URGENT – Urban Resilience and Adaptation for India and Mongolia

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Report on

"Using drones in environmental research - basic knowledge and examples of applications"

30th October-12th November, 2023

In Tartu, Estonia

Hosted by

Estonian University of Life Sciences
Tartu, Estonia

In Cooperation with Partner Institutions...

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The Estonian University of Life Sciences organized a course "Using drones in environmental research - basic knowledge and examples of applications" at Tartu, Estonia on the 30th October – 12th November, 2023.

Outcome of the course:

The aim of this course is to provide an overview about drones, flight regulations, flight planning and safety. Overview about drone based remote sensing and its applications are also included. At the successful completion of the class, the student is aware of flight regulations related with drones and has knowledge about flight planning and about possible sources for input information. Also has overview about drone based remote sensing and its applications.

Main topics:

History and basics of remote sensing; Estonian Land Board map data; ESTHub and Copernicus; Sentinel satellite missions; History and basics of drones; Flight safety and regulations; Flight planning; NOTAM; Drone based remote sensing (RGB, Multispectral, Thermal, LiDAR); Data processing; Applications. Test flights. Data collection. Anlyzing collected data by Softwares.

Drone course faculty:

Prof. Kalev Sepp, Estonian University of Life Sciences (Estonia)

Dr. Anton Shkaruba, Estonian University of Life Sciences (Estonia)

MSc Anne Kull, Estonian University of Life Sciences (Estonia)

MSc Janar Raet, Estonian University of Life Sciences (Estonia)

MSc Kaupo Kokamägi, Estonian University of Life Sciences (Estonia)

MSc Raul Sampaio de Lima, Estonian University of Life Sciences (Estonia)

MSc Volha Kaskevich, Estonian University of Life Sciences (Estonia)

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Day 1; 30. October, 2023

Raul Sampaio de Lima provided an introduction to the participants on the origin and concept of remote sensing and UAVs, giving the participants a comprehensive understanding of their applications and significance.

Raul Sampaio introducing the concept of remote sensing and UAV to participants

Participants also received training in Geographical Information System (GIS) by Anne Kull.

Day 2; 31. October, 2023

Raul Sampaio delivered lectures on various examples of the applications of UAVs., providing participants with a clear understanding of the practical uses and benefiits of UAV technology in real-world scenarios.

Janar Raet and Raul Samapio covered topics such as regulations, data collection and data resolution in the second session, which equipped participants with essential knowledge for operating UAVs within regulatory guidelines and optimizing data accuracy.

These sessions were followed by a Computer class and introduction to softwares by Anne Kull.

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Day 3; 01.November, 2023

Prof. Kalev Sepp introduced the university, delved into the course details available, highlighted the faculty members, and acknowledged the diverse array of participants engaged in the session.

Kaupo Kokamägi then conducted lectures on the following subjects: Cameras and photogrammetry, sensor positioning, terrestrial reference points, learning/training data, compiling flight plans, and the practical aspects of Flying

Participants were actively involved in preparing drones for test flights, meticulously ensuring all systems were operational having a hands-on experience handling and operating drones.

Participants handling drones

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Day 4; 02. November, 2023

GIS training. Test flights

Test flights by participants

Raul Sampaio de Lima then defended his thesis "Novel approaches in multi-sensor unmanned aerial vehicles as basis for enhancing fire management frameworks". Opponent prof Tarmo Remmel (University of York, Canada).

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Day 5; 03. November, 2023

Prof. Tarmo Remmel from York University in Canada delivered a lecture on "The complexities of measuring landscape structure".

Day 6 and 7; 04.-05. November, 2023

Study trip and free time

Day 8; 06.November, 2023

On day 8, the Schedule included an extensive overview of various case studies, providing participants with detailed insights and practical examples. Additionally, the day was dedicated to collecting data on the designated test sites, allowing ofor hands-on experience and the application of theoritical knowledge.

