IVO FORUM 2019, 20th - 21th November, Manila

A Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performant Plants

NEC Solution Innovators, Ltd. (NES), Japan
NEC Vietnam Co Ltd. (NECVN), Vietnam
Hanoi University of Science and Technology (HUST), Vietnam
National Institute of Communication Technology (NICT), Japan and Singapore
Champasak University (CHAM), Lao

About **HUST**

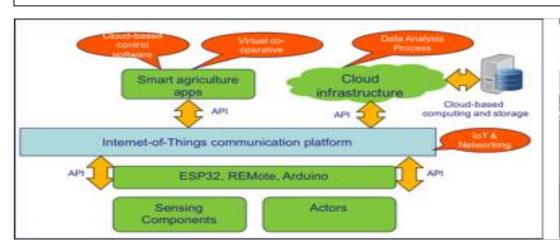**HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY**

- Established in **1956**
- **45.000** students
- **2000** employees, including 1600 faculty members
- **27** schools and research institutes
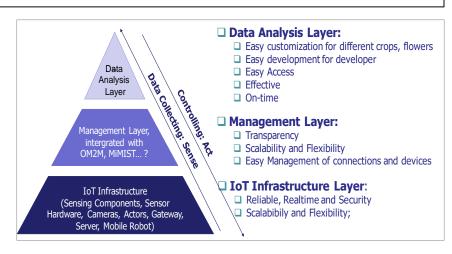- **One of the leading** technical universities in Vietnam

Project Title: Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performance Greenhouse Plant

Introduction:

In this project, we aim 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 using. This 3-layers framework (data collect and control, management and data analysis) consists of following components: i) End-to-end IoT-based Infrastructure, integrated with a Mobile Robot (optional). ii) Transparent management component. iii) Cloud, Fog Computing and APIs. iv) Data Analysis.

Project Members:

- Thu Ngo-Quynh — Hanoi University of Science and Technology, HUST, Vietnam
- Tomoyuki KURODA — NEC Solution Innovators, NES, Japan
- Giang Nguyen-Linh — Hanoi University of Science and Technology, HUST, Vietnam
- Son Ngo-Hong — Hanoi University of Science and Technology, HUST, Vietnam
- Fumihide KOJIMA — National Institute of Information and Communications Technology, NICT, Japan
- Sonxay LUANGOUDON — Champasak University, CHA, Lao

IVO Project - Scalable Distributed IoT Framework based on Mobile Robot Technology for High Performance Greenhouse Plant

Project's Current Result (1) – 1st Year

❑ **Duration: 1st April 2018 - 30th September 2020**

❑ **Project's goal:**

    ❑ Improving cultivating (hydroponic) production

    ❑ Focus initially at Vietnam, then extend to other Asean (Lao…) countries

    ❑ Bringing benefits for Vietnam and Asian farmers

❑ **For achieving this goal:**

    ❑ Collaboration - important

    ❑ Research – Development: also important

    ❑ Considering the opportunity for commercialization

❑ **By developing ICT solution that is:**

    ❑ **SCALABLE IoT FRAMEWORK,** associated possibly with **Mobile Robot Technology**

    ❑ **DATA ANALYSIS PROCESSES**
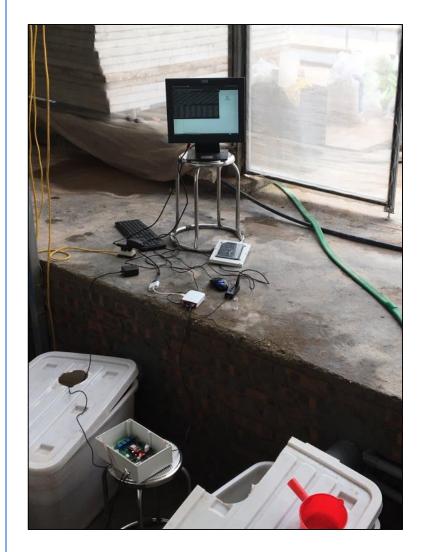
Project's Current Result (2) – 1st Year - Achievement

❑ **HUST surveyed Vietnamese agriculture market**
  ❑ It is important to classify different types of clients

❑ **Then, for HOME CULTIVATION, under NES's orientation:**
  ❑ HUST surveyed market for Home Cultivation at Hanoi
  ❑ This result can be applied to other big cities at Vietnam
  ❑ HUST **considered also the opportunity for commercialization**
  ❑ And develop IoT Framework for Home Cultivation

