ASEAN IVO:
To Solve Common Social Challenges

Hiroshi EMOTO
NICT, Japan
2021.7
ICT R&D

ICT is Borderless
- Network Security
- Information Sharing
- Standardization

Global Issues to Tackle
- Global Warming, Environments, Food, Population Explosion,
- Energy, Disasters, Digital Divide

Bi-lateral Collaborations ➔ Global Alliance

To solve social problems such as traffic, energy, agriculture, and more.
To share social benefit of ICT technologies in the borderless internet society.
To strengthen partnerships of global collaboration and cooperation.

Importance of Global Partnership
ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)

Feb. 2015, 2nd ASEAN-NICT ICT Roundtable

All members participated agreed to establish ASEAN IVO (ICT Virtual Organization of ASEAN Institutes and NICT)

Goal:
The mission of ASEAN IVO is to seek and identify strategic ICT research areas in the ASEAN region, and promote collaborative projects in them.

ASEAN IVO is a global alliance of ICT R&D institutes and universities in the ASEAN region and Japan, it is operated and represented by a Steering Committee of representatives from 10 ASEAN countries and Japan.
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<tr>
<th>Country</th>
<th>Organization</th>
<th>Name</th>
<th>Position</th>
</tr>
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<tbody>
<tr>
<td>Brunei</td>
<td>Universiti Brunei Darussalam (UBD)</td>
<td>Dr. Hj Ghani bin Hj Naim</td>
<td>Director of Information Communication Technology Centre (ICTC) and Director of the Institute of Applied Data Analytics</td>
</tr>
<tr>
<td></td>
<td>Universiti Teknologi Brunei (UTB)</td>
<td>Assoc. Prof. Dr. Somnuk Phon-Amnuaisuk</td>
<td>Director, Centre for Innovative Engineering at UTB</td>
</tr>
<tr>
<td>Cambodia</td>
<td>National Institute of Posts, Telecommunications and Information and Communications Technology (NIPTICT)</td>
<td>Dr. Sam Sethserey</td>
<td>Vice President</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Ministry of Communications and Information Technology (MCIT)</td>
<td>Mrs. Woroindah Widiastuti</td>
<td>Senior Technology Advisor</td>
</tr>
<tr>
<td></td>
<td>Telkom University (Tel-U)</td>
<td>Ir. MSc. PhD. Ashwin Sasongko SASTROSUBROTO</td>
<td>Chairman of Telkom University Research Center for ICT Public and Business Policy</td>
</tr>
<tr>
<td>Laos</td>
<td>National University of Laos (NUOL)</td>
<td>Dr. Somphone KANTHAVONG</td>
<td>Vice Dean of the Faculty of Engineering</td>
</tr>
<tr>
<td>Malaysia</td>
<td>MIMOS Berhad (Malaysian Institute of Microelectronic Systems)</td>
<td>Dr. Choong Khong Neng</td>
<td>Senior Director, Wireless Innovation</td>
</tr>
<tr>
<td></td>
<td>Universiti Teknologi Malaysia (UTM)</td>
<td>Prof. Ir. Dr. Abu Sahmah Bin Mohd Supa’at</td>
<td>Dean of Research, Innovative Engineering Research Alliance</td>
</tr>
<tr>
<td>Myanmar</td>
<td>University of Computer Studies, Yangon (UCSY)</td>
<td>Prof. Dr. Myint Myint Sein (Ms.)</td>
<td>Pro-Rector</td>
</tr>
<tr>
<td>Philippines</td>
<td>Mapua Institute of Technology (MIT)</td>
<td>Prof. Alejandro Ballado</td>
<td>Dean, School of Electrical, Electronics and Computer Engineering</td>
</tr>
<tr>
<td></td>
<td>Department of Science and Technology – Advanced Science and Technology Institute (DOST-ASTI)</td>
<td>Franz A. de Leon, Ph.D.</td>
<td>Director IV</td>
</tr>
<tr>
<td>Singapore</td>
<td>Institute for Infocomm Research (I^2R)</td>
<td>Dr. Lye Kin Mun</td>
<td>Executive Director</td>
</tr>
<tr>
<td></td>
<td>National University of Singapore (NUS)</td>
<td>Prof. Aaron Thean</td>
<td>Dean of Faculty of Engineering</td>
</tr>
<tr>
<td>Thailand</td>
<td>Chulalongkorn University</td>
<td>Asst. Prof. Dr. Widhyakorn Asdornwised</td>
<td>Department of Electrical Engineering, Faculty of Engineering</td>
</tr>
<tr>
<td></td>
<td>National Electronics and Computer Technology Center (NECTEC)</td>
<td>Dr. Chai Wutiwiwatchai</td>
<td>Executive Director</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Posts and Telecommunications Institute of Technology (PTIT)</td>
<td>Assoc. Prof. Dr. Habil., Dr.-Ing. HOANG Dang Hai</td>
<td>Vice President</td>
</tr>
<tr>
<td></td>
<td>Vietnam National University, University of Engineering and Technology (VNU UET)</td>
<td>Prof. NGUYEN Thanh Thuy</td>
<td>Professor, Director of AI Key Lab.</td>
</tr>
<tr>
<td>Japan</td>
<td>National Institute of Information and Communications Technology (NICT)</td>
<td>Dr. Hiroyuki Yano</td>
<td>Vice President, Member of the Board of Directors</td>
</tr>
</tbody>
</table>
Members:
Country: 10 countries of ASEAN region + Japan
Institution: 69 institutions as for 2021.9
(BRN: 2, KHM: 2, IDN: 8, LAO: 2, MYS: 14, MMR: 7, PHL: 5, SGP: 6, THA: 10, VNM: 10, JPN: 3)
Activities of ASEAN IVO

