Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 06, Issue: 02 (MAR-APR, 2026)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Smart Farming with AI and IOT: The Future of Indian Agriculture

*Harish Kumar R K M, Meykeerthi V and Kowsika T
Erode Sengunthar Engineering College
*Corresponding Author's email: harishkumarerode@gmail.com

With the use of artificial intelligence and the Internet of Things, smart farming is rapidly changing Indian agriculture. These technologies enable farmers to take informed action by providing real-time soil, crop, and weather monitoring. It is clear that crop yields have increased and input costs have decreased. Important tasks like pest control, fertilization, and watering are automated, requiring less labor and more accuracy. This reduces resource waste and the need for labor. Farming becomes more profitable and sustainable with improved data and predictive insight. Together, digital farming is transforming India's agricultural landscape into one that is prepared for the future. With improved access to information, these innovations also help small and marginal farmers compete in the market. With the increasing affordability of technology, smart farming may soon become the new normal across rural India. This digital transition is also being supported by government initiatives, startup inventions, and training programs in rural areas. Villages can become tech-savvy farming hubs through community-level adoption. The digital divide in agriculture may close as awareness rises, enabling smart farming to have a significant and inclusive national impact.

Introduction

Indian agriculture is undergoing a significant digital transformation, with Artificial Intelligence (AI) and the Internet of Things (IoT) playing a crucial role. These technologies enable farmers to make faster, smarter, and more accurate decisions by providing real-time insights on soil health, crop conditions, weather patterns, and harvest timing. Devices like sensors, drones, and automated systems are replacing guesswork with data-driven precision, improving productivity and reducing misuse of water, fertilizers, and pesticides. As India faces challenges like climate change, water scarcity, and population pressure, smart farming is a promising solution. This shift marks the beginning of a new era in Indian farming, technologically empowered and future-ready. Integrating digital tools is about giving farmers more control and knowledge, not just about technology. Even small-scale farmers can gain from appropriate policies, training, and reasonably priced access. As this change intensifies, it has the potential to propel economic growth, food security, and rural development nationwide.

Working Principle

Smart Farming Smart farming technology works as a tool to make agriculture more intelligent and efficient by employing sensors, drones, data-driven tools, etc. Sensors in the field collect real-time data on soil, moisture and crop health while drones provide overhead views and monitor farm health. That data is transmitted to a computer system, where artificial intelligence processes it and offers farmers actionable advice — for example, when to water, when to fertilize or when to protect crops from pests. These advisory messages are sent as simple, user-friendly advice via the farmers' mobile phones. Some systems can also be set to

work irrigation and spray without human involvement. Smart farming methods enhance precision, reduce resource usage, and improve crop quality, leading to increased productivity, reduced costs, and sustainable farming over time. Even small farmers can profit from this shift as digital tools and connectivity become more widely available. Smart farming is a long-term solution for climate resilience and food security, not just a passing fad.

Advantages

1. Higher crop yield as a result of data-driven choices.
2. Economical use of insecticides, fertilizers, and water while cutting waste.
3. Tracking crop, weather, and soil conditions in real time.
4. Time and labor are saved by automated procedures like pest control and irrigation.
5. Early identification of pest infestations and crop illnesses.
6. Reduced input costs as a result of careful resource management.
7. Improved produce quality that satisfies export requirements.
8. Remote farm management via dashboards and mobile apps.
9. Forecasting yields and market demands is aided by predictive analytics.
10. Reduces the negative effects on the environment, thus promoting sustainable farming.

Disadvantages

1. High initial setup costs for systems, drones, and sensors.
2. Small and marginal farmers lack digital literacy.
3. In rural areas, internet connectivity is inconsistent.
4. Technical assistance and maintenance might not be readily available.
5. Risk of cloud-based systems being misused or having their data stolen.
6. Reliance on a steady supply of electricity.
7. AI tools in regional languages are not widely available.
8. Traditional farmers are afraid of adopting new technologies.
9. Possible automation-related job loss.
10. Problems with scalability for dispersed farms and small landholdings.

Field Study

To observe the effects of AI and IoT in actual agricultural settings, a field study was carried out across a few farms in Tamil Nadu and Maharashtra. IoT sensors were set up to track temperature, humidity, and soil moisture. Pest detection and crop health analysis were conducted using drones and satellite imaging. Mobile apps powered by AI enabled farmers to get recommendations and alerts in real time. The farms using smart systems showed a 15–25% increase in yield compared to traditional methods. Automated irrigation controls optimized water use by more than 30%. The amount of fertilizer used was decreased without compromising the quality of the final product. Farmers reported less crop loss and better decision-making. Among the difficulties were the requirement for training and device maintenance. The study attests to the viability and significance of smart farming for Indian agriculture. Expanding these programs to additional areas may increase agricultural productivity nationwide. For millions of Indian farmers, smart farming has the potential to revolutionize their industry with the correct backing.

Conclusion

Indian agriculture is changing as a result of smart farming using AI and IoT, which makes it more accurate, data-driven, and sustainable. It assists farmers in real-time weather, crop, and soil monitoring, which improves decision-making and yields. Automation optimizes the use of resources like fertilizer and water while reducing manual labor. Results from the field indicate reduced expenses and increased productivity. However, issues like expensive setup fees and a lack of digital expertise need to be resolved. Support from the public and private sectors can hasten adoption. Farmers are empowered by these technologies, not replaced. Resilience against market and climate uncertainties is ensured by smart farming. It is a significant step towards India's agriculture becoming future-ready. Reaching small and

marginal farmers requires more awareness, training initiatives, and reasonably priced technology. This change can be accelerated through cooperation between government agencies, research institutes, and agri-tech startups. Smart farming has the potential to enhance rural livelihoods and guarantee long-term food security as it gains traction.

References

1. Balafoutis, A.T. and Beck, B. (2017). Precision agriculture technologies positively contributing to GHG emissions mitigation, farm productivity and economics. *Sustainability*, 9(8): 1339-1352.
2. Kamilaris, A. and Prenafeta-Boldú, F.X. (2018). Deep learning in agriculture: A survey. *Computers and Electronics in Agriculture*, 147: 70-90.
3. Liakos, K.G. and Busato, P. (2018). Machine learning in agriculture: A review. *Sensors*, 18(8): 2674-2690.