

The Role of IoT in Agriculture of Telangana

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Abstract:

IoT in agriculture can be used to achieve different goals as it can actually transform agriculture. The purpose of IoT-based smart agriculture is to make strategic decisions for the entire farm. As a result, the development of IoT technologies in the field of agriculture will accelerate the adoption of smart farming in the agricultural sector. Agronomists can now benefit from the technology and use the data to optimize their operations. At the same time, with the expansion of smart farming, agriculture sensors use, crop monitoring and crop management will be even more effective and useful for the agriculture organization. The ultimate goal is to increase the number of crops, minimize waste, and maximize the efficiency of human labor. In addition, smart agriculture sensors stimulate farmers to optimize the use of arable land through predictive analytics. A soil sensor, in turn, can be used to measure crop health and soil moisture.

Keynotes: soil sensor, agriculture, IoT, Smart farming, Data-Driven Decision, Drones

Introduction:

The IoT in agriculture is helping farmers meet the growing demands of global agricultural production. With a population of 9.7 billion by 2050, the agriculture sector needs to adopt new technologies to help meet the demand. Currently, shrinking agricultural lands is a widespread problem for the global population, and that is why a smart agriculture system is of such great importance. It is important to analyze data on weather patterns and world population demands and even climate forecasts. Moreover, connected devices will enable farm operations to meet food demands with high equipment efficiency, despite the environmental impact and climate change. Precision farming technologies will enable farmers to save on labor costs, and extra time spent to identify sick animals or for crop health assessment. Smart agriculture gadgets can automate multiple processes, which makes IoT-based smart farming such a popular option for the future of agriculture.

In the coming years, with the current green revolution, smart farming confidently goes to a range of new trends opening for new use cases. Smart farming definition nowadays extends far beyond the application of some smart devices. Now, when we are talking about smart farming, we emphasize the minimization of manual intervention in all processes and the replacement of the human workforce with smart machines. Industrial IoT solutions for agriculture are gaining

TREND ON COMPUTER IMAGING

The latest trend on computer imaging in agriculture is remote sensing imagery, which can offer valuable insights into crop health and yields. Modern satellites provide free, high-resolution imagery for farming purposes and smart greenhouses. They can create detailed maps for vehicle tracking, soil condition, and staff performance. The use of satellites for agriculture has spawned many new possibilities in precision agriculture. This technology can also help in identifying pests, diseases, and other problems. It is also possible to use agricultural drones to monitor the weather and base the watering schedule on it.

The biggest benefit of fusing computer imaging IoT devices is that they reduce manual work. This can help farmers manage acres of land better. These sensors can also tell them what kind of finite natural resources to apply and when. They also provide farmers with crop monitoring opportunities, livestock monitoring, and oil quality tracking. With information on soil condition, livestock health, and weather conditions, farmers can adjust their production accordingly. Furthermore, these IoT smart sensors and other devices can also prevent crop losses and maximize yields on the same amount of land.

IoT in Agriculture

The Internet of Things (IoT) refers to a network of interconnected devices and sensors that collect and exchange data over the internet. In the context of agriculture, IoT plays a pivotal role in gathering real-time data from fields, crops, livestock, and machinery. Farmers will become more efficient as they will let go of redundant and traditional farm practices as they replace them with Smart Farming techniques.”

Top 5 benefits of Smart Farming

1. **Data-Driven Decision Making:** IoT-powered smart farming provides farmers with valuable data on soil conditions, weather patterns, crop health, and livestock behavior. Armed with this information, farmers can make data-driven decisions, leading to better resource management and increased yields.
2. **Resource Optimization:** Smart farming minimizes wastage of water, fertilizers, and other valuable resources. By applying inputs precisely where and when they are needed, farmers can reduce costs and promote sustainable farming practices.
3. **Enhanced Efficiency:** Automation of tasks through IoT devices reduces manual labor and human errors. This efficiency boost allows farmers to focus on strategic planning and innovation.
4. **Early Detection of Issues:** IoT sensors can detect early signs of diseases, pests, or crop deficiencies. Timely identification enables farmers to take immediate action, preventing the spread of problems and reducing crop losses.
5. **Remote Monitoring:** IoT technology enables farmers to monitor their fields and livestock remotely. This capability is particularly valuable for large-scale farming operations and can save time and resources.

