

AGRI-DIGITAL GROWTH



Precision Farming Hackathon

Five challenges for future agriculture



University of Maribor
Faculty of Agriculture
and Life Sciences



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Background
to the hackathon

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Program and reasons behind the hackathon



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CREA

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EIT Digital

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The project focuses on enhancing digital skills within the precision farming sector in Central Europe. It will create a "Precision Farming Knowledge Transfer Ecosystem" involving SMEs, researchers, universities, and graduates to foster knowledge exchange and upskill the workforce.



Opportunities within the project:

- 5 pilot courses in 5 domains of precision farming
- 5 living labs: from theory to practice
- 5 hackathon challenges



Society: enhancing digital
knowledge in agriculture

Education centers and VETs:
collaboration with training
centers to improve
educational offer
A3.2

**Share the
experience
in a quadruple
helix context**

Business organisations

- Manufacturers
- Local SMEs
- And their federations

A3.3

Decision makers: provide inputs
for regional specialisation
policies
A3.1 - A3.4



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This hackathon is a collaborative, competitive event designed to address **real-world challenges** in precision farming. Participants will work individually to tackle one of five specific challenges, each connected to a living lab led by a partner organization.



Innovating Precision Viticulture



AI-Powered Solutions for Precision Agriculture



Climate-Smart Solutions for Precision Agriculture



AI-Powered Irrigation and Proximity Sensors



AR for Site-Specific Management in Agriculture

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Challenge 1

MATE
HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES

Innovating Precision Viticulture



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Hackathon Challenge 1: Innovating Precision Viticulture (MATE)

Viticulture is one of the most important horticultural sectors, where the yearly agronomic operations have great importance related to yield and quality:

- Pruning
- Canopy management
- Soil management
- Plant protection
- Nutrient supply
- Harvest



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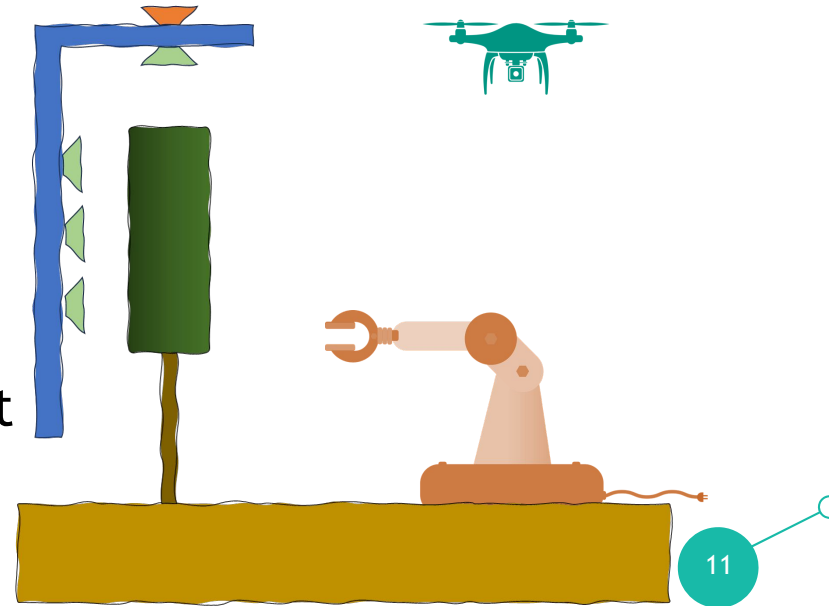
Hackathon Challenge 1: Innovating Precision Viticulture (MATE)

The task is to set up a precision farming system based on:

- Remote sensing sensors
- Proximal sensing sensors
- Robotics

with the aims to:

- Increase the quality
- Reduce the environmental impact
- Handle labor shortage



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Hackathon Challenge 1: Innovating Precision Viticulture (MATE)

- Prize: 500€
- Non-paid internship to the Hungarian University of Agriculture and Life Sciences (MATE)
- Opportunity to participate in research and publication at MATE Institute for Viticulture and Oenology

