UNIVERSITY OF APPLIED SCIENCES UPPER AUSTRIA

Advanced technologies: Drones, Space technologies, AI & Machine Learning, Advanced Robotics

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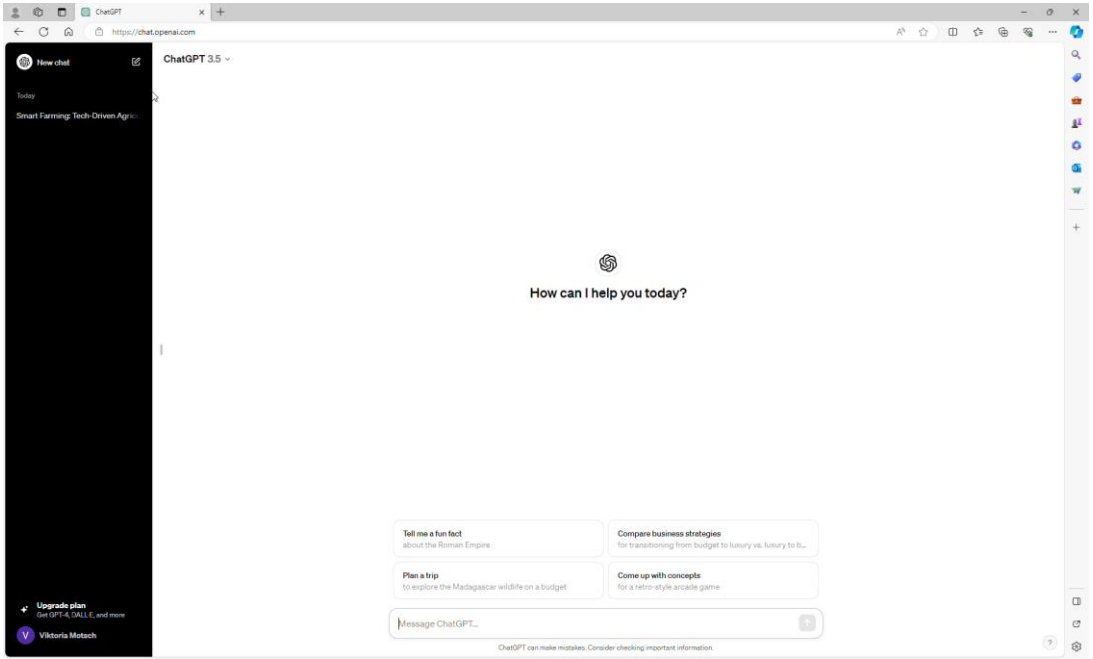
Scale Up, 06.02.2024

HAGENBERG | LINZ | STEYR | WELS

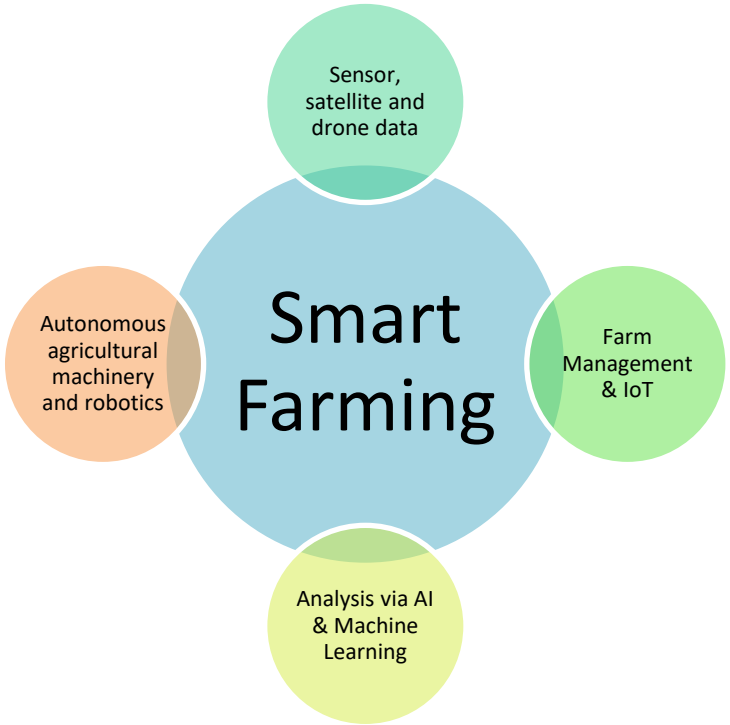
Smart Farming



Challenges and Opportunities

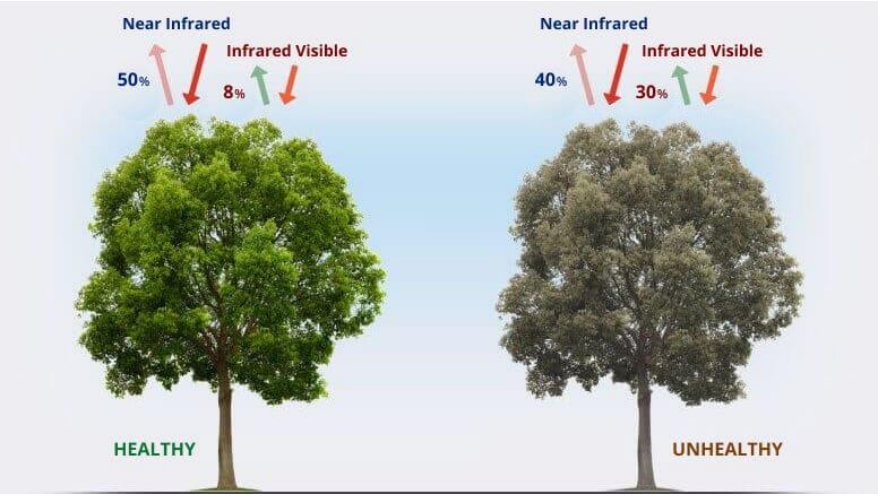
- Increased Global Food Demand
- Limited Resources
- Environmental Challenges
- Climate Change
- Manual Labor
- Reporting Obligations
- Production with fewer ressources
- Optimization & Precision Agriculture
- Increased Sustainability
- Adaptation
- Efficiency & Data-Driven Decisions
- Financial Incentives

Digital technologies as a solution



Space Technologies in Agriculture

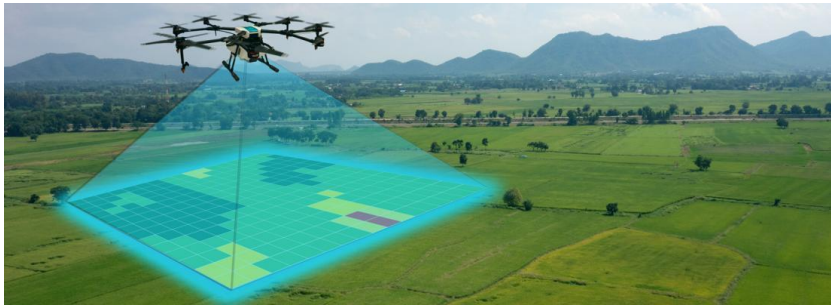
- Global Navigation Satellite Systems (GNSS)
- Satellite Imaging
  - > Sentinel System
  - > Multispectral Information
  - > Crop Monitoring



Space Technologies in Agriculture

- Global Navigation Satellite Systems (GNSS)
- Satellite Imaging
  - > Sentinel System
  - > Multispectral Information
  - > Crop Monitoring
- Weather Monitoring
- Communication

Drone Technology



also known as Unmanned Aerial Vehicles (UAVs)

- Crop monitoring with increased resolution

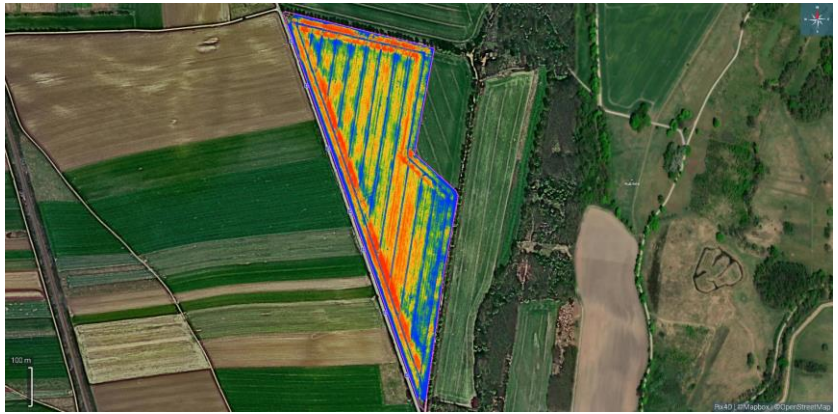
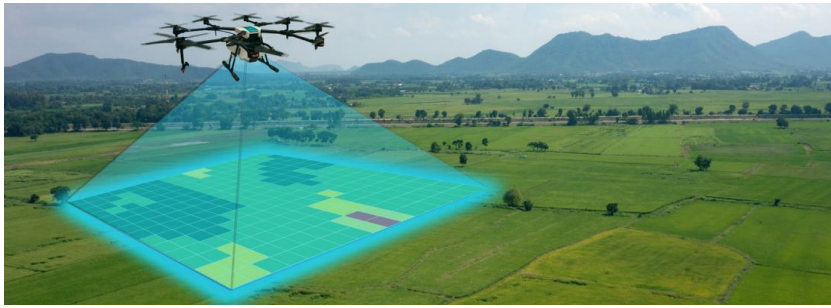


Image of a field in Lower Austria, red indicates a higher NDVI, blue a lower NDVI

Drone Technology



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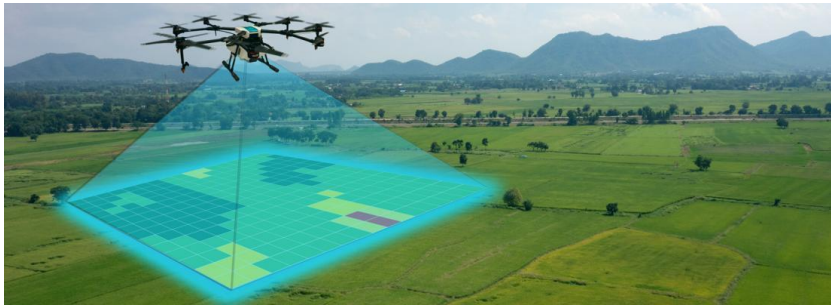
- Crop monitoring with increased resolution
- Fawn detection / Animal search
- Ichneumonidae (wasps)

Drone Technology



also known as Unmanned Aerial Vehicles (UAVs)

- Crop monitoring with increased resolution
- Fawn detection / Animal search
- Ichneumonidae (wasps)
- Collection of GPS data from fields
- Weed detection
- Cargo drone (up to 30 kg) for reseeding
- Legal framework for fertilization and chemical crop protection from the air

Systems in Use

Systems in Use

Systems in Use

Field Robotics in Action

Source: Small Robot Company

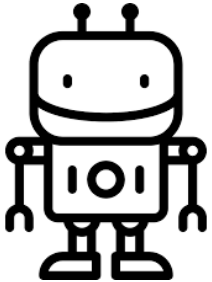
Source: Deepfield Robotics

Field Robotics in Action

Robotics in Agriculture

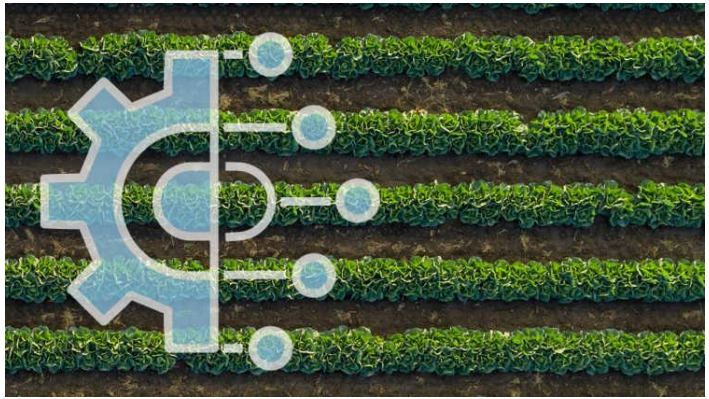
Agri-robotics encompasses various applications aimed at automating tasks, improving precision, and enhancing overall productivity.

- Robotic Dairy Farming
- Weeding and Crop Monitoring Robots
- Robotic Harvesting Systems
- Robotic Soil Sampling
- Swarm Robotics



The adoption of robotics in agriculture offers the potential for **increased efficiency**, **reduced labor costs**, and **sustainable farming practices**.

AI & Machine Learning



Let’s put the “**smart**” in smart farming!

- Artificial intelligence (AI) is proving to be a decisive factor in overcoming current and future challenges.
- By analyzing collected data, recognizing patterns and combining them with robotics, self-learning systems can make targeted interventions.
- Primarily used in the field of chemical and mechanical crop protection, which reduces costs and minimizes environmental impact.
- Further, determining the optimum times for sowing, crop protection and harvesting.

AI & Machine Learning

- **Artificial intelligence (AI)** refers to the ability of computers to perform tasks that traditionally require human intelligence, such as decision making, speech recognition and problem solving.

- Within this field, **machine learning (ML)** is a method by which computers learn and adapt through data analysis and without explicit programming.

- **Deep learning (DL)**, a subset of machine learning, deepens this approach by using artificial neural networks with many layers that allow complex patterns in large amounts of data to be identified and interpreted.

AI & Machine Learning

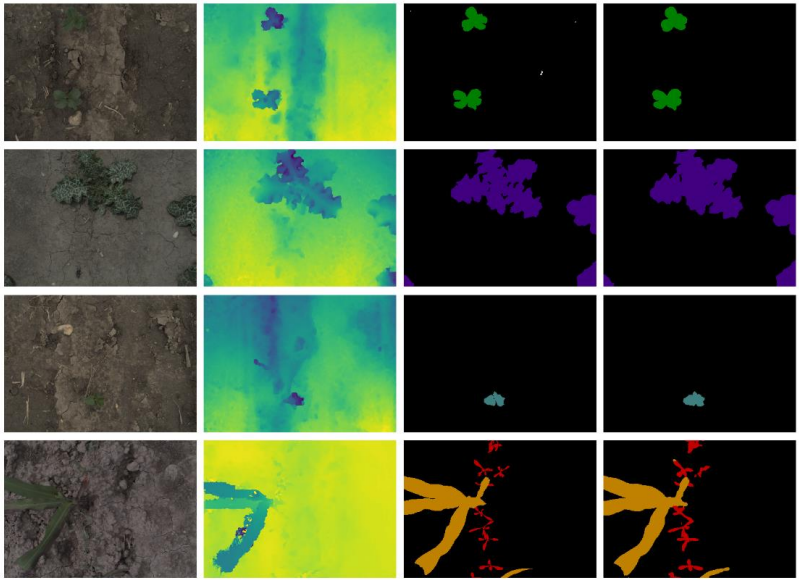
Applications in Agriculture

- Livestock Monitoring
- Irrigation
- Yield Mapping
- Protection against diseases
- Field robotics
- Post harvest handling

Conclusion Smart Farming

- At the forefront of Agriculture 4.0, where technology intersects with traditional practices for unprecedented efficiency, sustainability, and productivity.
- Further advancements in Artificial Intelligence, Internet of Things, robotics, and data analytics expected.
- Integration of precision agriculture techniques and innovative technologies → addresses contemporary challenges in the agricultural sector and aligns with global efforts toward sustainability and resilience.
- Potential to optimize resource usage, minimize environmental impact, and contribute to food security → smart farming is a strategic pathway to a more sustainable future for agriculture.

How to find our data set?



https:doi.org/10.5281/zenodo.7457983

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