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# "Real-time crop health monitoring and disease diagnosis using wireless sensor network in precision agriculture"

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# Introduction

## Background and context:

For thousands of years, Agriculture has been one of the humankind's core activities, and inventors and innovators have been striving to improve farming practices in order to reduce input costs, maximize yields, and safeguard the environment.

## Problem Statement:

The major issues facing agriculture today are outdated farming techniques, soil erosion, water scarcity, climate change, and a lack of irrigation. Despite the advances in technology in other sectors, agriculture has lagged behind due to the technical difficulties that arise when farmers are not familiar with the technology. Over-farming and mass urbanization can lead to soil erosion, which reduces the fertility of the soil and, in turn, the productivity of crops. In arid and semi-arid regions, water scarcity is a major problem, with farmers having to limit their water usage, thus impacting crop production. Climate change is another major issue that has a significant effect on agriculture, with extreme temperatures or sudden rainfalls potentially reducing crop productivity. Lastly, the lack of irrigation is largely dependent on the climate.

## Relevance and Importance of the Research:

From the everyday farmer striving to increase their yield, this research affects the lives of countless individuals, as everyone in this world depends on the food grown. This research focuses on uncovering and developing new technologies that can improve both the quality and quantity of the yield. This research may also contribute to the local economy by discovering new products and techniques that can enhance the yield.

## Key concepts, Theories & Studies:

Nigeria is striving to become a leading economy in Africa and a major player in the world's economic and political affairs, with their 20-20-20 plan as their guide. To reach the level of a developed nation, Nigeria must accelerate its economic growth by focusing on key economic sectors such as education, energy, agriculture, and manufacturing. Of these, the agricultural sector is the most promising for Nigeria to focus on in order to speed up its economic growth in the coming decade.

In order to achieve this, Nigeria must move away from the traditional view of agriculture as a static sector and instead focus on increasing the rate of growth of agricultural output and productivity. This requires a shift in perspective, from viewing agriculture in pre-modern or traditional societies as static to understanding the dynamics of agricultural growth in modernizing economies. With the right strategies in place, Nigeria can move from economies with output growth rates of 1.0% or less to those with agricultural output growth rates of 4.0% or more, thus paving the way for a more prosperous future.

There are about five general models in the literature on agricultural development

- a) The frontier model
- b) The conservation model

- c) The urban-industrial impact model
- d) The diffusion model
- e) The high-pay off input model

### Key Debates and Controversies:

Agriculture has been a fundamental part of human society for centuries, and as such, it has generated numerous debates and controversies over the years. Issues such as monocropping, pesticides, soil erosion, deforestation, genetically modified organisms (GMOs) and fertilizer runoff have all played a role in making agriculture a particularly polarizing topic. These debates can range from small-scale local arguments to global discussions around sustainable development. For example, there are ongoing conversations about the use of land for agricultural purposes versus housing or conservation efforts; whether industrialized farming should be encouraged over traditional practices; how land reform laws could improve food security and rural incomes; and the amount of government support needed to ensure farmers' livelihoods.

### Gaps in Existing Knowledge:

When it comes to agriculture, there is still much to be discovered. For instance, the effects of changing temperatures and levels of drought on plants are still largely unknown, making it difficult for farmers to decide which crops are best suited for their environment. Furthermore, there is a lack of knowledge regarding the impacts of various fertilizers and agrochemicals on soil health and ecosystem balance. Although agricultural management technologies have made great advances in recent years, there is still potential for more efficient methods of conserving energy, reducing labor costs, and increasing yields. Ultimately, a comprehensive understanding of these issues is essential if we are to achieve sustainable agricultural systems with plentiful harvests in the future.

### Method:

Agricultural technology has come a long way in providing farmers with new and innovative methods to maximize their crop yields. From precision agriculture and robotic farming, to sensing technologies and artificial intelligence, farmers now have multiple ways to make production more efficient and effective. Precision agriculture involves collecting data on soil types and conditions, while robotics can help with labour intensive tasks such as weeding, planting, harvesting, and sorting. Sensors can measure temperature, soil moisture levels, air and water quality, and other environmental factors that can affect crop growth. With these cutting-edge advancements in technology, farmers are now better equipped than ever to get the most out of their land.

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