❑ **Then, HUST switched to other types of Vietnamese clients**

❑ **While ALWAYS:**

  ❑ Collaborating, Researching, and

  ❑ Considering the opportunity for commercialization

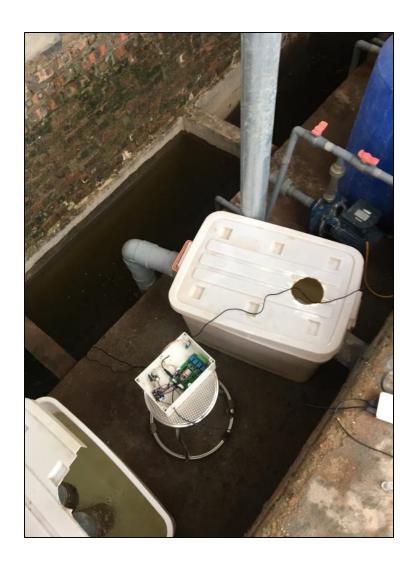# Project's Current Result (3)–1ˢᵗ Year–Achievement- IoT Framework for Home Cultivation

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Project's Current Result (1) – 2ⁿᵈ Year

❑ **Duration: 1th April 2019 – 30th March 2020**

❑ **FOR all other types of Vietnamese clients:**

    ❑ To increase agriculture production

    ❑ **DATA ANALYSIS PROCESS** are important!

❑ **So, HUST continues:**

    ❑ To **Realize Market Survey** for all other types of Vietnamese clients, **repeatedly and continously!**

    ❑ To **Collect Data**, and To **Evaluate Performance**

❑ **FOR COLLECTING DATA**

    ❑ It is necessary to try many times

    ❑ So far until now, 3 times, already. 4th time will be realized right after IVO Forum

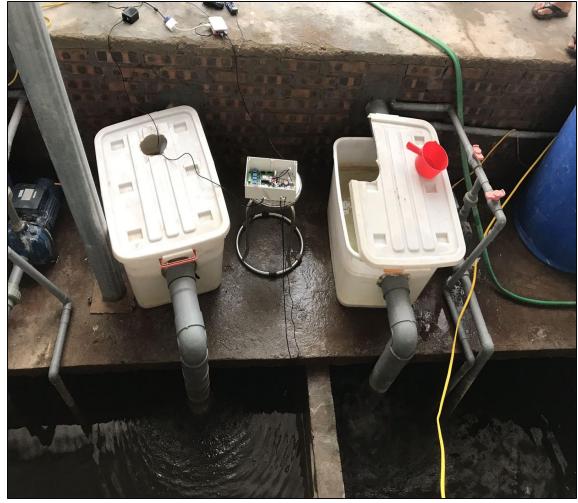# Project Current Result (2) – 1st Measurement on Sept. 22th Sep

Project Current Result (3) – 1ˢᵗ Measurement on Sept. 22ᵗʰ Sep

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Project Current Result (4) – 2nd Measurement, on 30th Sept.

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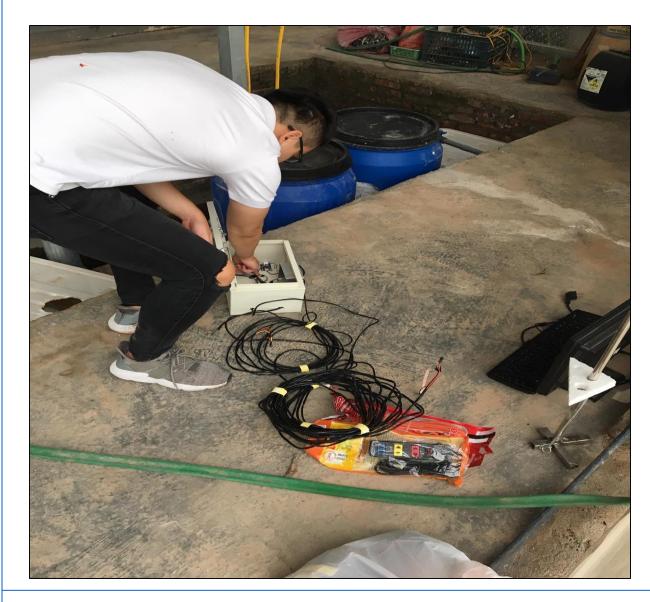
Project Current Result (5): 3rd Measurement, on 26th October

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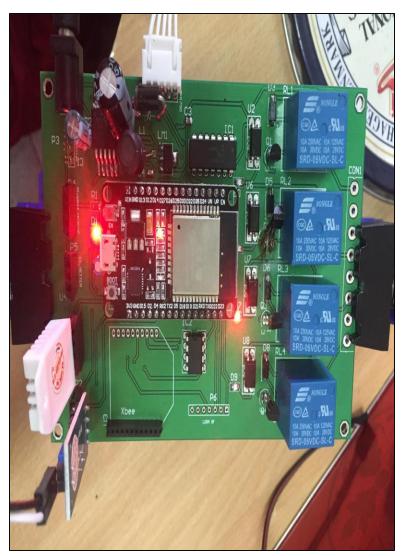
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Project's Current Result (7) – 2nd Year – Achievement:

❑ **Just yesterday, HUST fixed our market survey:**

    ❑ In this, **stated difficulties** of Vietnamese clients at their farm and greenhouses

    ❑ And classified Vietnamese types of clients

    ❑ This survey will be used for **developing SMART SOLUTION** for different types of clients

    ❑ And **for evaluating performance for them**

❑ **Briefly, the SMART SOLUTION HUST develops now under NES's orientation:**

    ❑ Permit to **increase agriculture production** while solving all **existed difficulties** of all clients

    ❑ Not only **APPLICABLE** for all types of Vietnamese clients

    ❑ But also **CAN BE INTERGRATED EASILY** for all of them

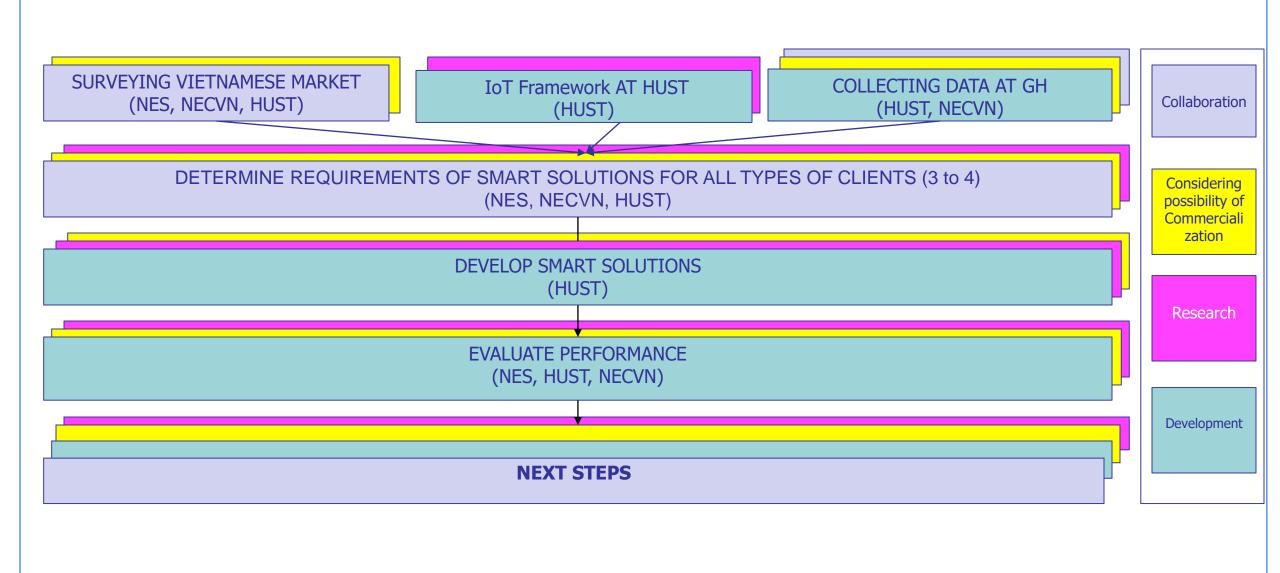   ❑ By **applying MANY NEW TECHNOLOGIES** (IoT, AI, Agriculture field), **at the same time**

Project's Current Result (8) – Box for collecting data and 1st element of Prototypes

Project's Current Result (9) – 2nd Year – Diagram

SURVEYING VIETNAMESE MARKET
(NES, NECVN, HUST)

IoT Framework AT HUST
(HUST)

COLLECTING DATA AT GH
(HUST, NECVN)

DETERMINE REQUIREMENTS OF SMART SOLUTIONS FOR ALL TYPES OF CLIENTS (3 to 4)
(NES, NECVN, HUST)

DEVELOP SMART SOLUTIONS
(HUST)

EVALUATE PERFORMANCE
(NES, HUST, NECVN)

NEXT STEPS

Collaboration

Considering possibility of Commercialization

Research

Development

Project's Current Result (10)

❑ **So, within the framework of IVO Forum,** supported by NICT:

    ❑ HUST has **great opportunity**

    ❑ Under **NES's orientation**

    ❑ To realize **research application** activities

    ❑ That help **Vietnamese agriculture come DIRECTLY to Agriculture 4.0!**

HUST thanks you all for YOUR SUPPORT!