Available online at: http://www.ijmtst.com/vol6issue04.html

International Journal for Modern Trends in Science and Technology

ISSN: 2455-3778 :: Volume: 06, Issue No: 04, April 2020

Agricultural Robot (Agribot): A Future of Agriculture

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To Cite this Article

Darshan Moundekar, Parinay Nakhate, Saurabh Ghosh and Abhay R. Kasetwar, "Agricultural Robot (Agribot): A Future of Agriculture", *International Journal for Modern Trends in Science and Technology*, Vol. 06, Issue 04, April 2020, pp.:06-10.

Article Info

Received on 27-February-2020, Revised on 21-March-2020, Accepted on 24-March-2020, Published on 27-March-2020.

ABSTRACT

The agricultural robot is used to reduce human efforts made by farmers during farming. There are many aspects to the future of this Agribot. Agriculture is considered one of the most important economic activities in India. The bot uses various techniques that help us track the various activities involved in the farming process such as soil moisture level, soil type, different nutrient levels in the soil, suggestion of the crop to be cultivated. The multi functionality of the robot will also help the farmer use the same robot to extract weeds, maintain records on soil data, and make it available at any time as it will be stored in a cloud server. Farmers using bots will be easier to monitor the field.

KEYWORDS: *Agribot, Soil Moisture Level, Cloud Server, Nutrient Level, Weed Extraction, Record of previous Crop Yield.*

I. INTRODUCTION

India has always been an agricultural country and mainly depends on natural resources. In the early days, farming was done manually by bullock cart which was very difficult and time taking for the farmer. India being an agrarian country needs new agricultural techniques, this paperwork will definitely help in the economic development of the country. Agribot will be the game changer in the agricultural sector. The objective is to build a robot that has different farming methods that can be adjusted according to the crop. Targeting in a key sector in the Indian economy is harder than expected. The bot will have an adjustable ground clearance mechanism which will make it a multi-purpose bot. Imagining a robot with interchangeable arms and adjustable ground clearance gives us a huge advantage over the counter parts available in the market. Also, by incorporating solar energy into the bot we get more power in the fields. Technology in farming can add more benefits for the farmer and the country. A bot in the field can do all the tasks that a farmer can do by plowing, sowing seeds, fertilizing and filling the field. This will save the time and effort of the farmer. Advance robots can also monitor the farm with the help of sensors and keep farmers updated on the current status of the farm. The future of farming will depend mostly on agricultural bots. The farmer can get the data on cellphone. There will be separate database. The farmer will have a database that will help them track the farm. The

farmer will know which crop to cultivate. The data will be stored in the cloud and the data will be tracked. Such a system will allow the farmer to have complete control over his farm sitting at his home. The data base will also help farmers to sell their property easily as they have the data of their farm in their palm. This data will also help government officials to analyze the fields.

II. LITERATURE SURVEY

The approach is now to develop smart machines that are intelligent enough to live in unmistakable or semi-natural environments. These machines should not be intelligent the way we see people as intelligent, but must display sensible behavior in recognized contexts. The approach of selectively visualizing the crop and soil by small autonomous machines according to their needs is a natural next step within the development of precision farming (PF) as it is all the way to individual plant or phytotechnology (Shibusawa 1996) Se reduces the scale of the sector). Existing human operations can be efficient over large areas, with autonomous machines having the ability to reduce the dimensions of treatment that will also end up in areas of higher capacity. Modern agriculture makes full use of energy. It comes in many forms, from fertilizers and chemicals to tractors and fuels. Another important factor is the phytotechnology approach of focusing energy initiated to increase efficiency. Any autonomous vehicle travels wrong at any time and therefore the possibility of catastrophic failure should be minimized within the look process. These machines should not be intelligent the way we see people as intelligent but must display sensible behavior in recognized contexts. The approach of selectively visualizing the crop and soil by small autonomous machines according to their needs is a natural next step within the development of precision farming (PF) as it is all the way to individual plant or phytotechnology. Modern agriculture makes full use of resources. It comes in many forms, from fertilizers and chemicals to tractors and fuels. Another important factor is the phytotechnology approach of focusing in resources is initiated to increase efficiency.[1].

