Visualisation 125
Haziq Yusoff bin Abdul Wahab (Nanyang Technological University, Singapore) and Alexei Sourin (Nanyang Technological University, Singapore)

THEMIS: Context-Sensitive Similarity Analysis for Wound Imagery Using Mathematical Model of Meaning 129
Yume Asayama (Keio University, Japan), Baoqing Wang (Keio University, Japan), Masanori Nakayama (Keio University, Japan), Hideki Shohjoh (University of Yamanashi, Japan), Noboru Adachi (University of Yamanashi, Japan), Yasushi Kiyoki (Keio University, Japan), and Issei Fujishiro (Keio University, Japan)

Poster Papers

Touch Point Prediction for Interactive Public Displays Based on Camera Images 133
Ziwei Song (Hangzhou Dianzi University, China, University of Yamanashi, Japan), Yuichiro Kinoshita (University of Yamanashi, Japan), Kentaro Go (University of Yamanashi, Japan), and Gangyong Jia (Hangzhou Dianzi University, China)

Generation of Music With Dynamics Using Deep Convolutional Generative Adversarial Network 137
Raymond Kwan How Toh (Nanyang Technological University, Singapore) and Alexei Sourin (Nanyang Technological University, Singapore)

Augmented Reality Based Support System Using Three-Dimensional-Printed Model with Accelerometer at Medical Specimen Museums 141
Atsushi Sugiura (University of Yamanashi, Japan), Toshihiro Kitama (University of Yamanashi, Japan), and Xiaoyang Mao (University of Yamanashi, Japan)

Creative Technologies - From VR and Art Aesthetics to Form and Function 145
Sarah Dashti (Cardiff Metropolitan University, United Kingdom), Irene Norbert (Cardiff Metropolitan University, United Kingdom), Edmond Prakash (Cardiff Metropolitan University, United Kingdom), Fiaz Hussain (Cardiff Metropolitan University, United Kingdom), Fiona Carroll (Cardiff Metropolitan University, United Kingdom), and AA Navarro-Newball (Pontifica Universidad Javeriana, Colombia)

Supporting Vine Vegetation Status Observation Using AR 147
Daisuke Inoue (University of Yamanashi, Japan), Prawit Buayai (University of Yamanashi, Japan), Hiromitsu Nishizaki (University of Yamanashi, Japan), Koji Makino (University of Yamanashi, Japan), and Xiaoyang Mao (University of Yamanashi, Japan)

Cognitive Human-Machine Interaction

Full Papers

Investigating the Acceptance of the Cognitive Assistant Reflect that Supports Humans in Computer-Oriented Work 151
Valeria Zitz (Karlsruhe University of Applied Sciences, Germany), Matthias Wölfel (Karlsruhe University of Applied Sciences, Germany), and Rainer Hoffmann (EnBW Energie Baden-Württemberg AG, Germany)

VR-Based Training on Handling LNG Related Emergency in the Maritime Industry 159
Yisi Liu (Fraunhofer Singapore, Singapore), Zirui Lan (Fraunhofer Singapore, Singapore), Benedikt Tschoerner (Fraunhofer Singapore, Singapore), S. S. Virdi (CEMS, Singapore Polytechnic, Singapore), Fan Li (Fraunhofer Singapore, Nanyang Technological University, Singapore), Jian Cui (Fraunhofer Singapore, Nanyang Technological University, Singapore), Olga Sourina (Fraunhofer Singapore, Nanyang Technological University, Singapore), Daniel Zhang (CEMS, Singapore Polytechnic, Singapore), and Wolfgang Müller-Wittig (Fraunhofer Singapore, Nanyang Technological University, Singapore)

Towards Increasing Adoption of Online VR in Higher Education 166
Ekaterina Prasolova-Førland (Norwegian University of Science and Technology, Norway) and Jose Garcia Estrada (Norwegian University of Science and Technology, Norway)

Algorithm for Quantitative Assessment of Cardiorespiratory Synchronization and Effectiveness of HRV Biofeedback Training 174
Anastasia Kovaleva (P.K. Anokhin Research Institute of Normal Physiology, Russia, Sports Center of Innovative Technologies and Teams Exercise Training, Russia) and Victor Anisimov (Lomonosov Moscow State University, Russia)

