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Implementation and Design of Agriculture Robot Using IoT

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Abstract: Agriculture can be defined as the art, the science, and business of cultivating crops and livestock for economic purposes. At certain stages of human development, agriculture used to be the only known means of living. It is derived from the 'Latin' terms ager referring to the soil and culture to its cultivation. Agriculture is a broad term encompassing all aspects of crop production, horticulture, live stock farming, forestry etc.

I. INTRODUCTION

Agriculture can be defined as the art, the science, and business of cultivating crops and livestock for economic purposes. At certain stages of human development, agriculture used to be the only known means of living. It is derived from the 'Latin' terms ager referring to the soil and culture to its cultivation. Agriculture is abroad term encompassing all aspects of crop production, horticulture, livestock farming, forestry etc. The foundation of the Indian economy is agriculture. As the world's population is expanding quickly today, agriculture is becoming more crucial to supplying the demands of the human race. Since farming is such a vital profession, many people choose to make it their job. The population of farmers is declining as a result of technological advancements and the conversion of rural areas into urban areas. Additionally, the number of labourers who used to help farmers in their work is declining. In this case, it is imperative that the next generation play a significant role in improving and simplifying the farming industry.

1.1 Importance of Agriculture

Agriculture is a production facility where the free gifts of nature land, water, air, soil energy, etc. are used as inputs before being transformed into a single primary unit crop plants and their yield, which are essential to human life. Animals ingest these primary units, which are then transformed into secondary units like milk, meat, eggs, wool, honey, silk, etc.

Provides employment : In terms of the country's GDP, agriculture accounts for 16% of the total. The livelihood of two-thirds of the population is also derived from the agricultural sector. 58% of the work force in the nation is employed in the agriculture industry.

Significant contribution in country's exports:

This sector accounts for about 15% of the total export earnings and provides raw material to Almost all the industries i.e. textiles, silk, rice, rubber, paper, flourmills, milk products industries.

An important source of resource mobilization:

Rural areas tend to be one of the major market places for in expensive consumer items because the population there is not particularly wealthy. Better Agriculture better is the Food Security of the country: If a nation's agricultural industry is robust, it serves as a barrier to protect both national security and food security.

Important allied sectors:

Numerous auxiliary businesses support agriculture, such as horticulture, silviculture, poultry, dairy, and fisheries. They are essential to the growth of the rural population. As a result, there needs to be balance in the development of agriculture and allied businesses.

1.2 History of Agriculture

India's economy is heavily reliant on agriculture. As early as 9000BC, the Indian agriculture system was established. By 9000 BC, the prominent crops that were domesticated in the subcontinent were wheat, barley, and jujube. During this time, techniques for the settled mode of production in agriculture were developed. It has long been assumed that agricultural prosperity is essential to national prosperity since it significantly boosts the productivity and stability of the nation's economy. It generates around 18% of India's gross domestic product, employs 58% of the country's working population1, and rural households rely on agriculture as their main source of income livelihood.

The Gross Domestic Product (GDP), which includes forestry, fishery, and agriculture, is one of the greatest contributors. The Neolithic period saw the development of crop planting, cotton spinning, and granary storage of grains. And they taught the following generation how to produce food using their enhanced methods. The foundation for continued agricultural progress in India was this transformation of knowledge. Today, there are numerous practical uses for the understanding of historical, non environmental restrictions on the distribution of valuable plants that result from such research. However, because to advancements in agricultural system technology during the past fifty years, the concept of agriculture has undergone significant transformation. Compared to other developing nations, India's agricultural growth in the twentieth century has been modest. However, the agriculture industry has seen a number of significant changes over this time. India had to deal with a significant food scarcity on the verge of independence. The output of food grains had suffered greatly as a result of the division. The population's minimal needs could not be met by agricultural production, thus food grains had to be imported from outside. As a result, agricultural growth was given top priority in order to achieve food grain self sufficiency and feed the vast numbers of people. Agriculture cannot wait; everything else can, as Pandit Jawaharlal Nehru famously said when India gained its independence. and other state policies and investment choices, particularly those related to irrigation, fertilisers, production, land reforms, and community development, mirrored this view point.

