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

NEC Solution Innovators, Ltd. (NES), Japan
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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:

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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

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

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

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Project Current Result (4) – 2nd Measurement, on 30th Sept.
Project Current Result (5): 3rd Measurement, on 26th October

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Project Current’s Result (6): 3rd Measurement, 26th October

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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

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Project’s Current Result (9) – 2\textsuperscript{nd} Year – Diagram

- **SURVEYING VIETNAMESE MARKET** (NES, NECVN, HUST)
- **IoT Framework AT HUST** (HUST)
- **COLLECTING DATA AT GH** (HUST, NECVN)

**NEXT STEPS**

**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)

**Collaboration**

Considering possibility of Commercialization

Research

Development
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!**