Smart Agriculture: A New Approach in Farming

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Smart agriculture is a concept of farming management using modern information and communication technologies to increase the quantity and quality of products. Smart agriculture and precision farming enables farmers to reduce food loss and waste and increase productivity from the amount of input used to the consumer table, from farm to table business.

- The third green revolution is taking over the agriculture world based upon the combined application of ICT solutions such as precision equipment, the Internet of Things (IoT), sensors and actuators, geo-positioning systems, Big Data, unmanned Aerial Vehicles (UAVs, drones), robotics, etc.
- The world will need to produce 70 % more food in 2050 than it did in 2020 in order to feed the growing population of the Earth, according to the UN Food and Agriculture Organization. To meet this demand, farmers and agricultural companies are turning for analytics and greater production capabilities.

Among the technologies available for present day farmers there are:
- Sensing technologies
- Software applications
- Communication technologies
- Positioning technologies, including GPS
- Hardware and software systems
- Data analytics

IoT Based Smart agriculture
Internet of Things: The core of Internet of Things (IoT) is the data you can draw from things ("T") and transmit over the Internet ("I"). To optimize the farming procedure, IoT devices installed on a farm must collect and process data in a repetitive cycle that enables farmers to react quickly to emerging issues and changes in ambient conditions.

Smart farming follows a cycle like this one:
- **Observation:** Sensors record observational data from the crops, livestock, soil and atmosphere
- **Diagnostic:** The sensor value are fed to a cloud –hosted Internet of Things and that ascertain the condition of the

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examined object and identify any deficiency or needs.
- **Decisions:** After issues are revealed, the user, and machine learning driven components of the IoT platform verify whether location-specific treatment is necessary and if so, which.
- **Action:** After the end user estimate and action, the cycle repeats from the beginning.

Application of IoT in agriculture:
- **Precision agriculture:** Precision farming, being one of the most renowned IoT applications in agriculture, inhibits farming practices even more precise and controlled through vehicle tracking, field observation, livestock monitoring, and many more.
- **Agriculture drones:** Ground based and aerial –based drones are being used in agriculture in order to enhance various agriculture practices: crop health assessment, irrigation, crop monitoring, crop spraying, planting, and soil and field analysis.
- **Smart Greenhouses:** Smart greenhouse is a step ahead of the regular greenhouses. In these setups, the microclimate is controlled and monitored to ensure optimal plant growth. Greenhouse Monitoring Software that supports this capability includes Growlink, Farmapp and Green IQ.
- **Livestock tracking and geofencing:** There are specialized sensors for livestock management that can be attached to every livestock animal on the farm. These sensors collect data about animal health and maintain a log of the performance.
- **Crop Water Management:** Agriculture IoT is integrated with Web Map Service (WMS) and Sensor Observation Service (SOS) to ensure proper water management for irrigation and in turn reduces water wastage.
- **Integrated Pest Management or Control (IPM/C):** Agriculture IoT systems assures farmers with accurate environmental data via proper live data monitoring of temperature, moisture, plant growth and level of pests so that proper care can be taken during production.
- **Food Production & Safety:** Agriculture IoT system accurately monitors various parameters like warehouse temperature, shipping transportation management system and also integrates cloud-based recording systems.

Benefits of using IoT in agriculture:
- The effective use of inputs helps in reducing wastage and thus, decreases costs incurred.
- Losses due to diseases and infections can be reduced, by continuous and real-time crop monitoring.
- The use of water can be optimized, which in turn shall reduce water wastage.
- The use of IoT-based devices allows better management of farm activities.
- With IoT, various factors would also lead to the protection of environment.

Significance of Smart Farming
- High crop productivity: the use of better and improved technologies in farming following the adoption of smart farming guarantee improved productivity since the focus is on maximizing inputs and reducing wastage.
- Decrease in the use of pesticides, fertilizers, and water: Traditionally, farmers applied water, fertilizers, and pesticides even without determining where such elements are needed in the farm. However, with smart, you apply water and other chemicals whenever and wherever they are needed, and in the right quantities. Reduced use of these chemicals leads to low food prices, as the cost of farming goes down.
- Reduce strain on the environment: Nowadays, smart farming has introduced better approaches to increasing productivity while at the same time minimizing wastage of chemicals, water, and other elements applied on the farm. The implication is that you do

not have to expose the environment with unnecessary harmful chemicals when you can use them sparingly and where they are highly needed.

- Increase in the safety of farmers and workers: Smart farming introduces the use of machines and better technologies that limits the involvement of workers on the field hence, there is no need to worry about the safety of farmers and workers anymore.
- Low disposal of chemicals into groundwater and rivers: Smart farming promotes sparingly use of chemicals and the adoption of environmentally friendly farming practices. This implies that there will be little to no chemicals deposited into rivers and on the environment in general.

Conclusion

Smart agriculture applications do not target only large, conventional farming exploitations but could also be new level to boost other common or growing trends in agricultural exploitations, such as family farming (small or complex spaces, specific cultures) or cattle, and enhance a very respected and transparent farming. Smart agriculture or precision farming reduces the time and resources that is required while performing it manually. In the future, smart agriculture can be a powerful tool for farmer for the efficient use of resources and real time management. This might be difficult for some farming communities until they will be provided by subsidy.