## 2020 11th International Green and Sustainable Computing Workshops (IGSC 2020)

Pullman, Washington, USA 19 – 22 October 2020



**IEEE Catalog Number: ISBN:** 

CFP2028K-POD 978-1-6654-1553-8

## Copyright © 2020 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:
 CFP2028K-POD

 ISBN (Print-On-Demand):
 978-1-6654-1553-8

 ISBN (Online):
 978-1-6654-1552-1

## **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



## TABLE OF CONTENTS

PROFILING ENERGY CONSUMPTION OF DEEP NEURAL NETWORKS ON NVIDIA JETSON NANO	1
Stephan Holly, Alexander Wendt, Martin Lechner	
LOW SIZE, WEIGHT, AND POWER NEUROMORPHIC COMPUTING TO IMPROVE COMBUSTION ENGINE EFFICIENCY	7
MEMRISTOR BASED NEUROMORPHIC NETWORK SECURITY SYSTEM CAPABLE OF ONLINE INCREMENTAL LEARNING AND ANOMALY DETECTION	15
MEMRISTIVE DEVICE VARIABILITY PERFORMANCE IMPACT ON NEUROMORPHIC MACHINE LEARNING HARDWARE	23
COMPARATIVE STUDY OF PERSISTENTLY SECURE NON-VOLATILE PROCESSORS TOWARDS DESIGNING SECURE IOT DEVICES	30
CONVERSION OF AN UNSUPERVISED ANOMALY DETECTION SYSTEM TO SPIKING NEURAL NETWORK FOR CAR HACKING IDENTIFICATION	38
NORMALLY-OFF COMPUTING DESIGN METHODOLOGY USING SPINTRONICS: FROM DEVICE TO ARCHITECTURES	42
RECENT ADVANCES IN RESERVOIR COMPUTING WITH A FOCUS ON ELECTRONIC RESERVOIRS	46
AN IMPROVED STOCHASTIC-BASED APPROACH FOR OPTIMIZING ENERGY-TIME TRADEOFF IN MULTICORE SYSTEMS	54
SMARTATTACK: OPEN-SOURCE ATTACK MODELS FOR ENABLING SECURITY RESEARCH IN SMART HOMES	62
RELIABILITY-PERFORMANCE TRADE-OFFS IN NEUROMORPHIC COMPUTING Twisha Titirsha, Anup Das	70
INTERCONNECTED ENERGY HUBS INCLUDING DERS TARGETED BY FDI CYBERATTACKS	75
A COMPREHENSIVE REVIEW OF ML-BASED TIME-SERIES AND SIGNAL PROCESSING TECHNIQUES AND THEIR HARDWARE IMPLEMENTATIONS	81

ARCHITECTURES	80
Biswadip Maity, Bryan Donyanavard, Nikil Dutt	07
ANALYSIS OF THE NUMBER OF PASSENGERS IN CONSECUTIVE NATIONAL HOLIDAY COLLECTED WITH A PRACTICAL MANAGEMENT SUPPORT SYSTEM IN THE CASE OF COMMUNITY BUS OF SHINGU TOWN IN JAPAN	97
EXPLORING ENERGY-ACCURACY TRADEOFFS IN AI HARDWARE  Cory Merkel	. 105
ALGORITHM-HARDWARE CO-DESIGN IN COMPUTING SYSTEMS: FROM EMBEDDED SYSTEMS TO THE CLOUD	. 112
DESIGN METHODOLOGIES FOR RELIABLE AND ENERGY-EFFICIENT PCM SYSTEMS	. 115
ENERGY EFFICIENT DATA CENTERS POWERED BY ON-SITE RENEWABLE ENERGY AND UPS DEVICES	. 118
COMPILING SPIKING NEURAL NETWORKS TO MITIGATE NEUROMORPHIC HARDWARE CONSTRAINTS	. 121
MODELING ENERGY EFFICIENCY OF FUTURE GREEN DATA CENTERS	. 124
Author Index	