Day 9-11, 7-9.November, 2023

Anne Kull led an exploration of the methodologies and techniques used for analyzing collected data during the computer class. The session delved into various aspects such as data interpretation, statistical analysis methods, and the utilization of computational tools to derive meaningful insights from gathered data.
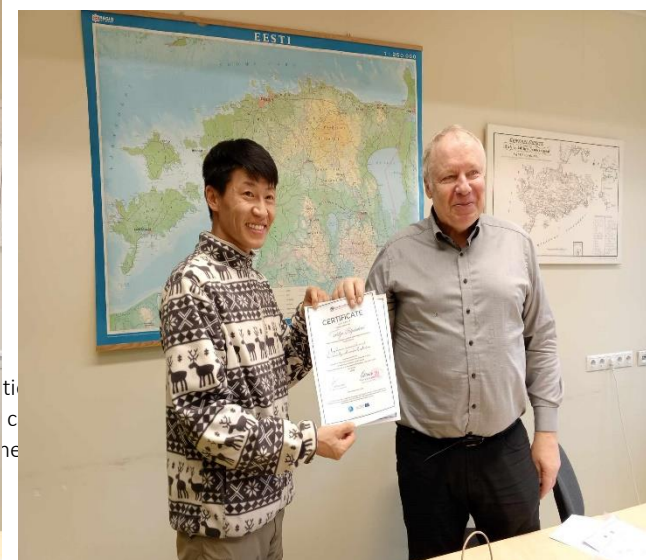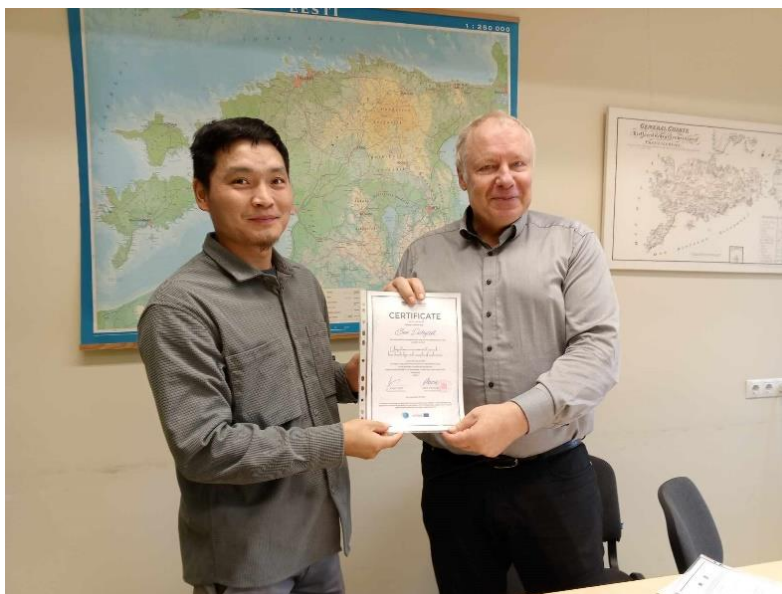
Day 13, 11.November, 2023

Prof. Kalev Sepp facilitated the participants and awarded them graduation certificates.

Participants facilitated by Prof. Kalev Sepp

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All the participants who have attended the whole course and have completed all the trainings were given certificate of completion.

Eesti Maaülikool
Estonian University of Life Sciences

CERTIFICATE

NO 5.1-16/3611-

hereby confirms that

has successfully completed and met all the requirements of the autumn school:

Using drones in environmental research – basic knowledge and examples of applications

under the code PK.1701
provided in the period from October 30 to November 12, 2023
at the Estonian University of Life Sciences
(register code 74001086, Fr. R. Kreutzwaldi 1, 51006 Tartu, EHIS code 174237)
and gained
3 ECTS

KALEV SEPP
HEAD OF AUTUMN SCHOOL

ARET VOOREMÄE
DIRECTOR OF INSTITUTE

Tartu, November 12th 2023

This autumn school was co-organised by Erasmus+ CBHE project URGENT - Urban Resilience and Adaptation for India and Mongolia: curricula, capacity, ICT and stakeholder collaboration to support green & blue infrastructure and nature-based solutions.

Appendix to the certificate No 5.1-16/3611-

has passed the course

Using drones in environmental research – basic knowledge and examples of applications

at the Estonian University of Life Sciences from October 30 to November 12, 2023,
PK.1701 (3 ECTS, 78 acad. hours)

The aim of this course is give an overview about drones, flight regulations, flight planning and safety. Overview about drone based remote sensing and its applications are also included.

Themes:
1. Introduction to remote sensing. UAV - the origin and development of the concept.
2. Examples of the applications of UAV.
3. Regulations. Flight safety. Data collection. Data resolution.
4. Cameras and photogrammetry. Sensors. RGB, Multispectral, Thermal, LiDAR)
5. Positioning. Terrestrial reference points and learning/training data. Radiometric calibration
6. Compiling a flight plan. Test flights. Collecting data by drones.
7. Computer class. Introduction into Software's. Data processing.
8. Analyzing collected data in computer class. Reporting.

After the course the students should:
- be aware of flight safety and regulations related with drones;
- have knowledge about flight planning and about possible sources for input information;
- have an overview about drone based remote sensing and its applications;
- have skills to process data collected by drones.

Lecturers:
MSc Kaupo Kokamägi, MSc Anne Kull, MSc Janar Raet, Dr Raul Sampaio de Lima, Prof. Kalev Sepp, Dr Anton Shkaruba, MSc Aret Vooremäe

ARET VOOREMÄE
DIRECTOR OF INSTITUTE

Tartu, November 12th 2023

Certificate of completion