

e-ASIA Joint Research Program Progress Report

1. Project Title: Development of information Gathering and Utilization Systems using small UAV for Disaster Risk Assessment, Monitoring and Response

2. Joint Research Period: August, 1st, 2016 ~ March 31st, 2020

3. Principal Investigators:

- Japan : Hiroshi Inoue, Principal Research Fellow, National Research Institute for Earth Science and Disaster Resilience
 - Planned Funding Period: August, 01, 2016 – March 31, 2020
- Thailand: Wutthiphath Covanich, Senior Researcher, National Electronics and Computer Technology Center
 - Planned Funding Period: October, 01, 2016 – September, 30, 2019
- Philippines : Bartolome C. Bautista, Deputy Director, Philippine Institute of Volcanology and Seismology
 - Planned Funding Period: October 01, 2016 – September 30, 2019
- Vietnam: Bui Quang Hung, Director, Center of Multidisciplinary Integrated Technologies for Field Monitoring, University of Engineering and Technology, Vietnam National University
 - Planned Funding Period: In-Kind
- Indonesia: Eko Yulianto, Director, Research Center for Geotechnology – LIPI
 - Planned Funding Period: in-Kind

4. Summary of the Progress of the Joint Research:

WP 1: UAV system development and evaluation

WP 2: Data management System

WP 3: System introduction package

WP 4: Applications

4-1 Japan; WP1, 2, 3, and 4

NIED coordinates the entire project and organized four e-ASIA UAV workshops, September 2016 in Japan, April 2017 in the Philippines, November 2017 in Vietnam, and July 2018 in Indonesia, hosted by each country.

NIED developed a fixed wing UAV system based on the aircraft model named X-5, and proved its capacity of maximum endurance of 120 km in 120 minutes. A method of landing by net and that by parachute system were developed for easy and safe landing. Experiments to monitor volcano craters in Japan, at Yakedake, Sakurajima, and Izu-Oshima was conducted.

NIED held hands-on workshops of building fixed-wing drones in Thailand, Philippines, and Vietnam, to initiate the development and applications of drones in the project. Workshop and seminars were also held at AIT in Bangkok, in Tonga, and in Bhutan as dissemination part of the project. NIED technically assisted UAV experiments in the Philippines.

Chubu University, in collaboration with Digital Earth Lab., developed an

'Oblique Photo Browser' to effectively utilize aerial photos for quick disaster response. The system enables the user to upload geo-tagged images with camera orientations to a server, to map the footprint of the photos, to sort and extract photos which show a particular point on the ground on the map, and to browse the extracted photos superimposed on the map for detailed investigations.

NIED and Chubu University is conducting experimental introduction of UAV systems to seven local governments and two fire departments in Mie Prefecture to be prepared for great Nankai Trough Earthquake and Tsunami disasters and year-round heavy rains. The oblique photo browser was introduced to the disaster information management system of Minami-Ise town.

4-2 Thailand; WP2, 3 and 4

Thai NECTEC discussed with the Forestry Offices to conclude that UAVs should be used to pinpoint wild-fires in timely manner to minimize the damages, because the smaller fire is the easier to manage. NECTEC assembled a fixed wing UAV Skywalker X8 with two cameras, one mobile phone and an FPV system. The UAV meets the minimum requirements of 20km flight range to take photos with GPS locations.

NECTEC developed a post flight patrolling software. A UAV video is played back on one window with the GPS location, heading and the flight path on another window. The forestry officer can have almost the same information as they patrol the forest on helicopter to look for wild-fires.

NECTEC made test flights at Oob Khan National Park in Chiang mai in May 2018. The results is summarized as a) the fixed-wing UAV achieved 20km flight range as planned, b) the communication range between the UAV and ground control station is more than 10km line of sight, c) it is not easy to find open space in the park for take-off and landing, d) it is not easy to take-off and land without such wide and open spaces, e) usable period of UAV is largely limited by wind and rain conditions, f) data acquired by UAV is good enough for monitoring wild fire, g) Department of National Parks, Wildlife and Plant Conservation would like to setup a UAV team, and h) there was no wild-fire during the test period and NECTED will improve the system in the peak wild-fire season from February to April in 2019.

