Project Title: **Resilient AIoT Green Energy System with Real-time Solution for Effective Aquaculture (REAS-SEA)**

Background:

- Current ***global climate change*** together with a series of upstream dams placed by China on the Mekong River
- Adoption of shrimp farming is a potential and ***natural solution*** for traditional farmers

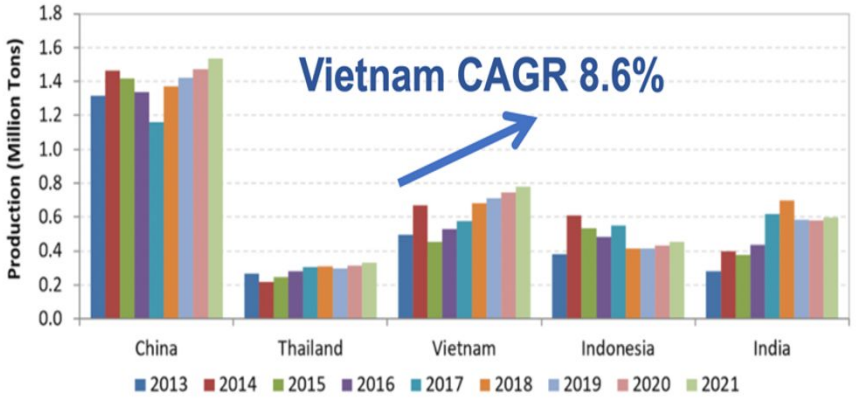


Figure 1: Compounded Annual Growth Rate of aquaculture shrimp farming in Vietnam and other ASEAN countries.

Targets:

- **To support** Southeast Asia and Vietnam's fast growth aquaculture industry with a real-time and holistic control solution
- **To help** farmers optimize their feeding pattern for growth, controlling dissolved oxygen, chemical and antibiotic use, reducing water pollution and mortality rate and feed cost.

Speaker: **Vo Nguyen Quoc Bao, PTIT, Vietnam**
Nguyen Ngoc Mai Khanh, UTokyo, Japan

Project Title: **Resilient AIoT Green Energy System with Real-time Solution for Effective Aquaculture (REAS-SEA)**

Project Members :

Party	Name	Division
PTIT, Vietnam	***Vo Nguyen Quoc Bao**	**Faculty of Telecommunications**
UTokyo, Japan	*Nguyen Ngoc Mai Khanh	Systems Design Lab (d.lab), Japan
SOITEC, Singapore	*Nguyen Bich Yen	Innovation
NTU, Vietnam	*Tran Thi My Hanh	Department of Research Affairs
	Nguyen Tan Sy	Institute of Aquaculture
	Ngo Van Manh	Institute of Aquaculture
IICT, Laos	Sayfon BOUTCHANTHALATH	Director General, Institute of Information and Communication Technology
	*Padapxay SAYAKHOT	Deputy Director General, Institute of Information and Communication Technology
	Aromhack SAYSANASONGKHAM	Deputy Director, Planning, Cooperation and Finance Division
	Phonexay NAMSAVANH	Technical Officer, Institute of Information and Communication Technology
	Phuangkeo KEOPHENGTHONG	Technical Officer, Institute of Information and Communication Technology
MIC, Vietnam	*Tran Minh Tuan	National Institute of Information and Communication Strategy
MMU, Malaysia	*Foo Yee Loo	Faculty of Engineering
BLU, Vietnam	*Tu Diep Cong Thanh	Bac Lieu University
	Luu Ngo Duc	Faculty of Information Technology
	Duong Viet Hang	Faculty of Education
	Nguyen Minh Tan	Department of Scientific Research Management and International Cooperation
	Nguyen Thi Hong Van	Faculty of Aquaculture
LEO, Japan	*SATOSHI YOSHINO	R&D Division
CADT, Cambodia	* Sopheakmanith Chhoun	Research & Innovation Center
	Chin Vannak	Research & Innovation Center
	Kann Bonpagna	Research & Innovation Center

Project Duration :

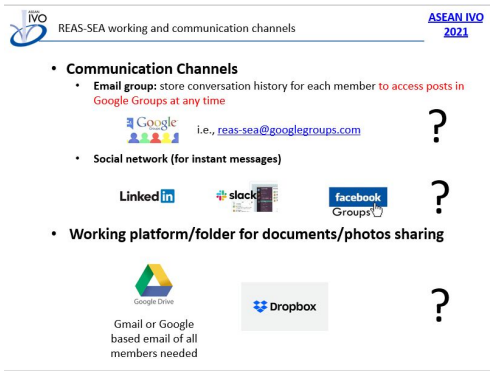
- First year: April 1st, 2021 – March 31st, 2021
- Second year: April 1st, 2022 – Mar 31st, 2022

