Thailand's Annual International Training Course (AITC)
Course Information

The Development and Design of IoT Technology for Smart Farmers in the Context of Sustainable Development Goals (SDGs)

17 – 27 January 2022

closing date of application : 27 December 2021

TICA : Thailand International Cooperation Agency
is a national focal point for Thailand's international development cooperation. TICA was established in 2004 to realize Thailand's aspiration to be a contributor of development cooperation. Believing that global challenges are best addressed by international cooperation and global partnership, today we continue to strengthen our contribution to achieve global development agenda through various capacity-building and human resources development programmes. In response to the recent changes in the global landscape of development cooperation, especially through the concept of South-South and Triangular Cooperation, TICA continues to realign our focus in order to deliver Thailand's commitment to be a relevant partner in global agendas including the 2030 Agenda for Sustainable Development.

AITC : Annual International Training Course
Was initiated in 1991 as a framework for providing short-term training for developing partners. Today, the AITC remains one of TICA's flagship programmes. It offers not only a training experience, but also a platform for exchanging ideas and establishing professional networks among participants from across the developing world with the aim of sharing Thailand's best practices and experience to the world. The AITC training courses focus on development topics of our expertise currently categorized under five themes namely; "Sufficiency Economy Philosophy" or SEP, Food Security, Public Health, Climate Change, and other topics related to Sustainable Development Goals (SDGs).

Royal Forest Department
Royal Forest Department, RFD, Ministry of Natural Resources and Environment (MoNRE) is tasked to monitor and promote forest conservation in Thailand, encourage community forest management, coordinate relevant research, and monitor wood industry. Promoting sustainable ecotourism has been among the department's prioritized mission. Through various project implementation both at national and community levels, the department acquires a number of best practices and lessons learned in forest-based eco-tourism management and stands ready to share the experiences with the world.

AITC Theme : SDGs
This training course falls under the AITC theme – "Other topics related to Sustainable Development Goals (SDGs)". We believed that each SDGs is designed to address specific challenges that by nature have no boundaries. Therefore, all goals can be achieved through cooperation, be it a government or private, or capacity building or human resources development.

Course Objectives

This training course aims at sharing Thailand's experiences in smart farmers' management with IoT technology, with an emphasis on precision agriculture cases. At the end of this course, participants are expected to:

- Understand concept of Internet of Things and its contribution to sustainable smart farmers
- Understand concept of precision agriculture and relevant technology
- Be able to develop and design IoT technology for their farm

Course Methodology

Training methodologies to be used during this two weeks training course include;

- Lecture
- Group discussion
- Field visit and excursion

Assignment and Evaluation

- In-class participation.
- Group assignments.
- Submission and 15 minutes presentation of "Group Report".
- Post-evaluation.
- Attendance – Participants are required to attend all activities organized during the course. TICA reserves the right to revoke its fellowship offer or take appropriate action in case a participant's attendance is less than 90 percent of the training hours.

Course Outline

This training course covers various topics in development and design for smart farmer, as well as a number of case studies of smart farm management in Thailand such as;

- Basic concept of Internet of Things
- Basic concept of electronics circuits
- Principle of microprocessor and microcontroller
- Computer programming with C++
- Computer programming with Python
- Workshop on ESP8266 and Arduino developer kits
- Workshop on cloud and network server over internet

Participant Criteria

Candidates must possess qualifications as specified in "Guideline for Thailand's Annual International Training Course Programme" No. 2 "Qualifications" as well as the following qualifications;

- Currently working with substantial experience in IT department or promotional role in agriculture or other related sectors to be able to actively participate in the class. Policy makers, planners and managers in agriculture field will be given priority.
- In good health and be able to physically carry out intensive field visits and excursions.

Application

Complete nomination documents must be submitted to TICA through the Royal Thai Embassy/ Permanent Mission of Thailand to the United Nations/ Royal Thai Consulate-General accredited to eligible countries/ territories.

(*See "List of Eligible Countries" for more information*)

Number of Participants

25 persons

Training Institution and Venue

Faculty of Information Technology and Digital Innovation
King Mongkut's University of Technology North Bangkok
1518 Pracharat 1 Road, Wongsawang, Bangsue, Bangkok.

Selection and Confirmation

- Particular attention shall be paid to the candidates' background, their current position, and practical use they expect to make of the knowledge and experience gained from training on returning to their positions.
- Selection of participants is also based on geographical distribution and gender balance.
- Successful applicants will be informed approximately 4 weeks before the beginning of training course.
- Successful applicants must return duly completed and signed acceptance form by the deadline to confirm their participation in the programme.

Terms of Awards

For AITC Eligible Countries – AITC Training Fellowship* include training fee, return economy-class, airfare, accommodation, allowance, insurance, airport transfer and social programme.

