ACCELERATING AGRICULTURE GROWTH WITH CONNECTED TOOLS AND TECHNOLOGY

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Abstract— **Agriculture accounts the oldest and the largest industry globally. Agriculture need to adopt connected technologies in order to disrupt the ever growing demand. Here I provide a brief overview of connected technologies, which could increase yield, improve efficiency and build sustainable crops cultivation.**

Keywords— **Technology, IoT, Agriculture, BioTechnology.**

I. INTRODUCTION

"Demand for food is growing at the same time the supply side faces constraints in land and farming inputs."(Goedde et al., n.d.)
The agriculture production system and supply chains are currently not on track to reach the sustainable development goals. They are wasteful and polluting, busting several of the so-called planetary borderlines, and give out on their most basic premise to provide an expanding global population with safe and nutritious diets, leaving 900 million people undernourished.(Rockström et al., 2020)
As a result, transformation through connected technology innovation is often proposed(Cole et al., 2018; Herrero et al., 2020). In such proposals, computer enabled technologies, including smart sensors, artificial intelligence and embedded systems are fundamental. Here we consider five technology i.e., Smart Crop Monitoring, Drone Farming, Smart Live Stock monitoring, Autonomous farming machinery and smart building and equipment management.
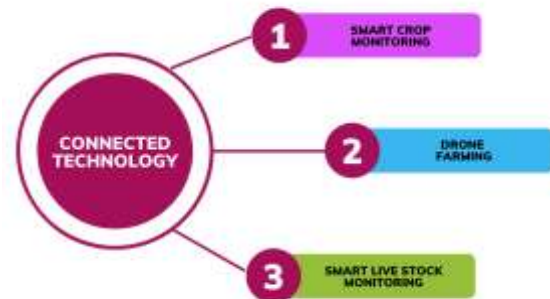
II. PROPOSED IDEAS

1. SMART CROP MONITORING
Smart Connectivity provides multiple ways to improve the observation and care of crops. Embedding weather information, nutrient, irrigation, and other activities can improve resources use and boost yield by more accurately identifying and predicting deficiencies.
IBM predicts, the use of IoT will enable farmers to enhance production rates by 70% by the end of 2050, so the future looks optimistic.
Here are the examples of smart crop monitoring solutions and how they function:

i. Soil Condition Monitoring
Monitoring of soil condition is an essential indicator helping farmers decide on the optimal planting and crop gathering time. With technology and sensors performing soil condition monitoring, farmers get instant alert of soil moisture and salinity. Additional metrics are soil temperature and air temperature: estimating them correctly helps farmers to plan watering times and know when to expect pests.
Technology solution is CropX – an agriculture technology platform for remote monitoring. It uses smart agriculture sensors to collect data and cloud infrastructure for data processing and storage to deliver information to farmer's smartphone.

ii. Weather Monitoring

It plays vital role as crops yield are highly dependent on the environment and weather.

Weather monitoring solutions helps to alert farmers if there is change in weather condition –humidity, precipitation, temperature, sun radiation and wind speed.

Technology Solution is Smart Element, Pycno and allMETEO. These solutions helps deliver efficient weather notification directly to farmer's smartphone helping them to take immediate action.

iii. Crop Monitoring

Many things can go wrong as crops grow and ripen like disease, infestation with pests or severe environmental conditions before farmer even notice. The crop monitoring solution collects data about the state of the crops that include temperature, humidity, health indicators and inform farmers take decision in time.

Technology solution is Semios and Arable helps to detect when the crop is going to ripe thus, farmers get information about the perfect harvesting time.

2. Drone Farming

Drones have been used within agriculture for more than a decade and are found to be providing many benefits. Till date, very little research has been conducted on farmer's adoption of drones. This study applies probit regression model to analyze future plans (n = 1000 in 2015–2016) in obtaining drone technology in the southern Australia. As at 2015–2016, it was found that only 4–8% of farmers in various agricultural sectors had adopted this technology. However, the conclusion suggested that up to one third of farmers mentioned that they planned to use drones in the upcoming five years, with adoption more likely to occur when irrigators are able to achieve tangible benefits, such as labor and water savings.(Zuo et al., 2021)

Farmers around the world rely on pioneers like YAMAHA's RMAX remote controlled drone to help with crop spraying. Now the next generation of drones is starting to impact the agriculture industry, with the ability to survey crops and herds over huge areas quickly and efficiently. Drone could also use computer vision to analyze field conditions and deliver precise interventions like nutrients, fertilizers and pesticides where crops most need them. Some vital uses of drone technology are:-

i. Crop Surveillance:

Drones are equipped with special imaging equipment called NDVI (Normalized Difference Vegetation Index).

RGB   NDVI

ii. Drone Field Monitoring:

Agriculture drone monitors the health of the soil and field condition by finding irregularities in the field.

iii. Planting and Seeding:

Automated drone seeders are capable of planting thousands of trees a day.

iv. Spray Treatment:

Drones are capable of delivering very fine spray to the targeted area to maximize efficiency and save chemical costs.

v. Security:

Traditionally, monitoring the area would take hours of walking, now can be completed in minutes with the help of drone technology.

Some of the right drone technologies are:

1. Plantom 4 RTK

2. The Agras T30

3. Smart Livestock Monitoring

Preventing disease outbreaks and spotting animals in distress are critical in large scale livestock management. Farmers are already using ear-tag technology to monitor cow's heat, health and location.

Some popular technologies are:-

1. Cowlar
2. SCR
3. Smartbow

III. CONCLUSION

Regardless of which group drives the necessary investment for connectivity in agriculture, no single entity will be able to do it alone. All of these advances will require the industry's leading players to accept collaboration as an essential aspect of doing business.

The public sector also could play a significant role by boosting the economies of developing broadband networks, particularly in rural areas. For example, the German and South Korean governments have played significant role in making network development more attractive by heavily subsidizing spectrum or providing tax relief to telecoms.

Agriculture being the world's oldest industries, finds itself at a technological crossroads. To handle significantly growing demand and several disruptive trends successfully, the industry will need to overcome the issue to deploy advance connectivity. The success and sustainability of one of the oldest industry may well depend of connected technology transformation, and those that adopt it at the outset may be best positioned to thrive in the agriculture's connectivity-driven future.

IV. REFERENCE

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