Navigating the digital landscape in the agri-food sector

Chances & Strategies to Grow & Expand your Business Using Modern Technology

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MODULES

1. INTRODUCTION TO DIGITAL TRANSFORMATION IN AGRI-FOOD
2. BUILDING A DIGITAL PRESENCE
3. E-COMMERCE & ONLINE SALES
4. DIGITAL MARKETING STRATEGIES
5. DATA ANALYTICS & INSIGHTS
6. MOBILE TECHNOLOGY & APPS
7. INTERNET OF THINGS (IOT) IN AGRICULTURE
8. ONLINE NETWORKING & COLLABORATION
9. CYBERSECURITY & DATE PRIVACY
10. FUTURE TRENDS & ADAPTATION STRATEGIES

Internet of Things (IoT)

- Understand the concepts & benefits of IoT in agriculture
- Identify key IoT applications relevant to the agri-food sector
- Best practices for implementing IoT solutions
- Potential challenges & considerations in IoT adoption

1) Introduction of IoT

Definition:

The Internet of Things (IoT) describes a **network** composed of **physical devices, vehicles, appliances**, and **various objects** that are equipped with **sensors, software, and network connectivity**. This integration enables them to collect and exchange data seamlessly.

Relevance of IoT to Agriculture:

- Precision Agriculture (monitor crop health, weather patterns.. in real-time)
- Resource Optimization (optimize use of water, fertilizer..)
- Livestock Management (monitor health & location of livestock)
- Automated Systems (irrigation system, greenhouse vents, feed supply)
- Supply Chain Transparency (enhance traceability in supply chain, provides data on conditions during transportation & storage, can improve safety & quality)

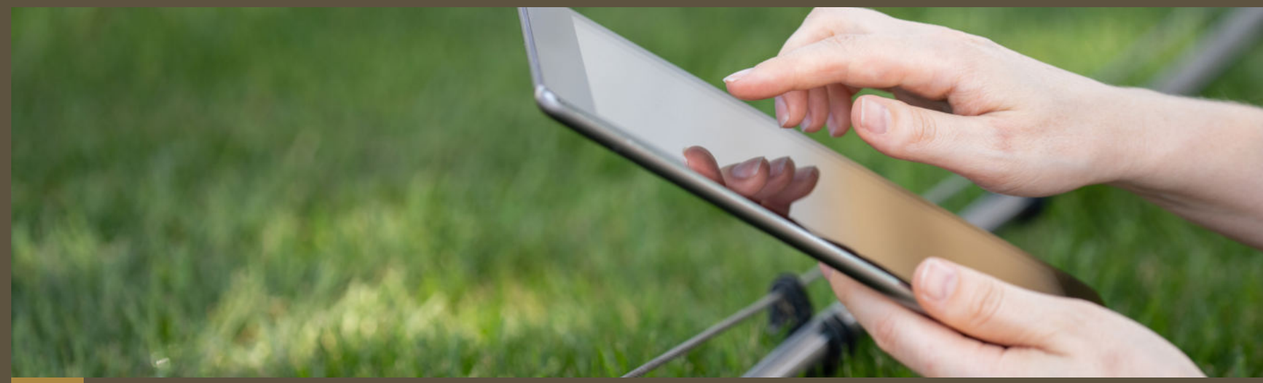
2) Benefits of IoT in agriculture

Increased Efficiency

- automation of tasks (irrigation, fertilization..) with real-time data
- time saving

Resource Optimization

- efficient use of water, nutrients & energy
- reduced water usage & waste; fertilizer & pesticide application



Data Driven Decisions

- real-time data collection for better crop management
- sensors for soil moisture, temperature, livestock activity/health, pest infestation

Predictive Analytics

- forecasting yields & detecting issues early
- based on data insights, farming practices adjusted with precision (e.g. application rates of water across a field)

