

# **2021 IEEE International Conference on Internet of Things and Intelligence Systems (IoTaIS 2021)**

**Bandung, Indonesia  
23-24 November 2021**



**IEEE Catalog Number: CFP21VVK-POD  
ISBN: 978-1-6654-2036-5**

**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:	CFP21VVK-POD
ISBN (Print-On-Demand):	978-1-6654-2036-5
ISBN (Online):	978-1-6654-2035-8

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

**THE 2021 IEEE INTERNATIONAL CONFERENCE ON  
INTERNET OF THINGS AND INTELLIGENCE SYSTEM  
NOVEMBER 23 - 24, 2021**

**TABLE OF CONTENTS**

Cover Proceedings of IoTaIS 2021 .....	i
Table of Contents .....	iii
Welcome Message from Chair of IoTaIS 2021 .....	viii
Program at a Glance .....	ix
Keynote Speakers - Dr. Pascal Thubert .....	x
Keynote Speakers - Dr. Jorge Pereira .....	xi
Keynote Speakers - Prof. Ari Pouttu .....	xii
The Committees of IoTaIS 2021 .....	xiii
Author Index .....	xx
Conception of a Generic IoT Device Life Cycle Model .....	1
<i>Steffen Späthe</i>	
Comparison and Evaluation of LwM2M and MQTT in Low-Power Wide-Area Networks.....	8
<i>Alessandro Parmigiani, Uwe Dettmar</i>	
Bio-Floc Monitoring and Automatic Controlling System Using IoT.....	15
<i>Kushik Kumar Saha, Ashraful Islam, Sakib Shahriar Joy, Ishmam Writwik, Kawshik Shikder</i>	
Threats and Attacks to Modern Vehicles.....	22
<i>Simon Philipsen, Birger Andersen, Bhupjit Singh</i>	
Outcome-Based Business Design in IoT-Enabled Digital Supply Chain Transformation.....	28
<i>Paul Grefen, Anna Wilbik, Frank Kuitens, Menno Blanken</i>	
A Comparative Study of Software Architectures in Constrained Device IoT Deployments.....	35
<i>Shani du Plessis, Noelia Correia</i>	

**THE 2021 IEEE INTERNATIONAL CONFERENCE ON  
INTERNET OF THINGS AND INTELLIGENCE SYSTEM  
NOVEMBER 23 - 24, 2021**

Smart Monitoring System for Stroke Rehabilitation.....	42
<i>Mehnaz Ummar, Hania Khafagy, Zainab Jamil, Mais Al Atallah, Fadi Aloul, Assim Sagahyoon</i>	
Semantic Search System for Real Time Occupancy .....	49
<i>Parwinder Singh, Karthikeya Acharya, Michail Beliatis, Mirko Alexander Presser</i>	
A Circuit-Embedded Reservoir Computer for Smart Noise Reduction of MCG Signals.....	56
<i>Biraj Shakya, Mostafa M. Fouda, Steve Chiu, Zubair Md Fadlullah</i>	
Simpler and Enhanced Multifactorial Evolutionary Algorithms for Continuous Optimization Tasks.....	62
<i>Yangyang Chang, Gerald E. Sobelman</i>	
Cost-Effective Mission Assurance Engineering Through Simulation.....	67
<i>Karl A Siil, Avi Rubin, Matthew C. Elder, Anton T Dahbura, Matthew Green, Lanier Watkins</i>	
Digital Contact Tracing Using IP Colocation.....	73
<i>Matthew Malloy, Aaron Cahn, Jon Koller</i>	
PiBase: An IoT-Based Security System Using Google Firebase and Raspberry Pi.....	79
<i>Venkata Siva Kumar Margapuri, Niketa Penumajji, Mitchell L Neilsen</i>	
On Energy-Efficient UAV Route Scheduling to Offload Health Data from Under-Served Rural Communities.....	86
<i>Tahrat Tazrin, Zeba Ayaz, Mostafa M. Fouda, Zubair Md Fadlullah</i>	
A Systematic Comparison of Traditional and Hybrid AI Models for NHANES Big Data Analytics.....	92
<i>Komal Barge, Nidhi Patel, Mostafa M. Fouda, Zubair Md Fadlullah</i>	
An Explainable AI Model for Interpretable Lung Disease Classification.....	98
<i>Vidhi Pitroda, Mostafa M. Fouda, Zubair Md Fadlullah</i>	
Narrow Band Digital Filtering Approach for CR-IoT Node with Carrier Aggregation Using Zero/Pole Placement.....	104
<i>Modar Shbat</i>	
Exploring the Characteristics and Limits of LoRaWAN.....	110
<i>David E Murray, Terry Koziniec, Andre deSouza</i>	