**ASEAN IVO Forum**
The Forum provides a place for all ASEAN IVO members to exchange ideas, discuss R&D topics and coordinate projects. Any and all members of ASEAN IVO can apply for the Forum.

*Past forum:*
2015. 11: Kuala Lumpur (Malaysia) 2016. 11: Hanoi (Vietnam)
2017. 11: Bandar Seri Begawan (Brunei) 2018. 11: Jakarta (Indonesia)
2019. 11: Manila (Philippines) 2020. 11: Online
2021. 11: Online *(planning)*

**ASEAN IVO Project**
at minimum 2 institutions total, and from at least 2 different countries in the ASEAN region (Max.: 2 years)

From 2016. 4: 8 projects From 2017. 4: 5 projects
From 2018. 4: 6 projects From 2019. 4: 5 projects
From 2020. 4: 4 projects From 2021. 4: 5 projects

Total: 33 projects

**ASEAN IVO Steering Committee**
To decide the R&D topics, operate the annual events, select the projects through email discussion and face to face meeting.
Activities of ASEAN IVO

ASEAN IVO Forum

To promote the ICT R&D, the Forum provides a place for all ASEAN IVO members to exchange ideas, discuss R&D topics and coordinate projects. Any and all members of ASEAN IVO can apply for the Forum.

ASEAN IVO Forum 2021 - Call for Presentations -
- Deadline for submission of abstracts: October 15, 2021
- Notification of acceptance: November 1, 2021

ASEAN IVO Projects

From core research to real world application, ASEAN IVO projects focus on a broad range of topics in the field of ICT. Particularly with regards to providing solutions for specific regional needs or environmental or social problems, great emphasis is placed on not just fundamental research but practical solutions.

- Call for Proposals 2022 will be open soon (tentative: November)
- 2022 Topics (tentative):
  - ICT for food
  - ICT for Environment Protection and Disaster Prevention
  - ICT for a Secure and Smart Community
  - ICT for Health and Welfare
  - ICT related Technologies and Applications
## Female Researchers Activities