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P4A Hackathon Challenge 2 in AGRI-DIGITAL-GROWTH

Pre-hack Webinar | 15. January 2025 | Markéta Kollerová | Tomáš Mildorf



Plan4all
Czech Republic



www.plan4all.eu

Innovators in digital agriculture and precision farming

Experts in Earth Observation (EO), Artificial Intelligence (AI), and digital innovation



Details & Prizes

Location: Fully remote

Mentors & Judges: Experts available for guidance and evaluation

Prizes: remote internship focusing on software development, ontology, GIS, and data work. Cooperation with universities (CTU, UWB)

Benefits: gain real-world experience, networking opportunities, potential for thesis collaboration, and travel reimbursement for in-situ meetings.

Website: www.plan4all.eu



Hackathon Challenge 2: AI-Powered Solutions for Precision Agriculture

Develop innovative AI-driven solutions for crop monitoring and weather forecasting using satellite imagery, local weather, and sensor data.

Focus on improving prediction accuracy by overcoming cloud cover and data integration challenges.

Showcase the potential of AI and machine learning in precision agriculture to optimize crop management and adapt to environmental changes.



Thank you



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Hackathon 2025

Agri-Digital Growth - UM HACKATHON TOPIC

Benjamin Založnik

WHO ARE WE?

- University of Maribor
- Faculty of Agriculture and Life Science
- Chair of Biosystems Engineering

- Researchers / lecturers
 - Agriculture
 - Mechanical Engineering
 - Electrical Engineering
 - Computer Science



WE PROUDLY PRESENT OUR TOPIC

Climate-Smart Solutions for Precision Agriculture

- Agriculture faces unprecedented challenges from climate change, including extreme weather, unpredictable growing conditions, and resource scarcity. At the same time, the global population is growing, increasing the demand for food while the pressure to reduce environmental impact intensifies.
- "Climate-Smart Solutions for Precision Agriculture" addresses these challenges by integrating advanced technology with sustainable practices to:
 - **Ensure Food Security:** Support higher yields and stable production despite changing climates.
 - **Enhance Resilience:** Equip farmers to adapt to weather variability and resource constraints.
 - **Promote Sustainability:** Minimize environmental impacts through smarter, data-driven resource use.



CRITERIA

■ Judging Criteria for Our Challenge

- Participants in our challenge will be evaluated by a jury of five precision agriculture experts.

■ Expectations for Participants:

- Clearly identify and describe a current agricultural challenge.
- Propose a research-based solution to address the challenge.
- Provide a thorough evaluation of the proposed solution.

■ Extra points will be awarded for integrating smart technologies, such as:

- Sensors
- Precision farming techniques
- Artificial intelligence
- Other innovative technologies

Interreg
CENTRAL EUROPE



Co-funded by
the European Union

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We look forward to hearing from
you!