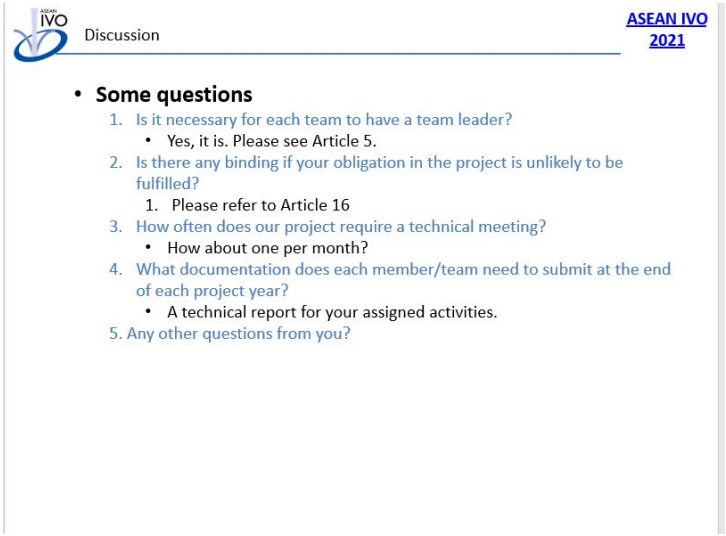
Project Budget: 80,000 USD

Project Activities #1: **REAS-SEA Kick-Off Meeting**

Time: June 15, 2021
Place: online by Google meet
https://meet.google.com/rza-pfcy-qwr
Attendance: All members
Agenda:

- Short introduction of members (1 minute for each with your slide): ~15 minutes
- Overview and plan: 10 minutes
- Other procedures and information
- CRDA
- Shared drive & communication tool/channel: 10 minutes
- Discussion: 10 minutes
- Group photos in Google meet and closing: 5 minutes

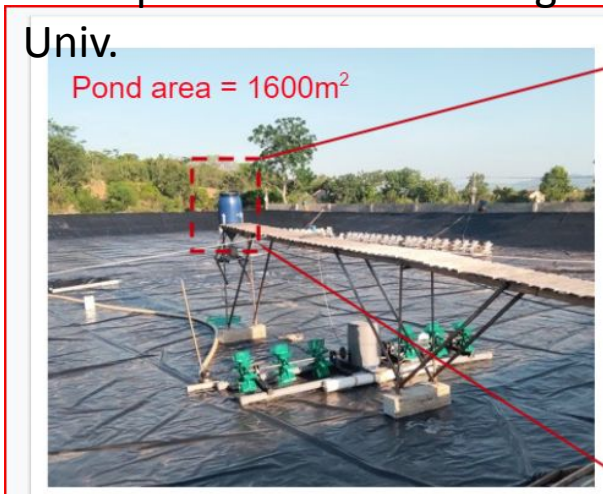


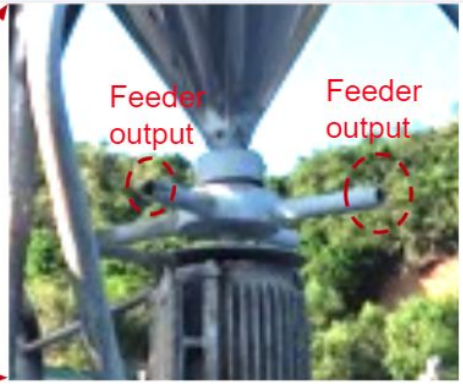


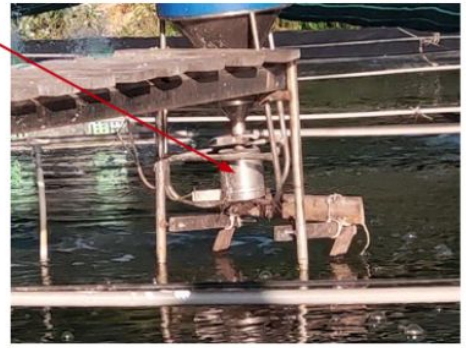
Project Activities #2: Meetings with **LEO**

Discussion on shrimp feeder with sensors

Shrimp feeder in Nha-Trang Univ.