### Projects led by female researchers

<table>
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<tr>
<th>F.Y.</th>
<th>Project</th>
<th>Leader</th>
<th>Institution</th>
<th>Country</th>
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<tbody>
<tr>
<td>2016-3</td>
<td>Mobile IoT</td>
<td>Dr. Sumei Sun</td>
<td>I2R</td>
<td>Singapore</td>
</tr>
<tr>
<td>2017-4</td>
<td>Evapotranspiration (ET)-Based Irrigation System with Internet of Things (IoT) Integration for Smart Farming Application Addressing the ASEAN Impending Water Crisis</td>
<td>Dr. Jennifer Dela Cruz</td>
<td>Mapua Univ.</td>
<td>Philippines</td>
</tr>
<tr>
<td>2017-5</td>
<td>Study and evaluation of heterogeneous network for smart community and smart city applications</td>
<td>Dr. Kultida Rojviboonchai</td>
<td>Chulalongkorn Univ.</td>
<td>Thailand</td>
</tr>
<tr>
<td>2018-3</td>
<td>Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performance Greenhouse Plants</td>
<td>Dr. Thu Ngo-Quynh</td>
<td>Hanoi University of Science and Technology</td>
<td>Vietnam</td>
</tr>
<tr>
<td>2018-4</td>
<td>Smart Aquaculture Quality Monitoring (AQM) System with Internet of Things (IoT)</td>
<td>Dr. Widad Ismail</td>
<td>Universiti Sains</td>
<td>Malaysia</td>
</tr>
<tr>
<td>2018-5</td>
<td><strong>NAPC: Networked ASEAN Peat Swamp Forest Communities</strong></td>
<td>Dr. Aduwati Sali</td>
<td>Universiti Putra Malaysia</td>
<td>Malaysia</td>
</tr>
<tr>
<td>2019-2</td>
<td>FarmTab: Precision Agriculture System using Internet of Things and Artificial Intelligence for Urban Farming</td>
<td>Dr. Chong Yung Wey</td>
<td>Universiti Sains</td>
<td>Malaysia</td>
</tr>
<tr>
<td>2021-3</td>
<td>IoT System for Water Reuse in Developing Cities</td>
<td>Dr. Choe Peng Leo</td>
<td>Universiti Sains</td>
<td>Malaysia</td>
</tr>
</tbody>
</table>
**Project: Mobile IoT**

**Project Leader:** Sun Sumei (I²R)

**Project members:** Fumihide Kojima (NICT), Kentaro Ishizu (NICT), Nobuyuki Asai (NICT), Hoang Vinh Dien (NICT), Thu Ngo-Quynh (HUST), Giang Nguyen-Linh (HUST), Binh Huynh-Thanh (HUST), Nordin Ramli (MIMOS), and Ernest Kurniawan (I²R).

**Duration:** 1 April 2016 – 31 March 2018

**Target of this project:** We consider a Mobile IoT deployment with multiple sensor nodes and mobile gateways, and addressed some challenges pertaining to connectivity optimization, node placement, protocol stack development, and low latency scheduling. We also developed some testbeds to demonstrate the potential of the technology in addressing real world problems such as environment monitoring, video surveillance, as well as wireless grid application.

**Findings and Outcomes:**
- Dynamic prioritization mechanism in LTE network
- Node placement for coverage and connectivity optimization among sensors, gateways, and sinks.
- Low latency scheduling for large scale networks
- System testbeds of Mobile IoT applications.

**Collaborations:**
- Discussions and idea exchange among the members from NICT, I²R, HUST, and MIMOS.
- Joint authorship of papers by HUST and I²R.
- Jointly develop system testbed of Mobile IoT addressing different application scenarios.

**Broader Impact and Future Developments:**
- Wider application of the technology in other countries, especially in the developing countries.
- Benefits other projects within ASEAN-IVO such as smart farming and smart aquaculture.

**Social Contribution:**
- Published several research articles on international conferences and journals.
- Contributed to standardizations and patents.
- Participated in public exhibitions and forums.
Project: Mobile IoT

Smart city/urban

Mobile Gateway (fixed route)

Cloud data center

Fixed GW

Smart agriculture/sub-urban

Testbed Development

Sensor node

Project team

Mobile gateway

Dr. Sumei Sun

From Project Report
Project: Evapotranspiration (ET)-Based Irrigation System with Internet of Things (IoT) Integration for Smart Farming Application Addressing the ASEAN Impending Water Crisis

Project Leader: Jennifer C. Dela Cruz, Ph.D / Mapua University

Project members: Meo Vincent Caya-MU, Febus Reidj Cruz-MU, Joseph Bryan Ibarra-MU, Ireneo Agulto-CLSU, Adrian Chummac-CLSU, Nadiatulhuda Zulkifli-UTM, Sevia Idrus-UTM, Muhammad Al Farabi Muhammad Iqbal –UTM, Khin Than Mya-UCSY, Eiji Kawai-NICT

Duration: June 2017 (3 years)

Target of this project: This work involves developing an irrigation system that determines the amount of water to be provided based on water loss due to the Evapotranspiration (ET) process. The computed amount of water was based on data from an automatic weather station (AWS) sensor suites installed in the plantation plot. The system comprises of microcontroller with the integration of sensors, actuator, and valve modules where each node serves as an IoT device. The computed amount of water for irrigation is based on Penman model or Hargreaves equation. The data will also be sent to the IoT server cloud services to be made available via graphical displays in mobile applications.

