

# Advances in Internet of Things



ISSN: 2161-6817



# JOURNAL EDITORIAL BOARD

ISSN 2161-6817 (Print) ISSN 2161-6825 (Online)

<https://www.scirp.org/journal/ait>

---

## Editor-in-Chief

**Prof. Ammar Rayes**

Cisco Systems Inc., USA

## Honorary Editor-in-Chief

**Prof. Guo-Ping Liu**

University of South Wales, UK

## Editorial Board

**Dr. Faruq A. Al-Omari**

Yarmouk University, Jordan

**Dr. Yas Alsultanny**

Arabian Gulf University, Bahrain

**Dr. Richard R. Brooks**

Clemson University, USA

**Dr. Roberto Caldelli**

University of Florence, Italy

**Prof. Mohuya Chakraborty**

Institute of Engineering & Management, India

**Prof. Chin-Ling Chen**

Chaoyang University of Technology, Chinese Taipei

**Dr. Kuo-Sheng Cheng**

National Cheng Kung University, Chinese Taipei

**Prof. Shuo-Yan Chou**

National Taiwan University of Science and Technology, Chinese Taipei

**Dr. Ashraf Darwish**

Helwan University, Egypt

**Dr. Yanfei Fan**

Oracle America, USA

**Prof. Jacques Fayolle**

University of Saint-Etienne, France

**Prof. Jing-Ming Guo**

National Taiwan University of Science and Technology, Chinese Taipei

**Prof. Bruce C. Kim**

City University of New York, USA

**Dr. Ning Kong**

China Internet Network Information Center, China

**Prof. Huansheng Ning**

University of Science and Technology Beijing, China

**Dr. Mustafa Sanli**

Aselsan Inc., Turkey

**Dr. Manolis Vavalis**

University of Thessaly, Greece

**Prof. Junru Wu**

The University of Vermont, USA

**Prof. Ping Yan**

Anhui Agricultural University, China

**Dr. Chia-Hung Yeh**

National Sun Yat-sen University, Chinese Taipei

**Dr. Zheng-Jun Zha**

National University of Singapore, Singapore

**Prof. Liying Zheng**

Harbin Engineering University, China

# Table of Contents

**Volume 11    Number 1**

**January 2021**

**Development and Evaluation of an Optical Sensing System  
for Detection of Herbicide Spray Droplets**

Y. B. Huang, W. Ma, D. Fisher.....1

**A Hybrid Intrusion Detection System for Smart Home Security  
Based on Machine Learning and User Behavior**

F. Alghayadh, D. Debnath.....10

**Performance Analysis of the Hybrid MQTT/UMA and Restful IoT Security Model**

O. H. Alhazmi, K. S. Aloufi.....26

**Python Software Integrates with Microcontrollers and Electronic Hardware  
to Ease Development for Open-Source Research and Scientific Applications**

D. K. Fisher, R. S. Fletcher, S. S. Anapalli.....42

# Advances in Internet of Things (AIT)

## Journal Information

### SUBSCRIPTIONS

The *Advances in Internet of Things* (Online at Scientific Research Publishing, <https://www.scirp.org/>) is published quarterly by Scientific Research Publishing, Inc., USA.

#### Subscription rates:

Print: \$79 per issue.

To subscribe, please contact Journals Subscriptions Department, E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### SERVICES

#### Advertisements

Advertisement Sales Department, E-mail: [service@scirp.org](mailto:service@scirp.org)

#### Reprints (minimum quantity 100 copies)

Reprints Co-ordinator, Scientific Research Publishing, Inc., USA.

E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### COPYRIGHT

#### Copyright and reuse rights for the front matter of the journal:

Copyright © 2021 by Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>

#### Copyright for individual papers of the journal:

Copyright © 2021 by author(s) and Scientific Research Publishing Inc.

#### Reuse rights for individual papers:

Note: At SCIRP authors can choose between CC BY and CC BY-NC. Please consult each paper for its reuse rights.

