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Utility of Internet of Things in Agriculture: From Concept to Reality

Monika Sharma
PhD Research Scholar, Department of Agricultural Communication, GBPUAT, Pantnagar
Corresponding email -monni9278@gmail.com
ARTICLE ID: 024

In this global era of digitizations and smart devices surrounding us twenty-four by seven, the utilization of Internet of Things (IoT) is inevitable. As the phrase "Internet of things" signifies, it consists of things that have a unique identity and are connected to the internet connection. Sensor network, cloud computing, embedded systems, wireless communication and remote technologies form the core of IoT technology. With the advent of information and communication technology and now IoT that make use of artificial intelligence and cloud computing, it is like concept shaping into reality which makes nonliving items interact among themselves and to the surroundings as well. These new technologies provide modern solution to the emerging problems. Agriculture (along with animal husbandry, fishing, forestry etc.) which is the largest sector of the Indian economy, faces many challenges be it climate nge, pest attack, drought, or unforeseen circumstances that lead to lower productivity and food shortage. The sector holds phenomenal challenge of meeting the increased demand for food. According to the Global Opportunity Analysis and Industry Forecast, 2018 – 2025, IoT in agriculture market size that was valued at 16, 330 million U.S dollars in 2017, is projected to reach 48,714 million U.S. dollars by 2025, growing at a CAGR (Compound Annual Growth Rate) of 14.7% from 2018 to 2025. This seems to play a crucial role in solving agriculture related issues.

What IoT have in stock for farmers?

IoT aids in farming automation, which helps in shaping farmer's workspace, ensuring connectivity management, and productivity along with remote management. A water system that makes use of remote sensors to detect surrounding heat and soil dampness esteem, moistness esteems & water altitude, along with assistance android application provides field data to the farmers.

The detected information along with the assistance of water system calculation controls the water supply subsystem without farmer being involved in whole process. By the use of IoT driven irrigation system, water utilization is lessened with the use of soil dampness, humidity, moisture content in soil, temperature sensors and soil water altitude based computerized system. Internet of Things (IoT) in agriculture is used for monitoring the soil conditions, drones for monitoring yield conditions and natural change, small drones to recognize the diseases of plants and pest attack by using sensors so that precautions can be taken at earlier stage, monitoring environmental conditions in greenhouses and decision support systems for agriculture field operations. Radio Frequency Identification (RFID) tags or sensor nodes are attached to the agricultural produce, cold storages, grain/seeds bags, livestock, and farm machinery for effective tracking and management from warehouses to the time they reach final consumers. Harvest and post harvest losses can be minimized by intelligently using IoT and cloud based platforms. Tracking the health of cows and buffalos, along with their vaccination pattern can help maintain animal health and productivity. These are a few applications of IoT and list is endless.

Issues regarding utilization of IoT by farmers.

IoT based system in agriculture, although proved to be very successful in developed countries, are in very primitive stage of implementation in India. India being a developing country where majority of farmers belong to small and marginal groups. The major challenge is to spread the knowledge and awareness about IoT to various stakeholders, particularly to

the farmers. Some of the research direction in the area is development of need specific and more effective sensors that are affordable. The research and analysis of the data generated can guide the ways to improve production with optimized use of resources, and can bridge the demand and supply gap of the agricultural produce. The data can also be used for policies and programme formulation by public and private firms. Processing, correlating, analyzing and inferring correct information from the data, which is coming from a variety of sensors, is the most challenging task in any IOT system. The data created by IoT is huge hence the storage and security of private data is another issue to ponder upon. For realizing technology driven precision agriculture visions, it's high time to seed the IoT knowledge and utilization to harvest the fruit of productivity and profitability in the near future.