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Challenge 4



AI-Powered Irrigation and Proximity Sensors



CHALLENGE 4

AI-POWERED IRRIGATION AND PROXIMITY SENSORS

Living lab - Challenge

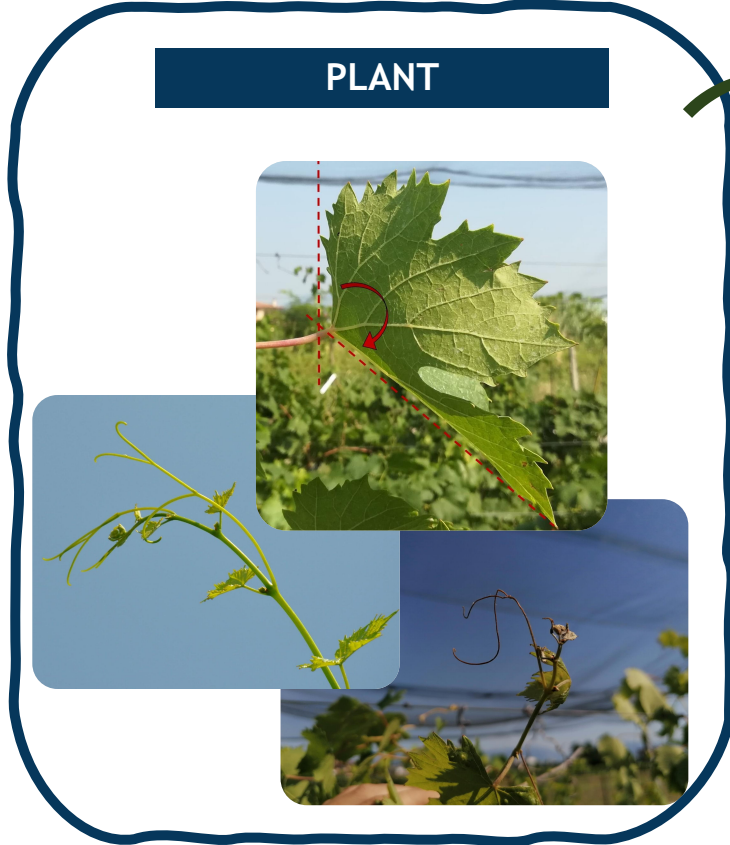
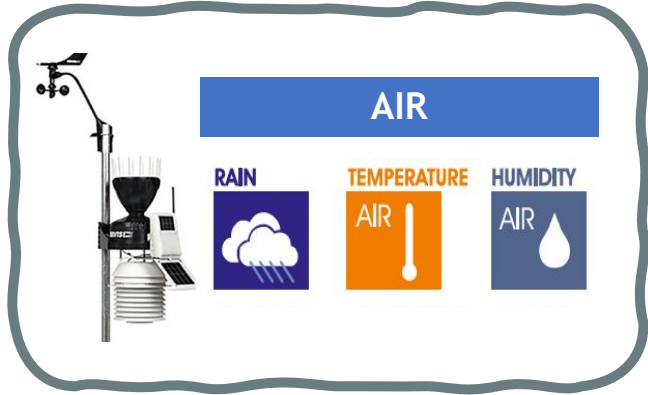
Develop an innovative decision support system for irrigation in viticulture.

How??

CHALLENGE 4

AI-POWERED IRRIGATION AND PROXIMITY SENSORS

Living lab - the new ideas



Simple measure

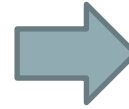


CHALLENGE 4

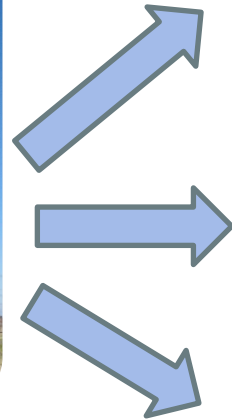
AI-POWERED IRRIGATION AND PROXIMITY SENSORS

Living lab - new digital tools in the vineyards

CLIMATE/SOIL MOISTURE + CANOPY DATA
DATA



IMPROVED VINE
WATER STATUS
ASSESSMENT



CANOPY
VOLUME



- To monitor canopy growth
- To improve the calculation of evapotranspiration

LEAF
ANGLE



Good relation to leaf water potential in several crops (Torrecillas et al., 2000; Paliotti et al., 2008, Briglia et al. 2020)

CANOPY
TEMPERATURE



Related to stomatal conductance and to plant water potential (Poblete-Echeverría et al. 2016; Belfiore et al., 2019)

Internship - What do we offer?