**THE 2021 IEEE INTERNATIONAL CONFERENCE ON  
INTERNET OF THINGS AND INTELLIGENCE SYSTEM  
NOVEMBER 23 - 24, 2021**

Analysis of ONOS Clustering Performance on Software Defined Network.....	117
<i>Kinanthi A Septian, Istikmal Istikmal, Ishak Ginting</i>	
5G Fixed Wireless Access Network for Urban Residential Market: A Case of Indonesia.....	123
<i>Muhammad Imam Nashiruddin, Muhammad Kevin Adityo, Muhammad Adam Nugraha</i>	
Electroencephalogram-Based User Authentication System for Bank Vault Security.....	129
<i>Melchizedek I Alipio</i>	
Experimental Analysis of WSN Based Solution for Early Forest Fire Detection.....	136
<i>Sayantani Bhattacharya, Sherin M. A, Poonguzhali P, Raja Vasudevan, Lokeshwar S, Vaibhav M, Sridevi S</i>	
Improving an IoT-Based Motor Health Predictive Maintenance System Through Edge- Cloud Computing.....	142
<i>Wilson Tan, Kristine-Clair Lee, Christian Villamera, Carlos Adrian Daroya, Paolo Samontanez</i>	
Deep Learning Algorithm for Picture Frame Detection on Social Media Videos.....	149
<i>Fucheng Zheng, Cheng Yang, Peter Han Joo Chong, George Wang, G G Md Nawaz Ali, Patrick Lam</i>	
ECG-Based Heart Arrhythmia Diagnosis Through Attentional Convolutional Neural Networks.....	156
<i>Ziyu Liu, Xiang Zhang</i>	
Bok Choy Leaf Diseases Detection Using Convolutional Neural Network Method.....	163
<i>Michael Susila, Budhi Irawan, Casi Setianingsih, Dony Tontiaro, Adli Farhan Ibrahim, E. Nur Furqon</i>	
Optimizing Deep Convolutional Neural Network with Fine-Tuning and Data Augmentation for Covid-19 Prediction .....	169
<i>Abdusy Syarif, Novi Azman, Ernawati Sinaga</i>	
Performance Analysis on Artificial Neural Network Based State of Charge Estimation for Electric Vehicles .....	176
<i>Aaruththiran Manoharan, Mumtaj Begam Kasim Rawthar, Vimal Rau Aparow, Denesh Sooriamoorthy</i>	

**THE 2021 IEEE INTERNATIONAL CONFERENCE ON  
INTERNET OF THINGS AND INTELLIGENCE SYSTEM  
NOVEMBER 23 - 24, 2021**

AI-Based Models for Resource Allocation and Resource Demand Forecasting Systems in Aviation: A Survey and Analytical Study .....	183
<i>Dina Hejji, Manar Abu Talib, Qassim MH Nasir, Ali Bou Nassif, Ahmed Bouridane</i>	
Code Saga - A Mobile Serious Game for Learning Programming .....	190
<i>Heeya Tacouri, Leckraj Nagowah</i>	
Development of Smart Indoor Workplace System Using Decision Tree Algorithm .....	196
<i>Melchizedek I Alipio</i>	
Lie Detector with Eye Movement and Eye Blinks Analysis Based on Image Processing Using Viola-Jones Algorithm .....	203
<i>Aziz Perdana, Muhammad Nasrun, Casi Setianingsih, Muhammad Ary Murti, Andi Sitti Syathirah, Al Agias Bayu Asa, Irene Gloria Paulina Nainggolan, Nesa Cristin Natalia</i>	
Data Distribution Platform for Smart City Applications .....	210
<i>Sethukkarasi C, K Pal Amutha, Poonguzhali P, Sridevi S</i>	
System Configuration of Human-In-The-Loop Simulation for Level 3 Autonomous Vehicle Using IPG CarMaker .....	215
<i>Vimal Rau Aparow, Cheek Jun Hong</i>	
Budgeting System in Event Management Application Using Web-Based Genetic Algorithms .....	222
<i>Surya Muhammad, Roswan Latuconsina, Casi Setianingsih</i>	
Energy Management of Dual Energy Sources Pure Electric Vehicle Based on Fuzzy Control.....	228
<i>Yunqi Lu, Shengyong Liu, MingHui Wu, Dehao Kong</i>	
Behavioral Disorder Test to Identify Attention- Deficit / Hyperactivity Disorder (ADHD) in Children Using Fuzzy Algorithm.....	234
<i>Nola Ristiyanti, Burhanuddin Dirgantoro, Casi Setianingsih</i>	
Smart Domestic Water Management System.....	241
<i>Ashraf A Zaher, Abdul Mohsen Al-Refaei, Ahmad Al-Enezi, Talal Al-Azemi</i>	
Power Factor Correction Control Based on Internet of Things Using Lumped Compensation Capacitor Bank.....	247
<i>Arin Juan Sari, Muhammad Ary Murti, Ig. Prasetya Dwi Wibawa</i>	

THE 2021 IEEE INTERNATIONAL CONFERENCE ON  
INTERNET OF THINGS AND INTELLIGENCE SYSTEM  
NOVEMBER 23 - 24, 2021

Earthquake Disaster Mitigation Based on Peak Ground Acceleration with Multi-Sensor System.....	254
<i>Casi Setianingsih, Muhammad Ary Murti, Alifi Wicaksono, Randy Saputra, Dimas Pangestu</i>	
Ubiquitous System Integration as a Service in Smart Factories.....	261
<i>Mirco Soderi, Vignesh Kamath, Jeff Morgan, John Breslin</i>	