4-3 Philippines; WP3 and 4

PHIVOLCS acquired two units of quadcopters and used to document recent events of lahars, landslides and earthquakes. PHIVOLCS hosted the 2nd e-ASIA UAV workshop in Manila in April, 2017. UAVs were used to map and document impacts of earthquake and volcanic eruption events (e.g., M6.7 10 February 217 Surigao del Norte Earthquake, 13 January 2018 Mayon Volcano Eruption, etc.). PHIVOLCS built capacity of staff to assemble and operate a cost-effective fixed-wing plane Skywalker X5. A comprehensive manual for assembling the plane is made. A photogrammetric software Agisoft PhotoScan was familiarized and a simple DSM database was developed.

Two experiments in volcano crater mission were conducted. The fixed wing drones reached the summit crater of Taal Volcano in April 2017 and Mayon Volcano in August 2017, and photos and videos were collected. Oblique

photography for exposure database development was tested in a shoreline community of Albay in August 2017. A splash-proof type of the plane was tested on Taal lake in June 2018 to address the problem of landing.

Local Government Unit officers of Albay, Quezon, and Batangas Provinces are being involved in the conduct of UAV test flights as part of promoting potential users of UAV in Disaster Risk Reduction (DRR) activities.

4-4 Vietnam; WP4 (in-kind participation)

FIMO center of VNU hosted the 3rd e-ASIA UAV workshop in Hanoi in November 30 to December 1, 2017, preceded by a drone building workshop instructed by NIED. VNU identified that UAV can be applied to reconstruct 3D models; raster aerial images and vector point clouds. VNU conducted a research to extract feature of building footprint and trees from such data to reconstruct 3D models with different levels of detail, which is needed for infrastructure monitoring during disasters. VNU also developed a web application for 3D model visualization for monitoring disaster management and urban planning.

4-5 Indonesia, WP4 (in-kind participation)

Research Center for Geotechnology LIPI hosted 4th e-ASIA workshop on 2-3 July, 2018, inviting Volcanology and Geological Agency who reported the use of UAVs. LIPI reported UAV utilization for mapping Lembang Fault and Synthetic Aperture Radar. The field trip was conducted to visit Tebing Keraton to observe Lembang Fault, and to visit Kawah Ratu Gunung - Tangkuban Perahu.

5. Scientific Achievements and Implemented Activities (Research Exchange, Workshop, Publication, etc. if any):

**For this item, please fill in the attached Excel file.*

6. Future Goals and Plan of Activities within and after the project period:

Remaining tasks towards the end of the development of WP 1 by NIED are 1) Improvement of the safe and easy take-off and landing system, 2) Evaluation of durability against rain and wind, 3) Development of a simple operation system for quick disaster response, 4) Longer range engine plane for island countries, 5) efficient bathymetry mapping system by autopilot boat. Chubu University will develop a Web-GIS based data management system for satellite, aircraft, drone, and land-based imageries. Both will introduce the system to local governments and fire departments in Mie prefecture as a pilot project.

Thai NECTEC will develop more reliable post flight software and test VTOL UAV system for easy operation by the forest offices. The new system will be tested during the 2019 forest fire season to prove the applicability of the system for real operation.

Philippines PHIVOLCS will 1) build a standard type plane with tail wings which can fly slower for easy landing, 2) build a quad-plane (VTOL) for Taal volcano missions, 3) develop manuals of UAV applications in active faults mapping, lahar hazard assessment, tsunami hazard and risk mapping, and volcano monitoring, to continuously integrate UAV to PHIVOLCS's disaster risk reduction practices,

and 4) introduce the drone system to Local Government officers

Vietnam VNU will test UAV systems developed by Japan and Thai group for monitoring forest fire and landslides in Vietnam. Indonesia LIPI will utilize UAVs for disaster risks assessment.

PHIVOLCS and VNU need support from project collaborator of Japan to build long distance and easy take-off and landing planes which are necessary in many of applications.

7. Recommendations and Comments to the Program (if any):

(ex. Any support to request from the Program in order to achieve item 6.)