The systematic deployment of more advanced agricultural technologies for crop production led to the Green Revolution in India. The true technological advance in agriculture was brought about by the introduction of hybrid and high yielding seed varieties. This invention was made at a crucial time when Indiawasreelingfromthe1965–1966 and 1966–1967 droughts. Mechanisation of agriculture, t 17he use of high yielding cultivars, and widespread application of fertilisers and pesticides in irrigated areas all contributed to the introduction of new agricultural technologies including biotechnology and the "green revolution." Clearly, the Green Revolution had a positive effect on the nation's agricultural sector. Records-breaking output was achieved as a result of the initiatives and incentives offered to encourage agricultural prosperity through innovative agricultural technologies. However, since the "Green Revolution" began, there have been many developments in agriculture that have an on the environment and society. By encouraging the monoculture of wheat and rice on a restricted and foreign new methods for agriculture, including as threshing, row genetic base, the Green Revolution has decreased genetic diversity.

The major implications of "green revolution" are as follows;

- The use of pesticides has increased dramatically over time with the green revolution and the adoption of HYV (high yielding varieties).
- Shifting cultivation, converting forest land to agriculture all and, mono cropping, and overgrazing. Increased irrigation for rice-based agricultural systems worsens the already existing issue of water logging in coastal areas by allowing these hazardous compounds to infiltrate the food chain and enter the bodies of livestock and people, where they pose a variety of health risks.

II. LITERATURE

The improved weed control system, which is built on a robotic platform and optimizes agricultural procedures like weed control, is covered in reference paper number [1]. They have created a robotic car with four wheels and a dc motor for steering. The machine manages the weed in the business by taking specific rows per column at a defined distance based on crop into account. The issue of obstacle detection has also been taken into consideration, sensed by sensors. The whole algorithm, calculation, processing, monitoring was designed with motors & sensors interfaced with micro controller.

The disadvantages of the advanced robotic weeding system are:

1. If there are any obstructions in the path, manual power is needed to remove them in order for the robot to operate methodically. Let's say that if there are hard rocks, the inspecting person will need to be there to clear the robot's path.
2. There is a chance that the crop could be harmed during the weeding procedure.
3. Concentrates solely on the issue of weed control in ploughed ground.

[2] Automation & Emerging Technology Development of Second Seed Sowing Robotby S. Chandika ME AMIE Department of Mechatronics Engineering Kongu Engineering College Perundurai, Erode 638052,TamilNadu, India. The paper number [2] discusses the current global situation, specifically how the Lack of trained labour in the majority of countries, particularly in the agricultural this issue, efforts have been undertaken to automate the agriculture industry.

Their project's novel idea was to automate the process of seeding crops like sunflower, baby corn, groundnut, and vegetables like beans, lady's finger, pumpkin, and pulses like black gramme, green gramme, etc. to eliminate labor-intensive manual labour and boost output. Automatically, seed plantations are carried utilising a DC motor. Using a microcontroller, the distance between the two seeds may be adjusted and changed. Additionally, a variety of seeds can be grown at various distances. Remote switches can be used to adjust the Robot's direction once it has reached the field's end. Microcontrollers are used to control the entire operation.

III. EXISTING MODEL

We have many machines which are capable of seed sowing but they are hand operated machines, so we are designing a robot which will drill the soil and sow the seeds this robot has two modes of operations like auto mode and manual mode, in auto mode it moves in a particular grid by help of sensors. This robot is capable of receiving few sets of command instructions in the form Bluetooth tones with help of android app and performs the necessary actions. Bluetooth module receives the commands we have an android app which will give signals to Bluetooth at robot for controlling the motion of the robot. This agriculture robot has two modes one is auto mode another is a manual mode in manual this set with help of switch button in manual it works with Bluetooth (HC -05) signals, in auto mode it works with Help of IR sensor in front of the robot for making a grid pattern seed sowing. In this agriculture robot project we are using Arduino UNO as motherboard which will control the robot driving motors and seed dispenser servo