Findings and Outcomes:
1. New Kc values for 6 different crops.
2. ET can save 60-70% of water compared to traditional irrigation
3. Project can be implemented in urban setting like IoT irrigation in public parks
4. Deficit irrigation can be combined with ET

Collaborations:
Mapua University (MU): collaboration of overall technical and detail system configuration including all the components and equipment needed. College of Engineering, Central Luzon State University (CLSU) – Collaboration related to irrigation engineering and ET value calculation. Universiti Teknologi Malaysia UTM – Hardware experimental setup, software development and Mobile App development

Broader Impact and Future Developments:
The project has auspicious results. We are considering integrating and implementing the developed ET-Based Irrigation Technology in an urban setting with exploration on deficit irrigation. Also, we will explore the integration of rainfall forecasts using Machine Learning. This is to apply the irrigation precisely and avoid wasting water when applying irrigation.

Social Contribution:
In this ET-Based Irrigation project, we promoted the research outputs and results to academia, including presenting the results to international conferences and publishing the results to Scopus indexed proceedings.
9 Conference Papers
Project: Evapotranspiration (ET)-Based Irrigation System with Internet of Things (IoT) Integration for Smart Farming Application Addressing the ASEAN Impending Water Crisis

From Project Report

Dr. Jennifer Dela Cruz

Project Meeting

Field Survey

Drip Irrigation System and Field Trial

Collected 6-hourly weather data from CLSU PAGASA Synoptic/Agrometeorological Weather Station for the month of November to December 2019 to be used to evaluate the accuracy of the installed weather sensors.

DAP – Days after planting.
Project: Study and evaluation of heterogeneous network for smart community and smart city applications

Project Leader: Assoc. Prof. Kultida Rojviboonchai, Ph.D. - Chulalongkorn University (CU)

Project Members: Adsadawut Chanakitskarnchok (CU), Teerapat Vongsuteera (CU), Kiattikun Kawila (CU), Kulit Na Nakorn (CU), Choong Khong Neng (MIMOS), Kok Gin Xian (MIMOS), Chrishanton Vethanayagam (MIMOS), Tham Mau Luen (UTAR), Yasunori Owada (NICT), Goshi Sato (NICT)

Start date: 1 June 2017 to 31 November 2019  Duration: 30 months

Target of this project:
To create a data distribution platform on wireless mesh network using NerveNet to overcome the limitation of traditional wireless communication.

Findings and Outcomes:
Data distribution platform using NerveNet
- Can cooperate with the traditional network
- Be a main infrastructure in disaster situation
- Portability and flexibility in setting up infrastructure
- Ability to extend the coverage of a wireless presentation system

Collaborations:
The collaboration of this project can be classified into two types including knowledge sharing and resource sharing. We held 6 workshops/meetings in the project timeline in order to share our knowledge and resources among CU, MIMOS, UTAR and NICT.

Broader Impact and Future Developments:
- Provide the NeverDie network using the vehicular cloud system in the smart city
- Access the knowledge from anywhere in anytime with the wireless presentation system
- Enable development of more application features

Social Contribution: 2 Academic Papers
- Disaster-Resilient Communication Framework for Heterogeneous Vehicular Networks @PIMRC2019
- An Analysis of a Large Scale Wireless Image Distribution System Deployment @ISCAIE 2019
Project: Study and evaluation of heterogeneous network for smart community and smart city applications

Vehicular Cloud System
- Vehicular Cloud System using wireless mesh network
- Never Die Network

Load Ratio: NerveNet - Heat Map of Connectivity

Dr. Kultida Rojviboonchai
To develop a **Scalable and Distributed IoT Framework** for Hydroponic Greenhouse in order to increase **hydroponic production** with following requirements: **low cost, scalability, distributed, high performance and practical use**.