Obligation and commitment of in-kind participants (Vietnam VNU and Indonesia LIPI in our project) to the funding agency are not clear. A nominal funding is necessary for any activities if the program promotes equal partnership. Or otherwise they should be clarified their roles, such as providing pilot sites for the implementations of the project output in Asia. Vietnam VNU will provide such sites of wild fire and landslide management in our UAV project.

PHIVOLCS's aim of the project is adaptation and utilization of existing UAV technology to PHIVOLCS's mission, not like Japan and Thai teams who aim at research and development. Although the outcome will certainly contribute to disaster management in the Philippines, the purpose and the versatility of the funding should be clarified and shared at the time of call for proposals to better organize the project.

Lists of Achievements and Implemented Activities

1. Original Publication of Articles etc.

【Notes】

Please fill in **only the achievements of this project** by country in order of publication date. Only “published” is targeted, but please write “in press” too only for Final Report.

Please count Proceedings with peer review as original paper.

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1. 1 Original Publications (Articles co-authored among Research Teams)

All Authors' Names, Title, Journal Name, Volume, Edition, Page, Year of Publication	DOI Code	Publication Status	Remarks (e.g. publication in top level journals etc.)
Taro Kagaku and Jiro Kagaku, Distinct roles of MLCK and ROCK in the regulation of membran	doi: 10.1083/jcb.201506	in press	

0 Total

1. 2 Original Publications (Articles by Single Team only)

All Authors' Names, Title, Journal Name, Volume, Edition, Page, Year of Publication	DOI Code	Publication Status	Remarks (e.g. publication in top level journals etc.)	Country name of the team
Taro Kagaku and Jiro Kagaku, Distinct roles of MLCK and ROCK in the regulation of membran	doi: 10.1083/jcb.201506	in press		Thailand

0 Total

Lists of Achievements and Implemented Activities

2. presentations at Academic Conferences etc. (Seminars, Workshops, Symposia)

【Notes】

Please fill in **only the achievements of this project** by country in order of presentation date.
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2. 1 Conference Presentations (Joint Presentations among Research Teams)

Date	Type of Presentation	Speaker, "Title", Conference Name, Location, etc.
March 4, 2018	Guest/Invited Speake	Taro Kagaku, "xxx", yyy, Tokyo,

0 Total

2. 2 Conference Presentations (by Single Team)

Date	Type of Presentation	Speaker, "Title", Conference Name, Location etc.	Country name of the team
March 4, 2018	Guest/Invited Speake	Taro Kagaku, "xxx", yyy, Tokyo,	Thailand
November 14, 2016	Oral Presentation	Hiroshi INOUE , , 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Japan
November 14, 2016	Oral Presentation	Satoru Sugita and Hiromichi Fukui "Development of GIS based Aerial Photo Viewer as a Part of Integrated Disaster Management System" 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Japan
November 14, 2016	Oral Presentation	Daniel Jose Buhay, "", 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Philippines
November 14, 2016	Oral Presentation	Wutthiphat Covanich, "", 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Thailand
November 14, 2016	Oral Presentation	Bui Quang Hung, "", 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Vietnam
November 14, 2016	Oral Presentation	Mudrik Daryono, "", 1st e-ASIA (Kick-off) workshop, at JST, Tokyo, Japan	Indonesia
April 24, 2017	Oral Presentation	Satoru Sugita and Hiromichi Fukui "A Prototype of Oblique Aerial Photo Browser and Database for Residential Areas along Tsunami Threatened Coast and Active Fault in Japan" 2nd e-ASIA workshop, at PHIVOLCS, Quezon City, Philippines	Japan
April 24, 2017	Oral Presentation	Hiroshi INOUE, "Progress Report of Japan", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Japan
April 24, 2017	Oral Presentation	Bart Bautista, "Progress Report of Philippines", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Philippines

