

Smart Farming Based on the Internet of Things (IoT): Towards Precision Farming in Agriculture

Dr.B. Bhaskar Reddy¹, P. Imran Khan², Dr. B. Dhananjaya³

Professor^{1,3}, Assistant Professor²

Department of Electronics and Communication Engineering
Bheema Institute of Technology and Sciences, Adoni-518301.^{1,2,3}

Abstract: The Internet of Things (IoT) technology has transformed every aspect of human existence by connecting everything. IoT that is well-developed and brilliant indicates a network of objects or people that form a self-building network. Food produced through smart farming is great and well supported by the people. High-quality farming is one of the most essential arena systems for producing food that is both wonderful and sustainable for the population. One of the most well-known uses of IoT in agriculture is high-quality farming, and several organisations across the globe are taking benefit of this method. Harvest management devices are another sort of IoT technology in farming and an important component of high-quality farming. And weather locations, they should be positioned in the field to gather data tailored just for crop farming, from temperature and rainfall to leaf water and overall crop health. Smart farming makes use of agricultural-based drones. Drones, also known as UAVs (unmanned aerial vehicles), are better equipped than aircraft and satellites to gather farming-related data. With the growing acceptance of the Internet of Things (IoT), linked devices have infiltrated every aspect of our lives, including health, home automation, self-propelled and planned transportation of people and goods, smart cities, and industrial IoT.

Keywords: Drones, Internet of Things, Precision Agriculture.

I. INTRODUCTION

Background:

To link all electronic items to the internet, the Internet of Things (IoT) programme was launched in 2009. In the "Internet of Things," developments are occurring at an accelerating speed. By using the Internet of Things-based items, we can make our lives easier and more efficient at work as well as in our personal life. In India, farmers stick to the old ways of doing things. Farmers that lack fundamental planning, literacy, and expertise make the situation much more unreliable. Projections may go awry in a lot of agriculture and farming-related businesses. As a consequence of the many victims that farmers have to deal with, some of them end up taking their own lives. Such constraints or regulations cannot be ignored because of the need for proper soil moisture, air respect, and cropwater or washing with water in crop development. In the vast majority of the world's population, farming is a way to earn a living.

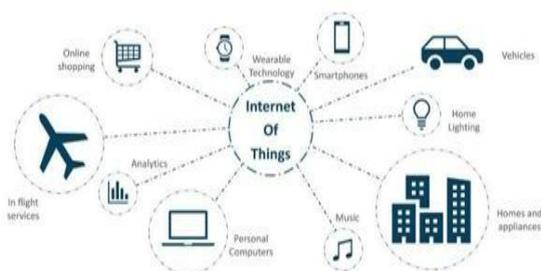


Figure 1 Internet of Things

Some farmers are unable to exhibit their ability to create new and interesting things through their physical acts, therefore they must rely on technical equipment to help them along. It is our goal to use IoT innovation to interact with the negative aspects of farming intelligently. When we used the old strategy of combining several items, we saw it as a single deep water supply system with an ingenious design. To address several critical difficulties regarding the essentials of unwinding, we make full use of IoT principles that may be used for financial gain.

II. SMARTFARMING

Farmers seek to always produce enough healthy food to feed the world's population. Using IoT, we have developed a novel crop monitoring or supervising and smart farming innovation. Farming is the most thoroughly explored field of IoT to uncover the truth. Because the world's population is continually growing, ensuring food security is a critical area. Soil moisture monitoring or supervision, conservation condition monitoring or supervision for temperature, moisture, and stream, and self-control or control device management are all needed for farming harvests. In IoT-based smart farming, a system is intended to use sensors to monitor or oversee crop performance and a water system to manage crop watering or washing..

Agriculture producers can monitor anything from anywhere, including weather conditions, soil conditions, and field conditions. When combined with a cautious strategy, IoT-based smart farming is quite beneficial. Farmers may generate full-knowledge outcomes by employing IoT sensors to collect conservational data and machine learning to measure things.

III. PRECISION AGRICULTURE

Farm-related popular items are described by the Precision Agriculture putting into use access to high-quickness internet, mobile to success plans or methods of accomplishing objectives, and consistent, cheap cost satellites by the producer. Agriculture farming is one of the most well-known IoT computer programmes in the farming-based domain, and most companies use this technique of doing things throughout the globe to achieve their primary aim of high-quality farming. When it comes to farming, high-quality farming is a mechanical device that manages the land, gets the job done, and minimises its impact on the surrounding environment.

As a result of the soil moisture technology, water usage may be improved by providing comprehensive and accurate information on local supply and references in the season. One of the most popular, cloud-based, and strong cloud-based positions for advisers and things that assist plants to develop to take advantage of the aids in high-quality crop watering or washing with water via a simplified connection is the virtual enhance PRO.

Figure2 Smart Agriculture using IoT



IV. Methods

A. Monitoring of climate conditions

The most common smart farming gadgets are weather stations, combining many smart farming sensors. Located across the performing area, they collect any data on the health of the Earth and the surrounding conditions, choose the good crops, and take the required measures to improve their ability. It is called precision farming.