**Outcome:**
- developed mechanisms on Markov-based Machine Learning Algorithm for Low-Power Low Cost WSN (802.15.4e) in order to minimize power consumption and to improve reliability adaptively to traffic.
- using ESP32 board with FreeRTOS operating system, MQTT/TCP/IP/802.11) for designing a low-cost and simple algorithm for controlling pH, EC levels in order to reach to target
- developed optimized control solutions for farmers at greenhouse and open-field
- developed new AI technologies for extracting growth of cabbage cultivated by hydroponic and also by soil for farmers at greenhouse and open-field
Project: Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performance Greenhouse Plants -- Dr. Thu Ngo-Quynh (Hanoi University of Science and Technology)

IoT Framework

Field trial

Dr. Thu Ngo-Quynh
Project: Smart Aquaculture Quality Monitoring (AQM) System with Internet of Things (IoT)

Project Leader: Professor Widad Ismail, University Sains Malaysia


Duration: 1st. June 2018 (2.5 years)

Target of this project: To design, analyze and monitor portable Aquaculture Quality Monitoring (system namely as SAM-IoT system based on pH, DO and temperature measurement through IoT based system implementation by incorporating the active RFID tag into WSN platform, to allow continuous M2M communication between the IoT gateway and user’s mobile device including the online monitoring mobile application through embedded circuit design. This promote and create awareness of multiple technologies embedment based on IoT for smart aquaculture quality monitoring

Findings and Outcomes: This brings along the useful of data monitoring and IoT for main priority to collect, store, transfer, and data analysis to the user. The implementation supports the improvement and development of agriculture quality for communities, society and the country as a whole regarding to solve the deadly problem of aquatic animals in the pond in a timely. The results of this experiment can provide guidelines to aquaculture operators and researchers for alternatives in aquaculture monitoring.

Collaborations: The team focus on pilot testing of the proposed hardware and IoT based system solutions to collect, analyze and improve the aquaculture ponds so that the stakeholders can experience the impact of the solution in improving the productivity of the aquatic life. This can benefit the economic growth of the farmers and reduce the effect of failure due to unmonitored pond.

Broader Impact and Future Developments: The impact focus on the talent development in scientific & technology of the IoT in aquaculture and assist aquaculture farmers to reduce the losses and improve their productivities

Social Contribution: The engagement involved non-profit and profitable organizations handling the production of sustainable aquaculture
Project: Smart Aquaculture Quality Monitoring (AQM) System with Internet of Things (IoT)

Proposed iSmartAqua network system

iSmartAqua with Solar Power Management

Mobile application

iSmartAqua of application system platforms

Installation to Malaysia, Indonesia and Thailand for fish, lobster and crab.

Main Dashboard
Reading and Reporting

Alarm System Feature

Survey, Meeting, Discussion, Training, ...

From Project Report
## Project: NAPC: Networked ASEAN Peat Swamp Forest Communities

### Project Leader: Prof. Ir. Dr. Aduwati Sali, Universiti Putra Malaysia (UPM)

Project members: UPM(MYS), BPPT(IDN), RAJ(JPN), MIMOS(MYS), Bogor Agricultural U (IDN), UTB(BRN), JIRCAS(JPN)

Duration: 01 July 2018 – 30 June 2021

### Target of this project:

1. **Technological Innovation**: Development and deployment of IoT systems for peatland forest management and monitoring to complement the existing manual system.
2. **Social Innovation**: Involvement of local stakeholders and communities to develop the IoT system.

### Findings and Outcomes

1. IoT systems deployment at three (3) peatland forests in three (3) countries
2. NAPC dashboard where peatland data from the three (3) peatland forests are integrated and displayed for potential alert system for the local communities
3. Engagement with local stakeholders (i.e. state forestry department, NGOs, researchers, government agencies, local communities) to advocate the potential role of IoT for an improved peatland monitoring and management

### Collaborations:

NAPC project consists of three (4) countries – Malaysia, Indonesia, Brunei and Japan. Each country is represented by UPM and MIMOS for Malaysia, IPB University and BPPT for Indonesia, UTB for Brunei and NICT for Japan. Each country has its own peatland forest of interest – Raja Musa Forest Reserve (RMFR) (Malaysia), Jambi, South Sumatera (Indonesia) and Badas (Brunei).