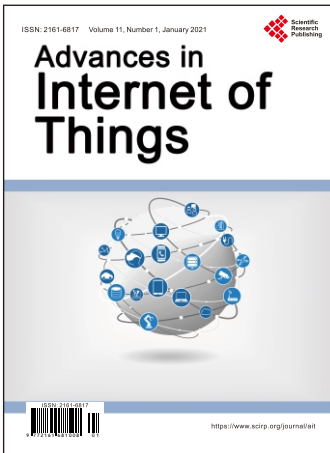
#### Disclaimer of liability

Statements and opinions expressed in the articles and communications are those of the individual contributors and not the statements and opinion of Scientific Research Publishing, Inc. We assume no responsibility or liability for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained herein. We expressly disclaim any implied warranties of merchantability or fitness for a particular purpose. If expert assistance is required, the services of a competent professional person should be sought.

### PRODUCTION INFORMATION

For manuscripts that have been accepted for publication, please contact:

E-mail: [ait@scirp.org](mailto:ait@scirp.org)



# Advances in Internet of Things

ISSN 2161-6817 (Print) ISSN 2161-6825 (Online)

<https://www.scirp.org/journal/ait>

Advances in Internet of Things is an international journal dedicated to the latest advancement of impact of the Internet to the society. The goal of this journal is to provide a platform for scientists, students, academics and engineers all over the world to promote, share, and discuss various new issues and developments in different areas of Advances in Internet of Things.

## Editor-in-Chief

Prof. Ammar Rayes

Cisco Systems Inc., USA

## Honorary Editor-in-Chief

Prof. Guo-Ping Liu

University of South Wales, UK

## Subject Coverage

The aim of the Advances in Internet of Things is to provide a forum for scientists and social workers to present and discuss issues in the impact of the Internet to the society and disseminate findings in scientific research on related subjects. The scope of the journal includes but is not limited to:

- Applications of the Internet of Things
- Artificial Intelligence
- Cloud and Services Computing
- Communications Network Technology
- Computer Networks
- Connection of Everyday Objects to the Internet
- Control of Networks
- Control over Networks
- E-Business
- E-Education
- E-Health
- Fine Arts and Media in the Internet
- Global Positioning Systems
- Home Networking
- Image Processing
- Infrared Sensors
- Internet and Online Services
- Internet of Things Communication Systems
- Internet of Things Network Infrastructures
- IP Multimedia Subsystem (IMS)
- Ipv6
- Laser Scanner
- Linking "Things" to Location and Users
- Location and Tracking of Objects
- M2M
- Mobile Ad Hoc Network (MANET) and Sensor Networks
- Network Protocols
- Network Security
- New Business Models Built around the Internet
- Online Communities and Social Networks
- P2P Networking and System
- Radio Frequency Identification
- RFID and Tagging Technologies
- Securing Information Technology
- Sensor Technology
- Text and Graphics Recognition
- Web Services

We are also interested in short papers (letters) that clearly address a specific problem, and short survey or position papers that sketch the results or problems on a specific topic. Authors of selected short papers would be invited to write a regular paper on the same topic for future issues of the **AIT**.

## Notes for Intending Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Paper submission will be handled electronically through the website. All papers are refereed through a peer review process. For more details about the submissions, please access the website.

## Website and E-Mail

<https://www.scirp.org/journal/ait>

E-mail: [ait@scirp.org](mailto:ait@scirp.org)

## ***What is SCIRP?***

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

## ***What is Open Access?***

All original research papers published by SCIRP are made freely and permanently accessible online immediately upon publication. To be able to provide open access journals, SCIRP defrays operation costs from authors and subscription charges only for its printed version. Open access publishing allows an immediate, worldwide, barrier-free, open access to the full text of research papers, which is in the best interests of the scientific community.

- High visibility for maximum global exposure with open access publishing model
- Rigorous peer review of research papers
- Prompt faster publication with less cost
- Guaranteed targeted, multidisciplinary audience



**Scientific  
Research  
Publishing**

**Website: <https://www.scirp.org>**

**Subscription: [sub@scirp.org](mailto:sub@scirp.org)**

**Advertisement: [service@scirp.org](mailto:service@scirp.org)**