Entering a new Dimension in Virtual Reality Research: An Overview of Existing Toolkits, Their Features and Challenges 180
Matthias Wölfel (Karlsruhe University of Applied Sciences, Germany), Daniel Hepperle (Karlsruhe University of Applied Sciences, Germany), Christian Felix Purps (Karlsruhe University of Applied Sciences, Germany), Jonas Deuchler (Karlsruhe University of Applied Sciences, Germany), and Wladimir Hettmann (Karlsruhe University of Applied Sciences, Germany)

ML-Based Classification of eye Movement Patterns During Reading Using eye Tracking Data from an Apple iPad Device 188
Victor Anisimov (Oken Technologies Inc., Russian Federation), Konstantin Chernozatonsky (Oken Technologies Inc., Russian Federation), Andrey Pikunov (Oken Technologies Inc., Russian Federation), Ksenia Shedenko (Oken Technologies Inc., Russian Federation), Daria Zhigulskaya (Oken Technologies Inc., Russian Federation), and Arsen Revazov (Oken Technologies Inc., Russian Federation)

Development of a Support System for Judging the Appropriate Timing for Grape Harvesting 194
Tatsuyoshi Amemiya (University of Yamanashi, Japan), Kodai Akiyama (University of Yamanashi, Japan), Chee Siang Leow (University of Yamanashi, Japan), Prawit Buayai (University of Yamanashi, Japan), Koji Makino (University of Yamanashi, Japan), Xiaoyang Mao (University of Yamanashi, Japan), and Hiromitsu Nishizaki (University of Yamanashi, Japan)

Subject-Independent Drowsiness Recognition from Single-Channel EEG with an Interpretable CNN-LSTM Model 201
Jian Cui (Fraunhofer Singapore, Nanyang Technological University, Singapore), Zirui Lan (Fraunhofer Singapore, Singapore), Tianhu Zheng (Nanyang Technological University, Singapore), Yisi Liu (Fraunhofer Singapore, Singapore), Olga Sourina (Fraunhofer Singapore, Nanyang Technological University, Singapore), Lipo Wang (Nanyang Technological University, Singapore), and Wolfgang Müller-Wittig (Fraunhofer Singapore, Nanyang Technological University, Singapore)

Short Papers

Semi-Supervised Learning for Aspect-Based Sentiment Analysis 209
Hang Zheng (Hangzhou Dianzi University, China), Jianhui Zhang (Hangzhou Dianzi University, China), Yoshimi Suzuki (University of Yamanashi, Japan), Fumiyo Fukumoto (University of Yamanashi, Japan), and Hiromitsu Nishizaki (University of Yamanashi, Japan)

Emotion Recognition on Extracted EEG Fragment Based on Self-Reporting Result 213
Fangkai Zhang (Hangzhou Dianzi University, China), Xiaofeng Fu (Hangzhou Dianzi University, China), and Masaki Omata (University of Yamanashi, Japan)

Poster Papers

Research Trending Topic Prediction as Cognitive Enhancement 217
Michael Charnine (FRC CSC of the Russian Academy of Sciences, Russia), Alexey Klokov (FRC CSC of the Russian Academy of Sciences, Russia), Leon Kochiev (FRC CSC of the Russian Academy of Sciences, Russia), and Alexey Tishchenko (The Presidential Academy RANEPA, Russia)

Skin Conductance as a Real-Time Indicator of the high/low Workload During Flight Simulator Sessions (Case Study) 221
Elena Kriklenko (P.K. Anokhin Research Institute of Normal Physiology, Russia) and Anastasia Kovaleva (P.K. Anokhin Research Institute of Normal Physiology, Russia)

Evaluation of the Text Input Performance of Touch-Based Smartwatches with Different Hand Postures and in Different Body Movements 225
Wei Zhao (Hangzhou Dianzi University, China, University of Yamanashi, Japan), Kentaro Go (University of Yamanashi, Japan), Yuichiro Kinoshita (University of Yamanashi, Japan), and Zhigang Gao (Hangzhou Dianzi University, China)