April 24, 2017	Oral Presentation	Wutthiphat Covanich, "Progress Report of Thailand", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Thailand
April 24, 2017	Oral Presentation	Arturo Daag, "Current applications of UAV in PHIVOLCS: Landslide monitoring", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Philippines
April 24, 2017	Oral Presentation	Robjunelieaaa Lim, "Current applications of UAV in PHIVOLCS: Lahar mapping and monitoring", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Philippines
April 24, 2017	Oral Presentation	Daniel Jose Buhay, "Current applications of UAV in PHIVOLCS: Earthquake hazard mapping", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Philippines
November 30, 2017	Oral Presentation	Wutthiphat Covanich, "Opportunities for application of UAV in wildfire management in Thailand", 2nd e-Asia UAV workshop, at PHIVOLCS, Quezon City, Philippines	Thailand
November 30, 2017	Oral Presentation	Hiroshi Inoue, "Mapping volcano crater by UAV", 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Japan
November 30, 2017	Oral Presentation	Satoru Sugita, Hiroshi Inoue, Yuji Asahi, Tomohide Seko, Hiroshi Itoh, Yuichi Furuse, and Hiromichi Fukui "UAV Photo Sharing System using "Oblique Photo Browser"" 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Japan
November 30, 2017	Oral Presentation	Art Daag, "", 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Philippines
November 30, 2017	Oral Presentation	Wutthiphat Covanich, "", 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Thailand
November 30, 2017	Oral Presentation	Wawan Kiswara, "", 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Indonesia
November 30, 2017	Oral Presentation	Bui Quang Hung, "", 3rd e-ASIA workshop, at VNU, Hanoi, Vietnam	Vietnam
July 2, 2018	Oral Presentation	H.Inoue, "Overview of e-ASIA UAV project Development of Information Gathering and Utilization Systems using small UAV for Disaster Risk Assessment, Monitoring and Response", 4th e-ASIA UAV workshop, Bandung	Japan
July 2, 2018	Oral Presentation	H.Inoue "Development of Information Gathering and Utilization System Using Small UAV for Disaster Risk Assessment, Monitoring and Response, Progress report and plan of Japan team", 4th e-ASIA UAV workshop, Bandung	Japan
July 2, 2018	Oral Presentation	H.Inoue, "Progress Report of Work Package 1&4, Development and applications of fixed wing drones", 4th e-ASIA UAV workshop, Bandung	Japan
July 2, 2018	Oral Presentation	Teesid Leelasawassuk, "Development of the On-Board Computational Unit on a UAV", 4th e-ASIA UAV workshop, Bandung	Thailand
July 2, 2018	Oral Presentation	Wutthiphat Covanich, "E-ASIA progress report and activity plan", 4th e-ASIA UAV workshop, Bandung	Thailand
July 2, 2018	Oral Presentation	Vitvasin Vimolmongkolporn and Satawat Prakanchareon, "Skywalker X8 Development Sharing", 4th e-ASIA UAV workshop, Bandung	Thailand
July 2, 2018	Oral Presentation	Cathey Pogai, "Applications of UAVs on the 2018 Mayon Volcano Eruption", 4th e-ASIA UAV workshop, Bandung	Philippines
July 2, 2018	Oral Presentation	"Robjunelieaaa B. Lim, "Project Progress and Accomplishments (Years 1 and 2)", 4th e-ASIA UAV workshop, Bandung	Philippines
July 2, 2018	Oral Presentation	Satoru Sugita, et al. Hiroshi INOUE, Yuji ASAHI, Tomohide SEKO, Hiroshi ITOH, Yuichi FURUSE, and Hiromichi FUKUI, "Introduction of Drone and Oblique Photo Browser to Disaster Information System of Local Government", 4th e-ASIA UAV workshop, Bandung	Japan
July 2, 2018	Oral Presentation	Hiromichi, Fukui, "Integration of multi-scale imagery of satellite, aircraft, drone, and ground camera to GIS for disaster management", 4th e-ASIA UAV workshop, Bandung	Japan

Lists of Achievements and Implemented Activities

3. Workshops, Seminars, Symposia and Other Events (Organized by the Project)

【Notes】

Please fill in **only the achievements of this project** in order of event date.

The information on this form is only disclosable. Please submit Non-disclosable information in a separate file.