3) Key IoT applications in agriculture

Smart Irrigation Systems

- sensors that optimize water usage

Crop Monitoring

- drones & sensors for monitoring crop health

Supply Chain Management

- IoT for tracking produce from farm to market

Livestock Management

- variable devises for tracking animal health & behavior

Communication Technologies used for data transmission

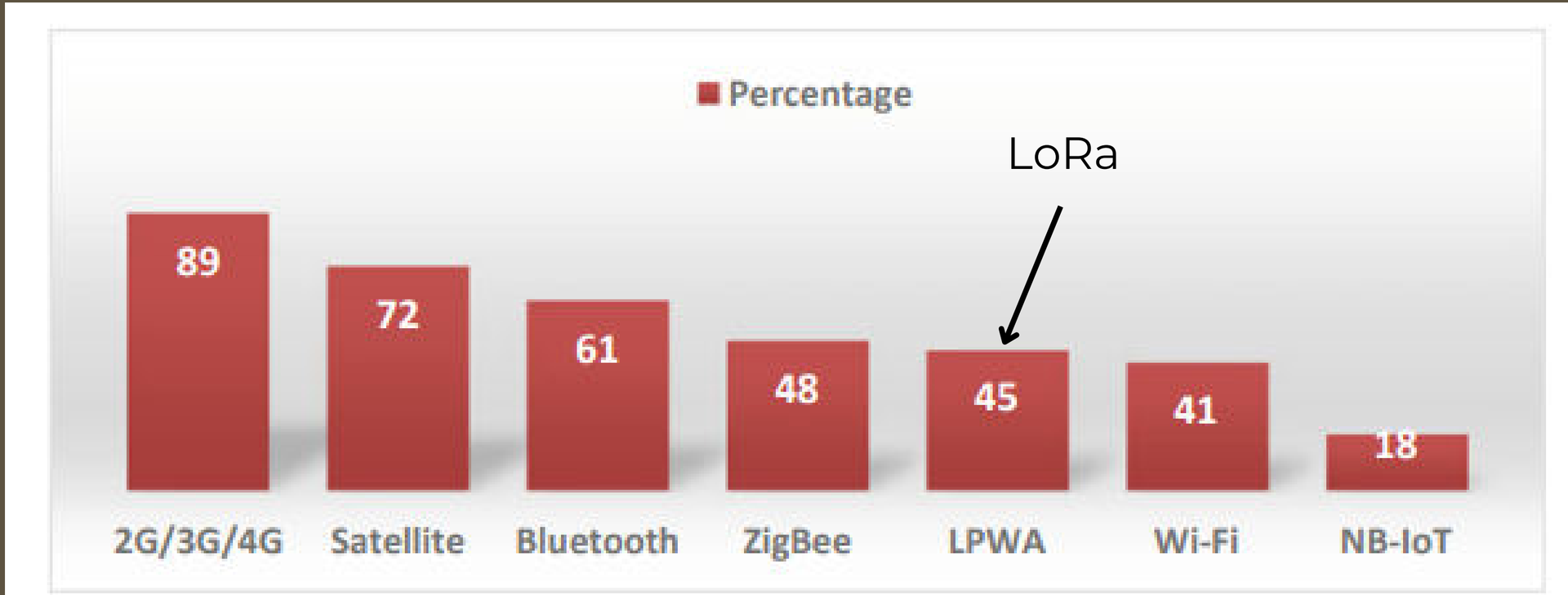


Fig. 1 Communication technologies used for data transmission in percentage

K. J. Singh et al (2023): Internet of Things in Agriculture Industry: Implementation, Applications, Challenges and Potential. In: Lecture Notes in Electrical Engineering. June 2023. 335-347.

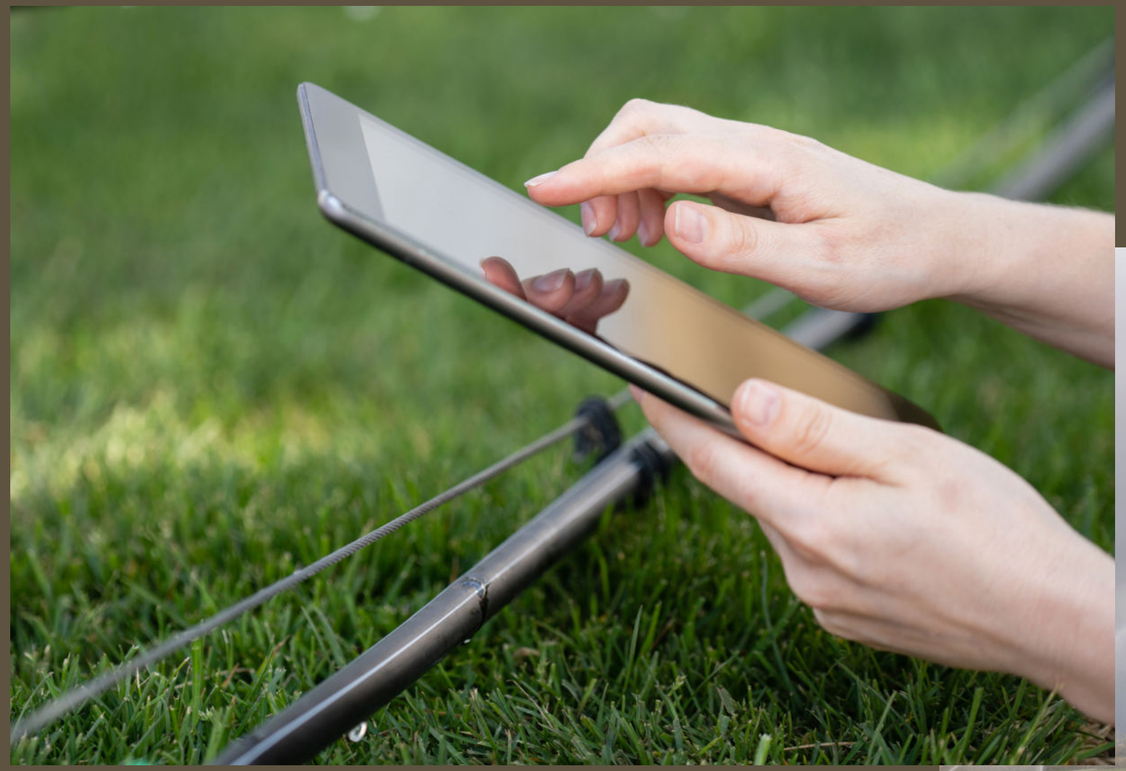
LoRaWAN

Humidity Sensor, digikey.ca

GPS cattle sensor, www.hktlora.com

Cormind.com

Smart Irrigation Systems & Crop Monitoring



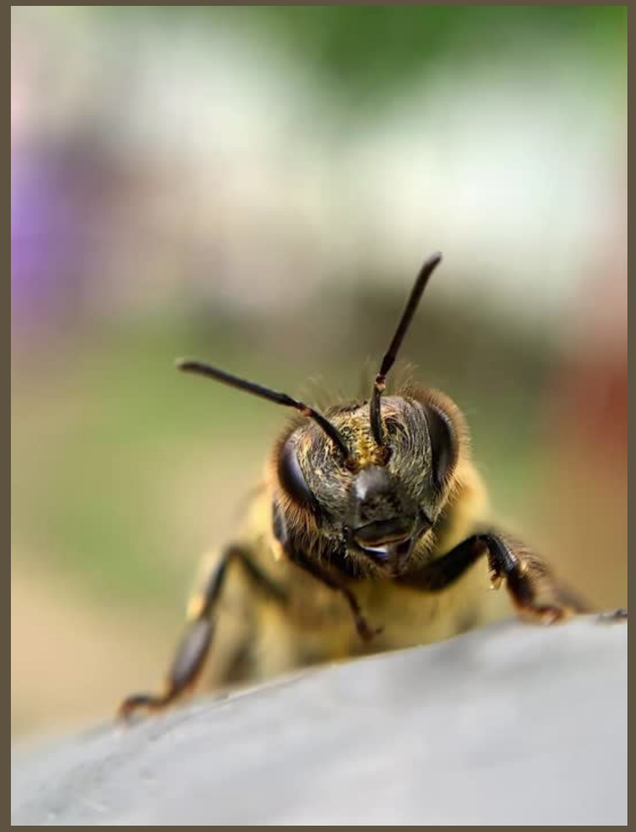
- soil moisture sensors
- weather data (T & humidity)
- pH & nutrient sensors
- frost sensors

Potential influences of LoRa on crops

- growth influence
- photosynthesis impact
- no proven long term harm

Pollination & Insect Monitoring

- sensors monitor hive health & pollination rates
- pest detection sensors



Potential effects on animals & insects

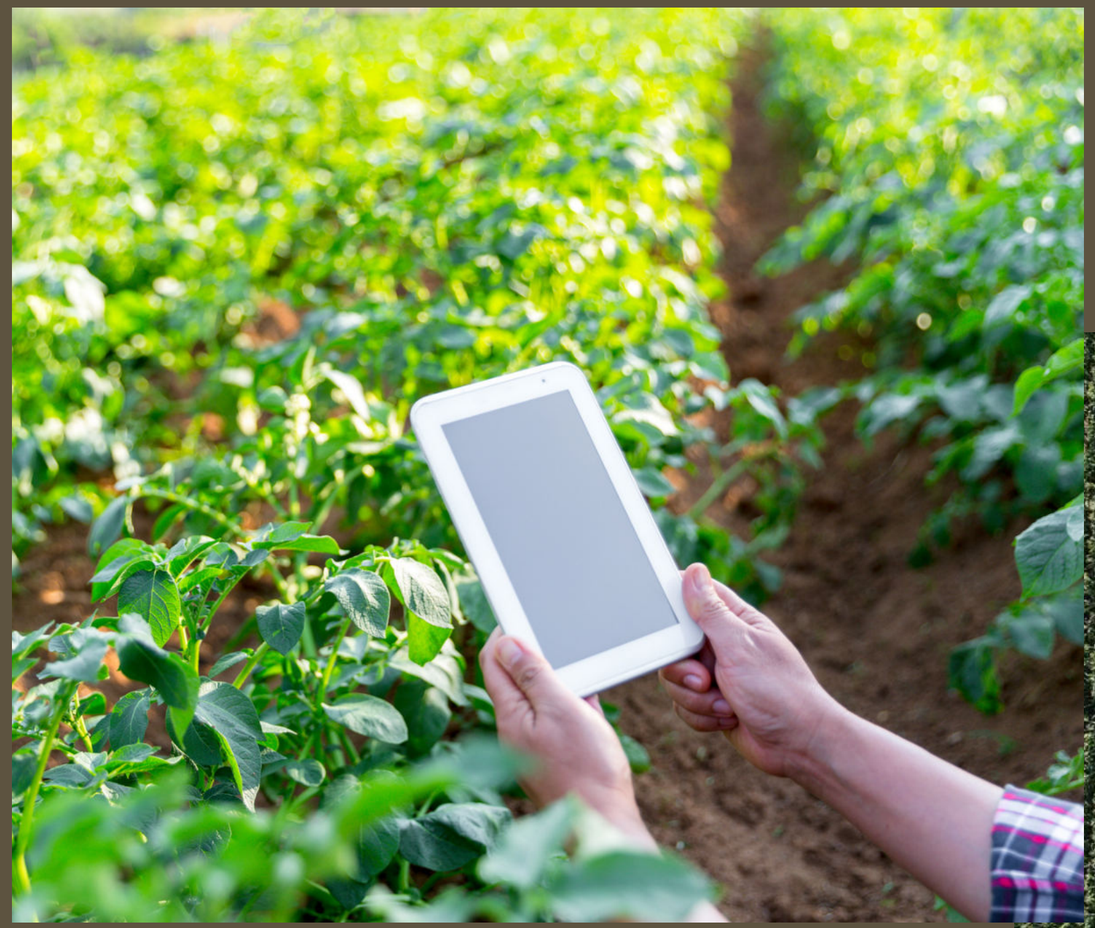
- no thermal effects
- behavioral insects
- electro sensitivity concerns

Precision Livestock Farming

Smart Greenhouses

Drone-based Crop Scouting

Predictive Analytics for Crop Management



Supply Chain Management & Traceability

AGRIVI

ORACLE NetSuite

Bloomberg Professional Services

theagrotechdaily.com/agricultural-supply-chain/

Sector-wide Applications of IoT in the agriculture industry

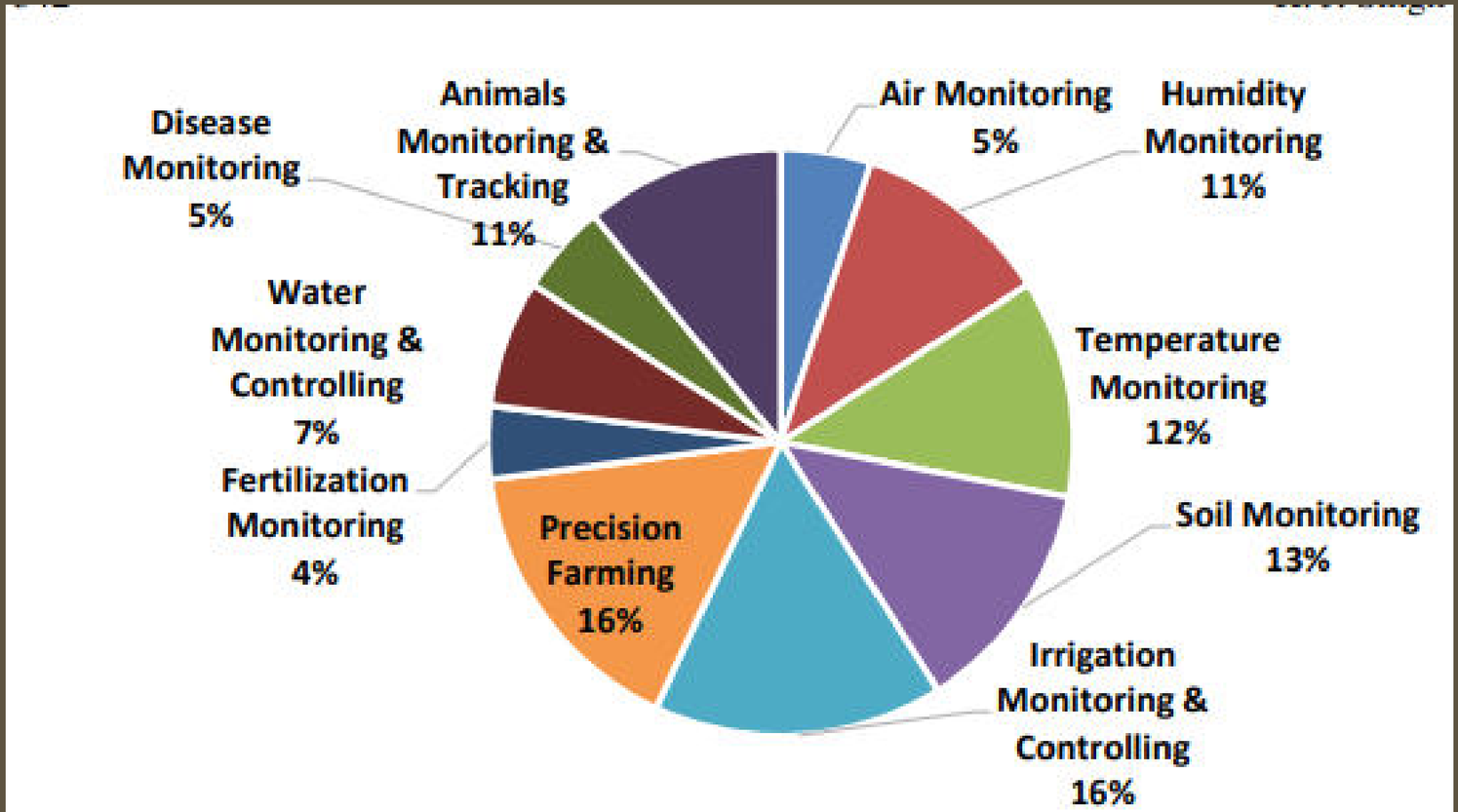


Fig. 2 Sector-wise applications of IoT in agriculture industry

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4) IoT solutions in agriculture

Hardware

- Sensors, robots, drones, cameras
- Equipment costly and delicate
- Recurring repair costs
- Large initial investments

Software

- No hardware on farm necessary
- Low-cost low-risk subscription plans
- Satellite images for tracking, GPS geotagging weather analysis
- Control of supply chain
- Data on chemical use, labor logs available
- Combination possible with existing devices & IoT’s

5) Best Practices for implementing IoT solutions

Assessing needs	identifying specific challenges that IoT can adress
Choosing right technology	evaluating devices and platforms suitable for your farm
Integration & Scaleability	ensuring new technologies can be integrated with existing systems
Training & Support	providing information & training for your staff

6) Challenges & Considerations

Cost of Implementation

- budgeting for technology & infrastructure

Connectivity Issues

- ensuring reliable internet access in rural areas

Data Security

- protecting sensitive information & ensuring privacy

Change Management

- addressing resistance to adopting new technologies

7) In Conclusion

The Internet of Things present significant opportunities for improving efficiency and productivity in the agricultural sector.

By understanding its applications and best practices agri-food businesses can better position themselves to leverage IoT technologies.

8) Active Engagement Exercises

Identifying

Identify one IoT key application relevant to the agri-food sector.

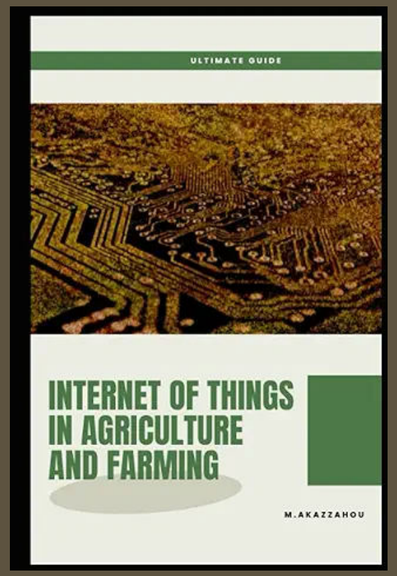
Researching

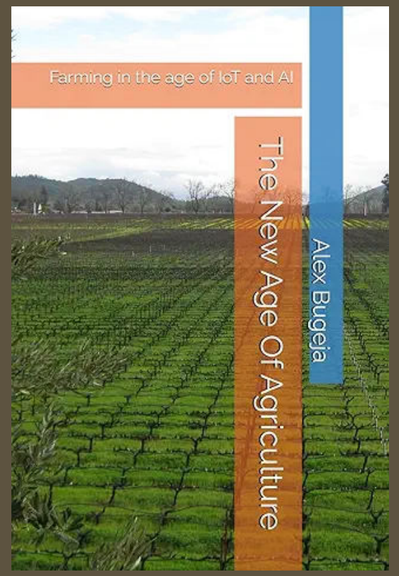
Research the cost & implementation challenges of an IoT solution of your choice in agriculture.

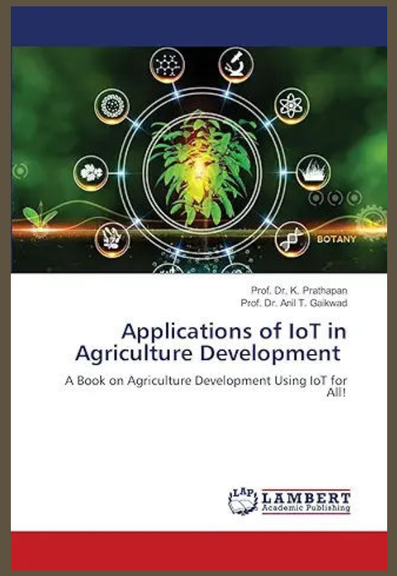
Self-Studying

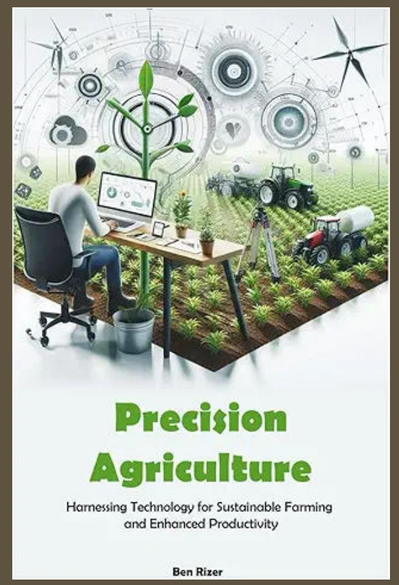
Dive deeper into the topic of IoT in agriculture and explore more challenges & potentials.
Read: https://www.researchgate.net/publication/371899518 .

RESOURCES









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Leveraging Technology for Farm Supply Chain Optimization
thefarminginsider.com/farm-supply-chain-optimization

Agricultural supply chain management and traceability - The Agrotech Daily
theagrotechdaily.com/agricultural-supply-chain/

THANK YOU

COURSE CREATORS:
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MADE POSSIBLE BY:
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