D.T3.2.5 –TRANSNATIONAL STUDENTS WORKSHOP & REPORT

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The transnational student workshop was organized by the Francesco Josephinum (Austria), Hungarian University of Agriculture and Life Sciences (Hungary) and University of Maribor (Slovenia) to introduce the student's research topics in the field of precision farming.

The meeting was held on-line on the Tuesday, 18th January 2021 from 10.00 to 12.00.

Program	
10.00 – 10.05	Welcome and presentation Agenda
	FJ Section 1: AI in Agriculture (Moderator Dr. Peter Riegler-Nurscher)
10.05-10.20	Topic 1: "Classification of Crops from Satellite Data"
10.20-10.35	Topic 2: "GNSS-Track Classification"
10.35-10.50	Topic 3: "Strawberry Flower Detection"
10.50-11.10	Coffee break
	UNI Maribor Section 2: (Moderator Dr. Jurij Rakun)
11.10-11.25	Topic 4: Student project - Farmbeast robot
	UNI MATE Section 3: (Moderator Dr. Péter Bodor-Pesti)
11.25-11.40	Topic 5: Sensor Data Acquisition for Precision Viticulture in a FIWARE data lake (the Transfarm4.0 pilot action)
11.40-11.55	Topic 6: Monitoring the grapevine canopy temperature with smartphone thermal camera (a running project in the Department of Viticulture).
12.00	End of the Meeting

Francesco Josephinum (Austria)

Topic 1: "Classification of Crops from Satellite Data"

Matthias Wahl and Helmut Steinkellner, both students in the 5th semester of the bachelor-programme *Agricultural Technology and Digital Farming* tried to detect and distinguish arable crops using spectral information provided by satellites. In this work, a trained Support Vector Machine (SVM) used the alteration of vegetation indices (NDVI) of selected crops. The images used to calculate the vegetation index were taken from the Sentinel-2 satellite. The team chose winter cereals, maize, grassland, soya, rape, and sugar beet as the most important crops in Austria.

Topic 2: "GNSS-Track Classification"

The team of Sarah Sulzer, Andreas Wilhelm and Markus Wallner tried to extract GNSS data from the CAN bus data of a tractor and distinguish between road and field travel. In this way, the hours of operation of machines used across farms should be accounted accurately and fair in the future. The AI algorithm presented can even distinguish between fieldwork (operation), turning manoeuvres and standstill.

Topic 3: "Strawberry Blossom Detection"

Alexander Waschl and Maximilian Kölbl, meanwhile, took on strawberry blossoms. With a specially developed algorithm and the associated YOLO model (you only look once), these can be recognised and distinguished based on their inflorescence. The work shows that the differentiation of strawberry blossoms into blossoming, faded and frozen is possible. In the case of the faded strawberry flowers, however, there was a great risk of confusion with the background, which seems logical due to the optical similarity with the leaves. The results are extremely promising; in further work, models for yield estimation and early detection of crop losses will now be created.

University of Maribor (Slovenia)

Topic 4: Student project - Farmbeast robot

The presenter of the student project was Urban Kenda, MSc student from the Faculty of Electrical Engineering and computer Science, University of Maribor. His field of study are mechatronic systems, which also includes agricultural robotic systems. Urban is an active member of the Farmbeast student team from 2018 on, and now also acts as a role of team captain. During his participation in the team, the Farmbeast team won 1st prize in Freestyle task @ international Field Robot Event (FRE) 2019, 2nd prize in Freestyle taks @ FRE 2021 and 3rd prize in Advance navigation @ FRE 2021.

As part of this workshop Urban presented the challenge involving the development of an autonomous field robot. This included the design and development of the robotic platform and all its electro – mechanical subcomponents, including also the processing units and advance sensors, as well as it software components based on ROS (robot operating system) with all the necessary drivers and nodes. In order to evaluate the work of the team, the team competes with the develop robot each year at the FRE, which is an international competition, where the robots compete in four to five different tasks, including basic navigation, advance navigation, weed / object detection, weed / object handling and freestyle.

Hungarian University of Agriculture and Life Sciences (Hungary)

Topic 5: Sensor Data Acquisition for Precision Viticulture in a FIWARE data lake (the Transfarm4.0 pilot action)

Dóra Taranyi, PhD student of the Institute of Viticulture and Oenology at the Hungarian University of Agriculture and Life Sciences introduced her research topic. The aim of her work is to evaluate the effect of different irrigation strategies on the performance, yield and quality of the 'Hárslevelű' grapevine cultivar. She investigates physical parameters of the canopy and plant physiology of the different plots. During the experiment, she use the open-source data provided by the Transfarm4.0 Big and Smart Data Management Pilot action case study 3: Sensor data acquisition for precision Viticulture in a fiware data lake. In her presentation, the student introduced the aims of her research and the preliminary results.

Topic 6: Monitoring the grapevine canopy temperature with smartphone thermal camera (a running project in the Department of Viticulture).

Réka Matisz, BSc student in the Viticulture and Oenology course at the Institute of Viticulture and Oenology at the Hungarian University of Agriculture and Life Sciences introduced her research topic, which is linked to the thermal imaging of the grapevine canopy. The aim of her work to use simple devices to monitor the grapevine water stress. According to the pictures provided by a Flir thermal camera, the student investigated crop water stress index. Results showed that vineyard structure, and vineyard maintenance cause significant alteration in the canopy temperature and water stress of the plants.