Exploring IoT Technologies for Smart Farming

1. **IoT Sensors:** These devices are deployed across fields to collect data on soil moisture, temperature, humidity and nutrient levels. They provide valuable insights for precision agriculture.
2. **Automated Irrigation Systems:** IoT-driven irrigation systems can adjust water supply based on real-time weather data and crop needs, ensuring optimal water usage.
3. **Livestock Monitoring:** IoT wearables and sensors can track the health, location and behavior of livestock, assisting in early disease detection and improving animal welfare.
4. **Connected Weather Stations:** IoT-enabled weather stations offer localized weather data to farmers, helping them plan farming activities more efficiently.

Present IoT Sensors and Devices for Smart Farming

1. **Crop Health Monitoring:** Drones equipped with multispectral cameras can capture images of crops and analyze their health, providing insights into potential issues.
2. **Livestock Tracking:** GPS-enabled collars or ear tags allow farmers to track the location and movement of livestock, ensuring their safety and efficient grazing practices.
3. **Automated Milking Systems:** IoT-powered milking systems can recognize individual cows, monitor milk quality and automate the milking process.

Automating Farm Operations with IoT: Robotics and Drones

Robotics and drones are increasingly being integrated into farming operations, bringing further automation and efficiency to the agricultural sector. These devices can perform tasks such as planting, harvesting, spraying pesticides and monitoring crop health.

Real-Life Examples of Successful IoT Implementation in Agriculture

“I came across many success stories of people implementing Smart Farming techniques across India. Be it Nagpur, Beed, or Jaisalmer, farmers who embraced technology happily are reaping unimaginable benefits from a small piece of land. This is what we have to do. Take these Smart Farming techniques to all the small farmers and help them make data-driven decisions. The day this happens, India will automatically become No. 1 globally in Agriculture and related industries,” says Parvinder Singh Gahlaut.

The Future of Smart Farming

The future of smart farming holds immense potential. As technology continues to advance, we can expect even greater integration of AI, robotics, and big data analytics. Artificial intelligence will play a pivotal role in making predictive analyses and suggesting optimized farming strategies. The result will be an agriculture sector that is not only highly productive but also environmentally sustainable. In conclusion, smart farming, powered by IoT technologies, is reshaping the landscape of agriculture. As the world's population grows, the importance of smart farming in ensuring global food security cannot be overstated. Embracing IoT in agriculture

is not just a trend but a necessity in the quest for a smarter, greener and more bountiful planet.

BenefitsofSmartFarminginTelangana

1) ImplementationofProjectsinvolvedEmergingTechnologies

Telangana is one of the first states in the entire country to tap the funds allocated under National e-Governance Plan in Agriculture for implementation of projects using emerging technologies. Implemented Smart Irrigation Project during last Rabi using IoT technology. In Grape, Groundnut and Maize crops. Implemented Nutrient Management Project using the device which uses IoT technology. The device analyses 11 nutrients. Over 1900 samples tested. Implementing Produce Grading and Quality Assaying project using the devices which use artificial intelligence which aids in produce grading.

2) ImplementationofProjectsinvolvedEmergingTechnologies

Implementation is under progress of Seed Traceability project which uses Blockchain Technology. It captures the entire life cycle of the seed production chain till the seed reaches consumers i.e. farmers. Finalization of firms is completed for implementation of Farm Automation project using Robotics Technology. Weed Control and Fertilizer Spraying for Oil Palm plantation using 3 Robots for 100 acres continuously for 12 months. Cotton Picking Operation using 5 Robots which can also be adopted to spray foliar nutrients and pesticides for 100 acres.

3) DigitisationofCadastralmaps

With a view to provide spatial angle to the farmers database, the process of digitization of cadastral maps was initiated. These maps will be tightly integrated with the farmers database available in our state. Since 2019 TS is using the farmers database created for implementing flagship programme of TS i.e. Rythu Bandhu for digitizing the crops sown next time every gunta of land. The digitized cadastral maps will help in facilitating the field extension officers in further improving the accuracy of the crops sown areas.

4) SaaguBaaguProject

Project is done on Pro-bono basis by the Project Implementation Partners (PIPs). Two PIPs are selected – Digital Green and Dehaat. Started implementation in Khammam District on Chilli Crop. Enrollment of Farmers is in progress – Targeting ~15000 farmers for this season. Farmers will get the advisory services on the Mobile Video Based Extension – Dissemination of Package of Practices to farmers through Video at their respective villages. On-farm soil testing and issuance of soil health cards / reports. Market Aggregation – Procurement of produce at Farm Gate. Quality Assessment of Chilli – higher price for higher quality. IOT based advisory services to the Farmers – Pest forecasting, Smart Irrigation etc., Analysis of Satellite imagery and providing Advisory to the farmer – Stress based advisory. Application of Fertilizer and pesticides with the help of drones.

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