### Broader Impact and Future Developments:

1. 1 Workshop hosted by Malaysia (Aug 2018)
2. 1 Workshop hosted by Brunei (Jan 2019)
3. 1 Workshop hosted by Indonesia (Aug 2019)
4. 1 Online Workshop hosted by Indonesia (Feb 2021)
5. 1 Online Workshop hosted by Brunei (Mar 2021)
6. 1 Online Workshop hosted by Malaysia (Mar 2021)

### Social Contribution:

1. 2 publications
2. 2 copyrights
3. 6 awards
4. 9 media coverage
Project: NAPC: Networked ASEAN Peat Swamp Forest Communities

Dr. Aduwati Sali

Proposed System Architecture

IoT deployment in (a) RMFR, Malaysia, (b) Jambi, Indonesia and (c) Badas, Brunei

From Project Report
Project: FarmTab: Precision Agriculture System using Internet of Things and Artificial Intelligence for Urban Farming

Project Leader: Chong Yung Wey (Universiti Sains Malaysia)

Project members: Widad Ismail (USM), Tan Eng Kee (USM), Nasnuri Mat Hassan (USM), Ooi Boon Yaik (UTAR), Cheng Wei Khuen (UTAR), Muhammad Niswar (UNHAS), Zainal (UNHAS), Zulkifli Tahir (UNHAS), Abdul Azis D (UNHAS), Achmad Basuki (UB), Raden Arief Setyawan (UB), Naoki Shinohara (Kyoto), Myint Myint Sein (UCSY), Khin Than Mya (UCSY), Thi Thi Soe Nyunt (UCSY)

Duration: 1 June 2019 – 31 May 2021

Target of this project: FarmTab embedded Internet of Things (IoT) and Artificial Intelligence (AI) technologies into one platform to boost the productivity of urban farming by automating the farming process. Various sensors’ data are to cloud server for monitoring, automating and analysis.

Findings and Outcomes:
• Helped farmers to grow crops with minimum attention.
• Farmers can monitor the growth rate
• AI models help to analyse the plant health

Collaborations:
USM, UB, UNHAS, UTAR, Kyoto University, UCSY

Broader Impact:
• Provide solution for citizens to grow healthy vegetables in urban area.
• Create new employment opportunity.
• Help farmers to minimize operation cost.
• Assist in achieving SDG.

Social Contribution:
• Published 4 academic papers
• Conducted technical workshops for local farmers at Batu (Indonesia), Makassar (Indonesia), Yangon (Myanmar), Penang (Malaysia)

Future Development: Commercialize the platform and make datasets collected available to research communities.
Project: FarmTab: Precision Agriculture System using Internet of Things and Artificial Intelligence for Urban Farming

Field trial at Victory Farm, Malaysia

Field trial at Batu, Indonesia

Universitas Brawijaya, Indonesia

Universitas Hasanuddin, Indonesia

UCSY, Myanmar

USM, Malaysia

Technical Workshops

After 35

Dr. Chong Yung Wey

From Project Report
Due to the limited water resources, the increasing urban water demand and the climate change, many urban water systems are facing the ever-increasing pressure to supply potable water. Water reuse technologies has been extensively developed over the years under the promotion of city sustainability. Many water reuse projects failed in the past due to the insufficient monitoring and maintenance. Hence, it should be paired up with ICT technologies which allow the real-time analysis and monitoring of water quality to preserve the water reuse system and the safety of vulnerable citizen. Moreover, big data should be collected through IoT to improve water management in cities. The major aim of this project is to design and develop a system which can perform wastewater treatment, water quality analysis and monitoring, as well as critical water reuse data collection to improve the household water use and conservation pattern. This requires a collaborative framework which orchestrates wireless communication technology and cloud-based technology involving image analysis, multisensory data fusion techniques, cloud computing analytics and system provisioning besides the wastewater treatment technologies. This system will be developed to promote public health and safety in water reuse within ASEAN countries. Hence, the system design must include ASEAN culture, lifestyle, behaviors, and infrastructures.
ASEAN IVO has 33 projects from 2016 to 2021, and there are 8 leaders who are female researchers and came from 5 countries in the ASEAN region.

The R&D area is in a wide range such as Smart City and community, Agriculture, Aquaculture, Environment Protection, etc. It means there is no gender issue in the ICT R&D field.

Generally, such the peatland issues definitely requires hard physical work in the field researches that may be sometimes disadvantageous for females, but researches by ICT are equally conducted by all genders regardless physical differences.
Outcome of the project:
NAPC: Networked ASEAN Peat Swamp Forest Communities

Digital News Asia

Best Paper Presentation Award in the CIIS2020

Malaysia Technology Expo 2021
- International Innovations Awards: SILVER AWARDS

Regional Finalist for ASEAN-US Prize 2021 for Women

https://www.youtube.com/watch?v=VrY121jEfoE
Thank you very much.

有難うございました。

ASEAN IVO HP: