

Lesson 2:

Benefits of Smart Farming and Its Importance for a Sustainable Future

Smart Farming with Drones

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Lesson Objectives

Understand the benefits of smart farming



Learn how smart farming contributes to
sustainability

Explore career opportunities in smart farming and related
fields



TOPICS

Introduction to Smart Farming and Sustainability

Benefits of Smart Farming

Real-World ExamplesCareer

Opportunities in Smart Farming

Discussion and Q&A

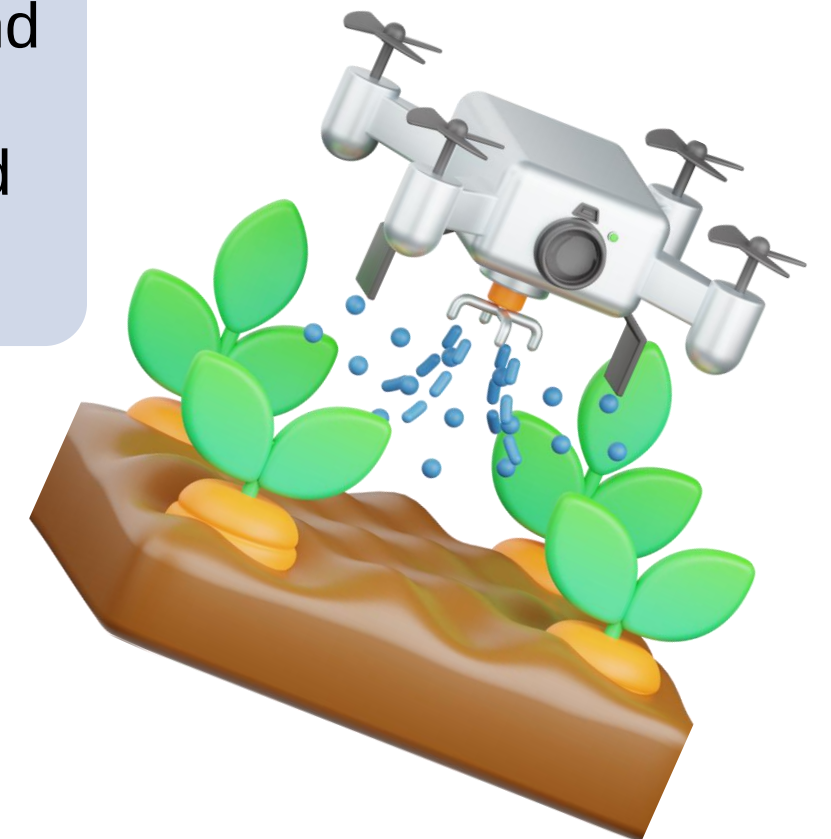
What is smart farming?



Smart Farming as a modern approach that leverages Information and Communication Technologies (ICTs) to increase farming productivity, optimize labor, reduce costs, and minimize environmental impact. It emphasizes the integration of advanced technologies to improve efficiency while contributing to sustainability in agriculture.



It can involve technologies such as the Internet of Things (IoT), big data analytics, and precision farming tools that help farmers make data-driven decisions to optimize resource usage, such as water, fertilizers, and energy, ultimately leading to increased production and reduced environmental footprint.



What is smart farming sustainability?



Sustainable Farming is a farming approach that can be sustained into the foreseeable future. It is a way of farming that: will be even more efficient and productive in ten or twenty years than it is today; and. will maintain and shape our countryside as a high-quality place in which to work and live.



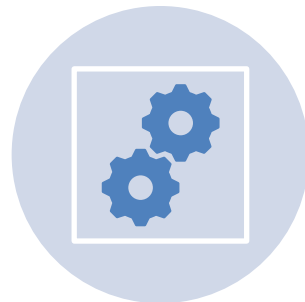
Smart Farming Cycle



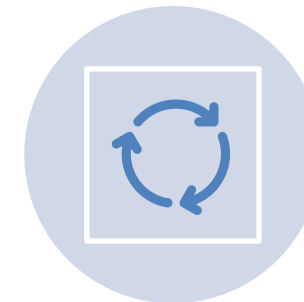
Observation: Sensors gather data from crops, weather, or livestock.



Diagnostics: A cloud-based IoT platform analyzes the collected data, identifying any deficiencies or needs.



Decisions: Based on the analysis, IoT determines the most appropriate treatment or course of action.



Action: The prescribed action is carried out, and then the cycle repeats from the beginning.

Smart Farming Applications

- **Precision Farming:** This involves using information technology to ensure crops receive exactly what they need for optimal health and productivity, helping farmers increase yields while using fewer resources.
- **Vertical Farming:** This technique allows crops to grow without soil, using hydroponics or aquaponics in vertically stacked layers, enabling farming in urban environments or areas with limited space.
- **Robotic Farming:** Robots are used for farming tasks such as irrigation, pesticide spraying, and harvesting. Examples include drones, autonomous tractors, and harvesting robots, which help automate labor-intensive processes.
- **Agrivoltaics:** This is a system where solar panels and crops are combined on the same land to maximize land use, generate renewable energy, and increase revenue. The energy generated can also be sold back to the grid.



Stakeholders

- **Suppliers:** Provide seeds, fertilizers, and equipment for farming.
- **Farmers:** Use smart farming tech to grow crops efficiently.
- **Retailers:** Sell farm products to consumers.
- **Consumers:** Benefit from better quality, efficient, and sustainable food.
- **Employees:** Technicians and workers who use and support smart tech on farms.
- **Communities:** Local people who gain jobs and a better environment.
- **Government & NGOs:** Make rules and give support for smart farming.
- **Telecom Providers:** Give internet and connectivity for smart tools.
- **Equipment Manufacturers:** Build tools like drones and sensors for farming.

Benefits Of Smart Farming

Increased Efficiency: Optimizes use of resources.

Higher Yields: Improves crop production.

Sustainability: Reduces environmental impact.

Cost Savings: Lowers operational costs.



Social Benefits

Stronger Communities: Local food production increases and communities rely less on outside help.

Healthier Environment: Using fewer chemicals and resources leads to better environmental health.

More Learning: Farmers get access to training and new knowledge with modern tools.

Better Food Security: Higher yields and efficiency mean more stable and sustainable food supplies.

New Jobs: Smart farming creates new jobs in tech, data analysis, and agriculture.

Economic Benefits

Attracts Investors

Smart farming is eco-friendly, so it draws interest from ESG (Environmental, Social, and Governance) investors.

Gets Government Support

Many governments offer tax breaks and incentives for using green technologies.

Cuts Costs

Using water, energy, and fertilizer more efficiently saves money.

Increases Sales

People want sustainable food, and smart farms can sell more because of that.

Stronger, Smarter Business

Tech helps farms adapt and survive in tough conditions and changing markets.



Enviromental Benefits



- **7% INCREASE IN FERTILIZER EFFICIENCY, ALLOWING FOR MORE PRECISE USE OF NUTRIENTS AND REDUCING WASTAGE.**
- **9% REDUCTION IN HERBICIDES AND PESTICIDES, CUTTING DOWN THE CHEMICAL IMPACT ON ECOSYSTEMS.**
- **6% REDUCTION IN FOSSIL FUEL USE, THANKS TO MORE EFFICIENT EQUIPMENT AND BETTER RESOURCE MANAGEMENT.**
- **4% REDUCTION IN WATER USE, ACHIEVED THROUGH TECHNOLOGIES LIKE SMART IRRIGATION THAT OPTIMIZE WATER DISTRIBUTION.**
- **4% INCREASE IN CROP PRODUCTION, DUE TO IMPROVED GROWING CONDITIONS AND RESOURCE MANAGEMENT.**
- **LAND CONSERVATION, AS SMART FARMING ENABLES THE EFFICIENT USE OF EXISTING LAND, REDUCING THE NEED FOR EXPANDING FARMING AREAS.**

Real Worlds Examples



DJI Agriculture
about 2 years ago



With Improved flight time of 42 minutes (with RTK module), Mavic 3M is able to capture over 2 square kilometers in a single flight to achieve efficient aerial surveying. 🌱

The RGB camera will be calibrated with intrinsic parameters when it's produced, and the intrinsic parameters will be written in the XMP information of each image. The mapping accuracy is relative to the GSD, and M3M GCP-free accuracy is about 2 times that of GSD.

#djiagriculture #mavic3m



Aerofarms and Nokia Bells Labs AI-Enabled Plant Vision



Careers in Smart Farming



Agricultural Data Analyst

This role involves analyzing data collected from sensors, drones, and farm equipment to help optimize crop production, irrigation, and farm management. They work closely with farmers and agronomists to provide insights that lead to improved efficiency.



Precision Agriculture Specialist

Precision agriculture specialists use technology like GPS-guided equipment, sensors, and drones to manage fields with a high level of accuracy. They help optimize the use of water, fertilizers, and pesticides to increase crop yield and sustainability.



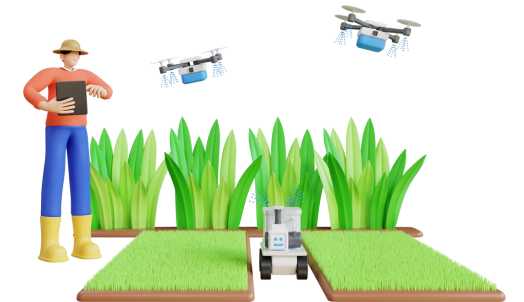
Farm Automation Engineer

These engineers design and implement automated systems such as robotic harvesters, automated irrigation systems, and smart greenhouse systems. They ensure that farms are utilizing the latest technology to minimize labor and increase productivity.



Agritech Software Developer

Software developers in smart farming create applications and platforms for farm management, crop monitoring, and predictive analytics. These tools help farmers make data-driven decisions, automate processes, and manage their farm operations more effectively.



Drone Operator/Technician

Drones are widely used in smart farming for tasks like crop monitoring, pest detection, and soil analysis. Drone operators and technicians are responsible for flying and maintaining drones, as well as interpreting the data collected from them.

Question & Answer Session

What are some ways that smart farming can help save water and reduce the use of chemicals like pesticides?

How can technology, like drones and sensors, help farmers grow more crops with less effort?

How do robots and machines make farming easier and more efficient for farmers?



Additional Resources

Further Reading

<https://doi.org/10.1016/j.jclepro.2023.140338>

Harvesting a sustainable future: An overview of smart agriculture's role in social, economic,

Videos

[https://www.dw.com/en/smart-farming-tech-for-sustainable-food/video-](https://www.dw.com/en/smart-farming-tech-for-sustainable-food/video-68640143)

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