*Subject to rates and conditions established by TICA

Contact

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Date	Details	
17 January 2022	**The principle of Internet of Things (Electrical circuits and Electronics)**	
	8.00 – 8.30 8.30 – 9.00	- Registration - Welcome to participants - Introduction to the faculty
	9.00 – 10.30	- Principle of Internet of Things - Case study of Smart Farm
	10.30 – 10.45	Break
	10.45 - 12.00	- Principle of Electrical circuits and Electronics (1)
	12.00 – 13.00	Lunch
	13.00 – 14.30	- Principle of Electrical circuits and Electronics (2)
	14.30 – 14.45	Break
	14.45 – 16.00	- Principle of micro controller and processor
18 January 2022	**Principle of C++ programming (1)**	
	8.30 – 10.30	- Approaching variables and types of data - String
	10.30 – 10.45	Break
	10.45 - 12.00	- The scope concept - Operators, operator structures, and precedence - Type manipulations - Comparing values and Boolean operators
	12.00 – 13.00	Lunch
	13.00 – 14.30	- Adding conditions in the code
	14.30 – 14.45	Break
	14.45 – 16.00	- Making smart loops for repetitive tasks
19 January 2022	**Principle of C programming (2)**	
	8.30 – 10.30	- Introducing functions - C++ standard mathematical functions and Arduino
	10.30 – 10.45	Break
	10.45 - 12.00	- Approaching calculation optimization
	12.00 – 13.00	Lunch
	13.00 – 14.30	- Time measure - Sensing with Digital Inputs

	14.30 – 14.45	Break
	14.45 – 16.00	- Sensing with Digital Inputs (continue)
20 January 2022	**Arduino controller programming (1)**	
	8.30 – 10.30	- Arduino Libraries - Setting the Arduino IDE to Use Library - A Sample Program Using the Dates Library
	10.30 – 10.45	Break
	10.45 - 12.00	- The Serial Peripheral Interface (SPI) - Interrupts and Interrupt Service Routines (ISR)
	12.00 – 13.00	Lunch
	13.00 – 14.30	- Introduction to Object-Oriented Programming and C++
	14.30 – 14.45	Break
	14.45 – 16.00	- The OOP Trilogy - The OOP Class
21 January 2022	**Arduino controller programming (2)**	
	8.30 – 10.30	- Programming Pin as Output - Blinking an LED - Multiple LEDs
	10.30 – 10.45	Break
	10.45 - 12.00	- Coding practical in class
	12.00 – 13.00	Lunch
	13.00 – 14.30	- Programming Inputs - Buttons / Switches
	14.30 – 14.45	Break
	14.45 – 16.00	- Coding practical in class
22 - 23 January 2022	**Holiday**	
24 January 2022	**Arduino controller programming (3)**	
	8.30 – 10.30	- Infrared (IR) Sensors - PIR Motion Sensor
	10.30 – 10.45	Break
	10.45 - 12.00	- Coding practical in class
	12.00 – 13.00	Break
	13.00 – 14.30	- Ultrasonic Distance Sensor

		- MQ2 Gas Sensor
	14.30 – 14.45	Break
	14.45 – 16.00	- Coding practical in class
25 January 2022	**Arduino controller programming (4)**	
	8.30 – 10.30	- Relay Module - Temperature Sensor
	10.30 – 10.45	Break
	10.45 - 12.00	- Coding practical in class
	12.00 – 13.00	Break
	13.00 – 14.30	- Humidity Sensor - LCD Display 16×2 / 20×4
	14.30 – 14.45	Break
	14.45 – 16.00	- Coding practical in class
26 January 2022	Sending data to display on computer system	
	8.30 – 10.30	- Ubuntu Server Installation - Node.js Installation - Introduction to Node.js
	10.30 – 10.45	Break
	10.45 - 12.00	- Node-Red Software Installation - Introduction to Node-Red
	12.00 – 13.00	Break
	13.00 – 14.30	- Influx DB Installation - Introduction to Influx DB
	14.30 – 14.45	Break
	14.45 – 16.00	- Grafana Dashboard Installation - Introduction to Grafana
27 January 2022	Sending data to display on computer system	
	8.30 – 10.30	- Coding with Node-Red - Practical in class
	10.30 – 10.45	Break
	10.45 – 12.00	- Working with MQTT Protocol - Create workflow with Node-Red
	12.00 – 13.00	Break

	13.00 – 14.30	- Influx DB Practices - Coding practices to store data to Influx DB
	14.30 – 14.45	Break
	14.45 – 16.00	- Connect data between Node-Red and Influx DB
28 January 2022	Present student project, summary of the training, and exercise exam	
	8.30 – 10.30	- Participants present their own project by individual (1)
	10.30 – 10.45	Break
	10.45 - 12.00	- Participants present their own project by individual (2)
	12.00 – 13.00	Break
	13.00 – 14.30	- Conclusion to training
	14.30 – 14.45	Break
	14.45 – 16.00	- Final Exam - Close session - Group photo