Event duration	Name of Organizer	Title of the Event	Location (Country, City, Venue)	Number of Participants (Including Team Members)	Overview
Mar 4-16, 2018	Taro Yamada	○○○○	Germany, Hamburg, ○○○○	10	
2016/11/14~ 2016/11/16	Hiroshi INOUE, NIED	e-ASIA UAV Kick-off	Japan, Tokyo, JST and Tsukuba, NIED	17	Overview of the plan and sharing 2017 plan
2016/12/12~ 2016/12/16	Bartolome Bautista, PHIVOLCS	UAV Assembly Training	Philippines, Quezon City, PHIVOLCS	11	Building and operation of fixed wing UAV
2017/3/15~ 2017/3/17	Wutthiphath Covanich	Drone Workshop	Thailand, Pathumu Thani, NECTEC	10	Building and operation of fixed wing UAV
2017/4/18~ 2017/4/20	Bartolome Bautista, PHIVOLCS	UAV Assembly Training	Philippines, Quezon City, PHIVOLCS	10	Building and operation of fixed wing UAV
2017/4/24~ 2017/4/27	Bartolome Bautista, PHIVOLCS	e-ASIA UAV 2nd Workshop	Philippines, Quezon City, PHIVOLCS	30	Progress report and plan, UAV test flight
2017/7/3~ 2017/7/7	AIT GIC Center	UAV Assembly Training	Geoinformatic Center, Asian Institute of Technology	7	Building and operation of fixed wing UAV
2017/11/18~ 2017/12/1	Bui Huang	e-ASIA UAV 3rd Workshop	Vietnam, Hanoi, Vietnam National University	10	Progress report and plan, UAV test flight
2018/7/2~ 2018/7/3	Eko Yulianto	e-ASIA UAV 4th workshop	Indonesia, Bandung, LIPI	30	Progress report and plan

8 | Total

Lists of Achievements and Implemented Activities

4. Record of Research Exchanges

【Notes】

Please fill in the record of **research exchange only of this project**.
 "Duration of exchange" is not the number of days stayed on the site, but the number of days from departure to return home.
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Date of Departure	Date of Return	Last Name & First Name	Country of Affiliation	Affiliation	Position	Exchange Destination (Country, City, Research Organization etc)	Description of Exchange Content/Purpose	Duration of Exchange (autocompleted)
January 6, 2016	January 16, 2016	Taro Yamada	Japan	Yamada University	Professor	NANOTEC, NECTEC, Bangkok	〇〇	11
2016/8/2	2016/8/11	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Philippines, Manila City, PHIVOLCS Vietnam, Hanoi, VNU	Meeting	10
2016/11/13	2016/11/17	Eko Yulianto	Indonesia	Research Center for Geotechnology, LIPI	Director	Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/13	2016/11/17	Mudrik Daryono	Indonesia	Research Center for Geotechnology, LIPI	Researcher	Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/14	2016/11/17	Bui Quang Hung	Vietnam	FIMO Center, Vietnam National Univ.	Director	Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	4
2016/11/13	2016/11/17	Daniel Jose Buhay	Philippines	PHIVOLCS		Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/13	2016/11/17	Dave Benedict Emerenciana	Philippines	PHIVOLCS		Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/13	2016/11/17	Kanokvate Tungpimolrut	Thailand	NECTEC		Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/13	2016/11/17	Kittipong Ekkachai	Thailand	NECTEC		Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/11/13	2016/11/17	Wutthiphath Govanich	Thailand	NECTEC		Japan, Tokyo, JST, NIED	1st e-ASIA UAV workshop	5
2016/12/11	2016/12/18	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Philippines, Manila City, PHIVOLCS	Workshop, Meeting	8