Cybersecurity and Biometrics

Full Papers

Two-Stream Convolutional Neural Network for Image Source Social Network Identification 229
Alexandre Berthet (Eurecom, France), Francesco Tescari (Eurecom, France), Chiara Galdi (Eurecom, France), and Jean-Luc Dugelay (Eurecom, France)

Extending Routes in Tor to Achieve Recipient Anonymity Against the Global Adversary 238
Francesco Buccafurri (University Mediterranea of Reggio Calabria, Italy), Vincenzo De Angelis (University Mediterranea of Reggio Calabria, Italy), Maria Francesca Idone (University Mediterranea of Reggio Calabria, Italy), and Cecilia Labrini (University Mediterranea of Reggio Calabria, Italy)

How Artificial Intelligence can be used for Behavioral Identification? 246
Yris Brice Wandji Piugie (FIME EMEA, France, Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, France), Joël Di Manno (FIME EMEA, France), Christophe Rosenberger (Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, France), and Christophe Charrier (Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, France)

Multi-Modal Aesthetic System for Person Identification 254
Brandon Sieu (The University of Calgary, Canada) and Marina Gavrilova (The University of Calgary, Canada)

Secure Transmission of Medical Images Using Improved Hybrid Cryptosystem: Authentication, Confidentiality and Integrity 262
Amal Hafsa (Monastir University, Faculty of Sciences of Monastir, Laboratory of Electronics and Microelectronics, Tunisia)

Biometric Template Security Using Watermarking Reinforcement Based Cancellable Transformation 270
Samira Bader (LATIS - Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie), Lamia Rzouga Haddada (LATIS - Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie), and Najoua Essoukri Ben Amara (LATIS - Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie)

Face Transparent User Authentication Respecting Privacy 278
Guiga Takoua (Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, France), Schwartzmann Jean-Jacques (Orange Labs, France), and Rosenberger Christophe (Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, France)

Short Papers

Effectiveness of Decoder Transformer Network in Breaking Low-Resource Real-Time Text Captcha System 287
Rajat Subhra Bhowmick (Indian Institute of Engineering Science & Technology, India), Isha Ganguli (Indian Institute of Engineering Science & Technology, India), Jayanta Paul (Indian Institute of Engineering Science & Technology, India), and Jaya Sil (Indian Institute of Engineering Science & Technology, India)

Privacy-Preserving Keystroke Analysis Using Fully Homomorphic Encryption & Differential Privacy 291
Jatan Loya (Vishwakarma Institute of Technology, India) and Tejas Bana (D.Y. Patil College of Engineering, India)

Keystroke Dynamics Classification Based On LSTM and BLSTM Models 295
Abir Mhenni (Université de Sousse, Institut Supérieur d'Informatique et des Technologies de Communication de Hammam Sousse, Tunisie), Christophe Rosenberger (Normandie University, UNICAEN, ENSICAEN, CNRS, GREYC, France), and Najoua Essoukri Ben Amara (Université de Sousse, Ecole Nationale d'Ing ´enieurs de Sousse, Tunisie)

Adversarial Attacks in a Multi-View Setting: An Empirical Study of the Adversarial Patches Inter-View Transferability 299
Bilel Tarchoun (LATIS- Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie), Ihsen Alouani (IEMN-DOAE, Universite polytechnique Hauts-de-France, France), Anouar Ben Khalifa (LATIS- Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie), and Mohamed Ali Mahjoub (LATIS- Laboratory of Advanced Technology and Intelligent Systems, Universite de Sousse, Ecole Nationale d'Ingénieurs de Sousse, Tunisie)

Poster Paper

Trusted Artificial Intelligence: Technique Requirements and Best Practices 303
Tao Zhang (Guangxi Key Laboratory of Trusted Software & Guangxi Key Laboratory of Cryptography and Information Security, Guilin University of Electronic Technology, China, Guangxi Key Laboratory of Hybrid Computation and IC Design Analysis, Guangxi University for Nationalities, China), Yi Qin (Guilin University of Electronic Technology, China), and Qiang Li (Henan Key Laboratory of Network Cryptography Technology, PLA Information Engineering University, China)

Author Index **307**