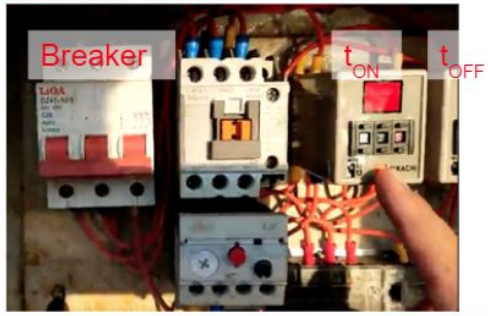






- **Timer**: t_{ON}=2s -> t_{OFF}=17 minutes, for shrimp finishes eating
- **Range (**from feeder output): 12-15m
- **Other version:**
  - can control motor rotate
  - Can control the food amount
- **Improvements/ideas**:
  - A cover/box to protect the motor
  - Hydrophone to sense shrimp's noise and then control the feeder

Controller Panel



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Project Activities #3: Others

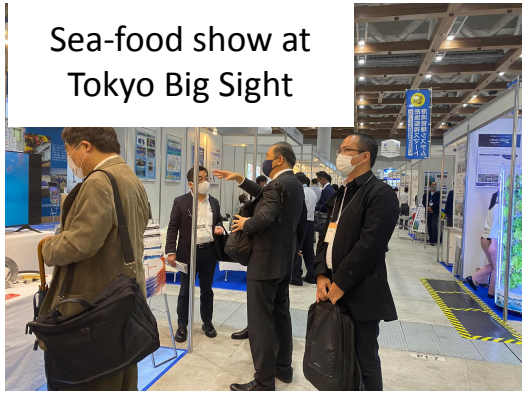
- **Propose and host** a Special Session entitled “Advanced Communication and Signal Processing Technologies for IoT-based Smart Farming” at IEEE Nafosted NICS conference
- **Visit** seafood show in Tokyo, Japan
- Design two **experiments** (indoor & outdoor) for recording **shrimp noise** in Nha-Trang Univ.

NICS 2021
Hanoi, Vietnam, Dec 21-22, 2021

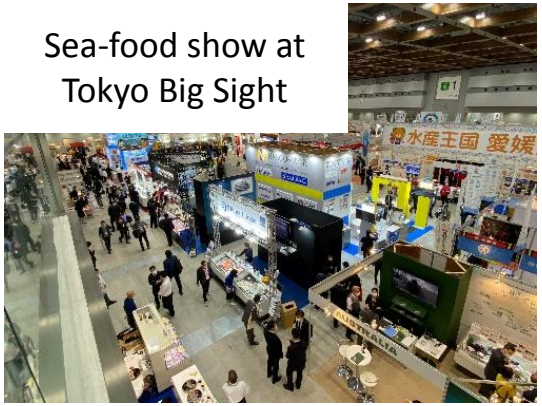
Circular Pond: Area 100-800m^2

NTU, Vietnam

Sea-food show at Tokyo Big Sight



Sea-food show at Tokyo Big Sight



Location for collecting samples

Feeder

Underwater Camera

Societal Impact:

- **Provide** early warning to aquaculturists of detrimental changes in critical environmental parameters affecting aquatic animals, mitigating risks
- **Minimize** mortality loss, reducing feed cost, and promoting sustainable and profitable adoption for aquaculture farming for areas along the Mekong river including Lao, Cambodia, and Vietnam including 3M small shrimp farmers
- **Support** the training of students, master's students and farmers
- **Reduce** environmental contamination by reducing chemical and antibiotics usage in both aquaculture and agricultural farming

Conclusion:

For the first six month of the first project year:

- CDRA completion for all members
- Kickoff meeting and many technical meetings

1. Scientific and technological

- A detailed study for the critical parameter sensing and shrimp's eating behaviors.
- A design for REAS-SEA for two ponds

2. Application development & experiment

- A design for the closed loop of sensors and food feeders

Future works:

- **Design**
  - Sensing node
  - Controllers
  - Gateway
  - Cloud and database
- **Testing**
  - Sensing node
  - Controllers
  - Gateway
  - Cloud and database
- **System fabrication and verification**
- **Field test:**
  - Nha Trang, Khanh Hoa Province, Vietnam
  - Bac Lieu Province, Vietnam
- **System optimization**