2017/3/14	2017/3/23	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Thailand, Bangkok, NECTEC	Workshop, Meeting	10
2017/4/17	2017/4/28	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	12
2017/4/23	2017/4/28	Hiromichi Fukui	Japan	Chubu University	Professor	Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/4/23	2017/4/28	Satoru Sugita	Japan	Chubu University	Associate Professor	Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/4/23	2017/4/28	NECTEC member	Thailand	NECTEC		Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/4/23	2017/4/28	NECTEC member	Thailand	NECTEC		Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/4/23	2017/4/28	NECTEC member	Thailand	NECTEC		Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/4/23	2017/4/28	NECTEC member	Thailand	NECTEC		Philippines, Quezon City, PHIVOLCS	The 2nd Annual Meeting and Workshop	6
2017/5/11	2017/5/12	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Thailand, Bangkok, NECTEC, AIT	Meeting	2
2017/8/8	2017/8/20	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Philippines, Manila City, PHIVOLCS Province of Albay	Drone aerial photograph, UAV survey, Meeting	13
2017/11/29	2017/12/2	Wawang	Indonesia	LIPI	Researcher	Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/27	2017/12/2	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	6
2017/11/29	2017/12/2	Hiromichi Fukui	Japan	Chubu University	Professor	Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	Satoru Sugita	Japan	Chubu University	Associate Professor	Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	Art Daag	Philippines	PHIVOLCS		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	ALISSANDRA PAULINE MARIANO	Philippines	DOST		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	NECTEC member	Thailand	NECTEC		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	NECTEC member	Thailand	NECTEC		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	NECTEC member	Thailand	NECTEC		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4
2017/11/29	2017/12/2	NECTEC member	Thailand	NECTEC		Vietnam, Hanoi, VNU	3rd e-ASIA UAV workshop	4

2018/5/16	2018/5/19	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Thailand, Chiang Mai, Royal Forest Department	UAV meeting	4
2018/6/14	2018/6/23	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Philippines, Manila City, PHIVOLCS, Taal Volcano	Meeting, Drone aerial photograph, UAV survey	10
2018/7/1	2018/7/4	Van Duc Ha	Vietnam	FIMO Center, VNU University of Engineering and Technology	Researcher	Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop	4
2018/7/1	2018/7/4	Hiromichi Fukui	Japan	Chubu University	Professor	Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop	4
2018/7/1	2018/7/4	Satoru Sugita	Japan	Chubu University	Associate Professor	Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop	4
2018/7/1	2018/7/8	Hiroshi Inoue	Japan	NIED	Principal Research Fellow	Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	8
2018/7/1	2018/7/4	Rob	Philippines	PHIVOLCS		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4
2018/7/1	2018/7/4	Cathy	Philippines	PHIVOLCS		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4
2018/7/1	2018/7/4	NECTEC member	Thailand	NECTEC		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4
2018/7/1	2018/7/4	NECTEC member	Thailand	NECTEC		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4
2018/7/1	2018/7/4	NECTEC member	Thailand	NECTEC		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4
2018/7/1	2018/7/4	NECTEC member	Thailand	NECTEC		Indonesia, Bandung, LIPI	The 4th e-ASIA UAV Bandung Workshop, UAV meeting	4

Total (Person) 42

Total (Person-day) 230

Lists of Achievements and Implemented Activities

5. Patent Applications

[Notes]
Please fill in **only the achievements of this project** by country in order of presentation date.
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5. 1 Independent Applications by Single Team

Application Number	Name of Patent/Patent Name	Application Date	Patent Applicants (Fill in All Members)	Publication Number (leave blank if unpublished)	Inventor	Country of Application	Registration Number (leave blank if unregistered)	Country Name of the Team
WO20xx-xxxxxx		January 21, 2016	○○ Univ、Univ.of xx	WO/2016/xxxxxx	○○○○、○○・○○	PCT	WO20xx-xxxxxx (20xx.xx.xx)	Thailand

Total (Number of Application)

Total (Number of Registration)

5. 2 Joint Applications

Application Number	Name of Patent/Patent Name	Application Date	Patent Applicants (Fill in All Members)	Publication Number (leave blank if unpublished)	Inventor	Country of Application	Registration Number (leave blank if unregistered)
WO20xx-xxxxxx		January 21, 2016	○○ Univ、Univ.of xx	WO/2016/xxxxxx	○○○○、○○・○○	PCT	WO20xx-xxxxxx (20xx.xx.xx)

Total (Number of Application)

Total (Number of Registration)

Lists of Achievements and Implemented Activities

6. Awards

【Notes】

Please fill in **only the achievements of this project** by country in order of date of Award.
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Date of Award	Name of Award	Recipient	Remarks	Country Name of the Team
December 24, 2015	○○ Prize	Taro Yamada		Thailand
October, 5, 2017	UAV Startup	Wutthiphat COVANICH and Thailand Team		Thailand

1

Total