Advantages:

- We can check temperature and humidity of field at any location
- We can capture the image of location for many where
- We can check the soil moisture date easily
- Robot can control over IoT from anywhere in world
- Generating solar energy for farming sector, impacts the development of developing nations. To solve

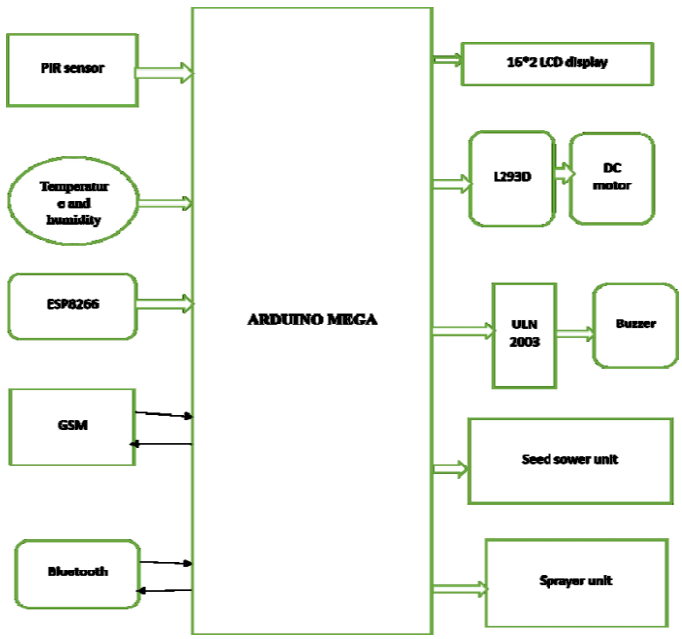
Disadvantages:

- 1 focuses solely on the act of planting crops.
- It's possible for seeds to suffer damage while beings own.
- Productivity may or may not be more.
- We cannot estimate the weather conditions as pollution is increasing gradually

IV. PROPOSED MODEL:

- This planter is very simple to use hence, unskilled farmer is also able to handle this machine.
- We simplified the design also made it cheaper and affordable to every rural farmer.
- We made various adjustments and simplified it from controlling and maintaining point of view.
- In this design we connected drive shaft to metering mechanism which eliminates the attachments such as pulleys system.
- DC motor drives the shaft of motor which is coupled with battery bank

BASIC BLOCK DIAGRAM OF PROPOSED MODEL



Working Principle

The main module of the projects works on the principle of Bluetooth (HC05) communication working methodology divided into two modes one is manual mode and one more is automated mode in manual mode we are going to control the Agri robot with the help commands via Bluetooth. In automated mode we have sensors to read their respective values and later it will update to thing speak cloud.

Internet of Things

The Internet of Things (IoT) is an interconnected system of computing devices, mechanical and

Figure2: Impact of IoT in Agriculture

The article covers a wide range of technological elements related to IoT in agriculture. The key elements of IoT-based smart farming are explained. Network architecture & layers, network topologies, and protocols have all been thoroughly discussed in relation to network technologies used in IoT based agriculture. Additionally, it has been discussed how IoT based farm systems can be connected to pertinent technologies like cloud computing, big data storage, and analytics. Security concerns in IoT agriculture have also been brought forward. A list of sensor-based and smart phone applications developed for different aspects of farm management as also been presented.