- collaborate with researchers Federica Gaiotti, Patrick Marcuzzo e Alessandro Romano from CREA, and specialists from CET Electronics, Denise Vicino - Nicola Vicino;
- participate in all pilot courses developed within the project on the theme of precision agriculture.
- Learn more about precision viticulture:
 - proximity sensors: types, functionality, and potential;
 - how to collect the water status data in the field to build a model;
 - DSS decision support systems. How to interpret data to optimize the use of resources (water and treatments);

LIVING LAB ITALY

Internship - more details

- length: 3 – 6 months; more or less 200 hours from April to September
- modality: mainly in person. Where? In two towns of the Veneto region (Conegliano – Zenson di Piave);
- Part-time / full-time: both are possible;
- Paid: 2000 €;
- Thesis: possible;
- Future job opportunities in the organizations: possible;

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Challenge 5: Josephinum Research (JR)

AR for Site-Specific Management in Agriculture

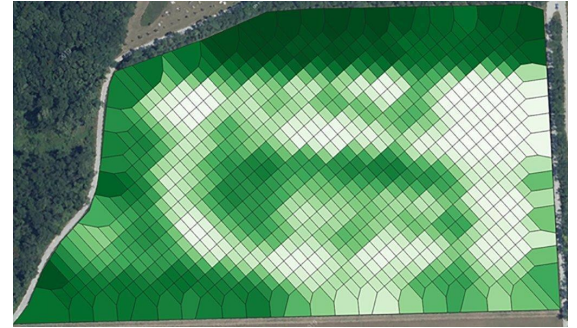
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INTRODUCTION

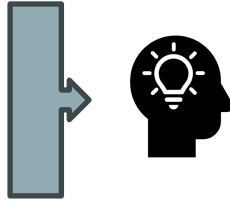
Hackathon Challenge 5 (JR)

AR for Site-Specific Management in Agriculture



Site-specific management

Site-specific management in agriculture enables farmers to optimize resource use, increase crop yields and reduce environmental impact by tailoring practices to the unique characteristics of different areas within a field.

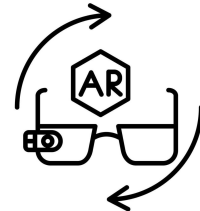


Augmented Reality

Augmented reality offers new opportunities in visualization by overlaying digital information onto the real world, enhancing decision-making and interaction with complex data in real-time

AR can be applied using a variety of devices:

- Smartphones and Tablets
- AR Glasses
- AR Enabled Wearables
- ...



TASK

Hackathon Challenge 5 (JR)

AR for Site-Specific Management in Agriculture

The **TASK** is to design a concept where the new opportunities and benefits of “Augmented Reality“ are used to improve site-specific management in agriculture.

Possible Advantages can be:

- Increased Efficiency
- Improved Precision
- Enabled real-time Data Visualization
- Improved field navigation
- Enhanced mapping and modeling



PRIZES

Hackathon Challenge 5 (JR)

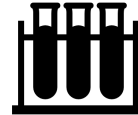
AR for Site-Specific Management in Agriculture



- 500€ for the winner



- Internship at Josephinum Research



Hackathon: 06.02-07.02, 2025

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Practicalities and How to Join?



Register to the event

Jan 15 - Jan 26

Registration Deadline

Jan 26

Selection of invited participants

Jan 29

Onboarding call

Feb 3 14:00

Hackathon

Feb 6 - Feb 7

Participants register individually through the form

Choose one challenge

Approved individuals will receive an email notification

Onboarding information will be included

Tools

Links

Schedule

Hackathon process

Online

Zoom & Slack

Mentor support for each challenge

Pitch video presentations



Event Schedule (CET) - Online

February 6th

- 13.00** - Opening Session
- 13.15** - Challenge partners introduce their assignments
- 14.00** - Participants start to work on the assignments with online support from mentors
- 18.00** - Pitching Training

February 7th

- 09.00** - Deadline to submit assignments
- 10.00** - Pitch Streaming and Q&A
- 12.30** - Jury deliberation
- 13.00** - Announcing winners and closing



Next steps reminder

Sign up through the form

Jan 26, 23.59 CET - Registration Deadline

Jan 29 - Selection announcement

Each applicant will receive an email whether they are selected or not

Follow the instructions in the email to confirm your participation

Feb 3 - Onboarding Call 14.00 CET

Please reach out to madde.kivikangas@ultrahack.org if you have any questions!



Q&A



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