B. Crop management

Crop management devices are another IoT product that contributes to high-quality farming. To acquire crop farming data from temperature and rainfall as leaf water probable and the overall health of the crops, they should be placed in the field in a similar way to weather stations.

C. Agricultural drones

The employment of farming-based drones in smart farming is one of the most potential agricultural advancements or rises in the future. Unmanned Aerial Vehicles, or "drones," are more equipped than aircraft and satellites to collect farming-related information. In addition to the use of UAVs for their smart capabilities, a large range of tasks that formerly required and demanded human labour, such as planting crops, scouting for pests and illnesses, and keeping

an eye on or overseeing crops, may now be accomplished by drones (see Figure 3).

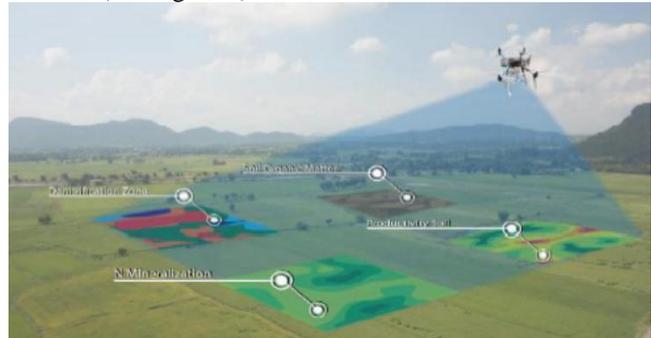


Figure3 Remotesensing by Drones

IV. RESULT

An understandable format is supplied to farmers with the data. The study offers information that may help farmers make better choices about their farms.

A. Estimating soil condition

Data-driven farming empowers farmers to make maximum use of their land by providing them with precise knowledge about its conditions. Previously, the data was gathered via field trips and the collection of data is based on measurements made in the real world. And so Drones equipped with farming-like gear and sophisticated sensors may collect and send this data.

B. Planting future crops

Drones are utilised instead of labour-intensive, out-of-date planting methods to prepare the soil for new plants to grow. Using drones to plant seeds has been likened to something else that hasn't been tried yet, although some firms have already started using this method.

C. Fighting infections and pests

Farming drones utilise thermal, multispectral, and hyperspectral technologies to educate farmers about soil conditions, but they also identify areas that have been contaminated by weeds, pests, and other nuisances. When dealing with huge numbers of hazardous or repulsive items, farmers may pick the number of chemicals required or desired, and not only assist in reducing costs but also reduce the use of pesticides and fertilisers, and aid in payments to improve field health.

V. DRONES

A. Agriculture spraying

As a further measure to minimise human exposure to harmful chemicals and materials, modern farms are increasingly turning to the use of drones for agricultural spraying. When it comes to treating a specific area, drones are also helpful. Sensors allow them to identify contaminated regions and operate on them while keeping the rest of the field untouched.

B. Crop surveillance

Large tracts of farmland make it hard to predict the general health of crops. As a result, farmers can keep an eye on the health of crops in a specific region and identify which in broad areas without having to assume about the general health of crops. Drone mapping allows farmers to keep tabs on the health of their plants in a specific region and pinpoint which parts of the field need extra care. Using infrared cameras and light mental concentration/picking up of liquid rate, drones study the field to make educated guesses about crop health. Farmers in any place may take action to enhance the health of their plants if they are given accurate information that is occurring or can be seen right now.



Figure5 Crop Surveillance

6 C. Livestock monitoring

Drones can monitor grazing cows, bulls, and other agricultural animals, reducing the need for humans to monitor them. Drones may use thermal sensing technology to locate agricultural animals that have gone missing, as well as to determine the precise number of animals that have been injured or are ill. Drones are more capable of producing superior cattle, such as cows and bulls, than humans ever could.



Figure6 Livestock Monitoring

VI. CONCLUSION

It is possible to meet the expanding needs of the group via smart farming, a solution to the problem in the area of farming. A lot of food can be produced and technology can be used to increase farming and the whole process of people manufacturing, selling and purchasing goods. It is the most efficient method of farming since it combines a variety of various technologies into a single unit, reducing the amount of time and labour required.

REFERENCES

1. Chris Anderson, (2016) "Agricultural Drones Relatively cheap drones with advanced sensors and imaging capabilities are giving farmers new ways to increase yields and reduce crop damage."
2. S. R. Nandurkar, and V. R. Thool,, (2014). "Design and Development of Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems (ACES).
3. Y. Kim, R. Evans and W. Iversen, (2008) "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network", IEEE Transactions on Instrumentation and Measurement, pp.1379-1387.
4. Yoo, S.; Kim, and Kim, D. A2S, (2007). Automated agriculture system based on WSN. In ISCE 2007. IEEE International Symposium on Consumer Electronics, 2007, Irving, TX, USA.
5. McBratney, A., Whelan, B., Ancev, T., 2005. Future Directions of Precision Agriculture. Precision Agriculture, 6, 7-23.