1.4 Overview

The Internet of Things (IoT) is a networked system of computing devices, mechanical and digital equipment, objects, animals, or people that have been given unique identifiers and the ability to exchange data across a network without the need for human-to-human or human to-computer interaction. The new concept of these papers is to enhance the increase of farming operations consisting of seed sowing of vegetation, fertilization, water sprinkling, and obstacle detection. The power applied for robotic gadget is minimum than other machines like other agricultural tools and also this electricity is developed from the DC supply that is observed. Now days, robotics is essential in fields like commercial, clinical, and plenty of different fields. Digital machinery, items, animals, or people that are given unique identifiers and the capacity to communicate data across a network without necessitating human to human or human to computer interaction. The Internet of Things (IoT) is a promising technology that offers trust worthy and effective answers for the modernization of many different fields. Solutions based on the Internet of Things are being created to monitor and automatically update agricultural forms with the least amount of human input. Traditional farming needs but some kinds of robotic and pneumatic mechanism are required in precision farming. As robots have entered in the mentioned above fields it is important to think that till, why the robots are not entered in the farming field? If the robots are being used for weed control, that will help to reduce the herbicides usage and the produces will turn into an organic, the same way robots can be used for transplanting the seedlings to avoid intensive labor. We used to read in news papers on few impressive innovative technologies by rural inventors i.e. electric motors can be operated remotely by cell phones, It's very Driver less robots are designed to update human electricity. The statistics logger through Wi-Fi module on net server increases the effectiveness of the machine so that surveillance of all movements might be maintained. The future scope for this challenge is not best detecting obstacle however also warding off it efficiently without demanding the primary course of the gadget. In this paper, the robot machine is used to develop the procedure of cultivating agricultural land without using guy labour. The purpose of the paper is to decrease the person labour with time. In now a days's generation range of countries do no longer have enough human labour in agricultural sections and it affects the growth of developing international locations, so it's time to automate the sections to reduce this problem. In India, there are 70% human beings dependent on agriculture. Innovative idea of this paper is to automate the procedure of sowing crops. The farming machine like seed sowing, fertilization, water sprinkling, etc. Are the extraordinary approaches to be managed, All the strategies are advanced to increase the farming mechanism which fits without the person labour. Seeding training is the each day life operation which use tractor in farms, but it makes use of extra time and the man scarcity is confronted constantly. The motivation for doing this paper is because of these days' agricultural issues and here the controller, it's interfacing with the dc motors, interfacing with the PIR sensor. Lead-acid battery for storing power and further it's far given to power supply circuitry that is presenting +5V for Arduino board and +12V deliver for riding DC motor the usage of L293d.

DC motor is used for Seed sowing an disconnected with Arduino and wirelessly with Android Smartphone to controlling the whole meeting. The hardware of agricultural robotiz established on Chassis.

V. FUTURE SCOPE

Our farm equipment companies and researchers have developed a lot of small and heavy farm equipment for traditional farming needs but some kind of robotic and pneumatic mechanism are required in precision farming. As robots have entered in the mentioned above fields it is important to think that till, why the robots are not entered in the farming field? If the robots are being used for weed control, that will help to reduce the herbicides usage and the produces will turn into an organic, the same way robots can be used for transplanting the seedlings to avoid intensive labor. We used to read in newspapers on few impressive innovative technologies by rural inventors i.e. electric motors can be operated remotely by cell phones, it's very helpful to farmers in summer times in cut power supply is irregular. If we think advanced intelligent machines in farming, Sensors or readers and hand held PDAs are going to be great helpful in computation and accuracy in farming. There are lot of hurdles taken in the agriculture sector in all countries but specially in India. Farmers decreasing in India a daily report from the newspaper. According to Shineveramya a famous writer gave a report mentioning that the Farmers are eyes of our country. They are great men who provide food for us but now a day's farmers are reducing more in number. Many are leaving the farming profession by telling some repeated common sentences that it is no longer profitable and none want to get losses and it is becoming risky day by day. So many disadvantages. Also the youngsters are not interested in that. So they are ready to work in construction companies and not in farmland.

VI. CONCLUSION

The vision of this paper is to create an open and accessible technology aiding. The Agribot Project has the potential to revolutionize the way humanity produces food both on the small and large scale. As the vision states, the project aims to create an open and accessible technology enabling everyone to grow food and to grow food for everyone. However, revolution will not be the defining metric of success in the short term.

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