Automation of agricultural operations is the need of the hour to spice up productivity with the help of tools and technology. In recent years, there has been increased interest in the incidence of autonomous vehicles in agriculture. Many researchers began to develop more rational and favorable vehicles for agricultural operations. Some prototypes were produced by Europe named CROPS, USA-ISAAC2 & Michigan-Hortibot, Australia-AgBot, Finland- Demeter, India-Agribot and many other countries. The Autonomous Plant Inspection (API) research platform designed by the Danish Institute of Agriculture (DIAS) was initially developed within the year 2001 by Madsen and Jakobsen. Further it was developed exactly by Aalborg University in Denmark. It is a third-generation autonomous research platform designed for precision agricultural prototyping with four-wheel drive, four-wheel steering with two motors per wheel, to provide a traction and conversely induce high mobility within the robot's movement Provides steering to do. ISAAC 2 from Hohenheim University, Germany This prototype is meant to gather timely and accurate information within a crop carrying range of sensors to assess crop health and standing. This high evacuation platform carries devices above the crop canopy and uses GPS. The Bonirob farming robot developed by Deep field Robotics, funded by Bosch, Germany Bonirob, can also be a multi-purpose robotic platform for applications in agriculture. It has four independently movable drive wheels with the facility to manage its track width and is also known as the highly powerful lathes bot, California lathes bot, called Rambo's Weeds, which was designed by Herad and the co-creator of the boat, Lee Redden Atstford University, also. Bot design is more of robotics, computer vision, and machine learning algorithms to pursue growing areas. The bot has a database of quite 1,000,000 images used to identify plants. CROPS, Europe CROPS research, "clever robots for crops", sponsored by the European Union Commission, may provide a solution for an automated harvesting process. Other fellows may also be commercially produced and robust equipment carriers, including the Technical University of Munich, Wageningen University, Research Institute, CSIC, and corporate forse- Hortibot, Denmark Hortibot, designed for top nursing plant nursing. Biologically grown vegetables AgBot II, Austrilla AgBot II can also be a robot designed to help farmers make decisions on pesticides, pesticides, fertilizers and water employment. It has developed in Australia at Queensland University of Technology (QUT), Agribot, India. Many countries in Asia, including India, are agricultural economies and most of their rural populations depend on agriculture to earn their livelihood. Agribot is an agricultural robot designed by students of BIT Hyderabad, Bharat Vitriovar Solar Robot, New Zealand a French

company has created an intelligent autonomous robot called Vitriovar [2].

In the current scenario every technology is getting automated and people are getting use to adopting smart technologies to get their work done. It can be seen how seed sowing techniques and equipment have progressed over time. Proper seed sowing is a very important part of the farming process and a hand operated seed sowing machine has been designed and developed for this purpose. Agriculture is one of the most important areas for determining the development of a country. For an agricultural sector to be successful one needs to add growing technologies as input and take care of processes as well as learn about the behavior and key role of technology that is going to play in the area of increasing interest is. In the current growing aspect, it has become a necessity to use the available technologies to get the best results. The seed sowing vehicle is designed based on two criterions.One is to keep the design in such a way that the working is as simple as possible and the other is to maintain low weight of theframe and reducing the number of pulleys used. The machine operates in the forward direction with the command. The cultivators move the soil as the machine moves forward and the seeds are dropped into the soil at regular intervals through a distributor mechanism that includes the hopper and seed flow system. Thus, model construction and its automation have been done to overcome the difficulties of farmers by obtaining regular distances between rows and successive seeds [3].

Agri business accounts for more than 60% of India. It is the backbone of the Indian economy. It is very important for farmers to improve the efficiency and productivity of agriculture along with safe farming.The field of robotics has progressed and has expanded in the field of application ranging from home automation to military.Additionally, the proposed design also includes a sprinkler motor enabling spraying of pesticides, Fertilizers, weedicides, etc. on the crop simultaneously as the crops are being checked for pests like stem borers using the camera. This work is based on the implementation of an agricultural robot vehicle that navigates between crops based on the instructions given by the farmer using a joystick with the help of a speed switch. The paper was aimed at not just to extend the application of advanced technology in the field of agriculture, but also to bring the technology close to the reach of farmers in financial aspect, in a very convenient way. Such projects encourage people to take up farming as full-time and part-time jobs. This is very important in developing countries, especially India, where agriculture is the backbone of the economy [4].

The Internet of Things (IoT) refers to the use of cleverly related devices and structures to use data collected by sensors and actuators embedded in machines and other physical things. The paper helps farmers for horticulture information and services. The pro-posed framework is helpful in addition to viewing field information and controlling field activities which gives flexibility.In, smart agricultural monitoring systems, various wireless sensors are used. This framework allows information examination and customized through an application or by page data.All sensors in the hardware board have been interfered with. The sensors input the controller and the farmer receives the data in detail on the cloud platform.The test results show that the hardware can be remotely controlled using wireless network technology.This clearly gives us information about the sensor level, at what time the crop status is changing and also the date. Through this data, the com- mon man becomes easy to understand.This system is used to maintain the optimal conditions of the irrigation system effectively [5].

Robotics and autonomous systems (RAS) are set to transform many global industries.The global food chain cannot be taken: it is under pressure from global population growth and the need to drive productivity.Given these conditions, the global agri-food sector can be transformed by advanced RAS technologies.A new focus for RAS within agri-food will have significant social and environmental benefits, to deliver economic benefits as well as increase productivity and reduce waste in the food supply chain. Also known as 'Smart Farming', it has its origins in the first applied developments in the industrial manufacturing sector in the 1970s and 80s.Robotics and autonomous systems for livestock at the farm level, robotic systems are now commonly deployed for milking animals, 'Vertical farming' systems use indoor farming techniques and closed environments where all environmental factors including nutrients, temperature, humidity and light can be controlled. Although post-harvest activities are beyond the main focus of this white paper, we note that the need for new research and innovations in agri-food does not stop at the farm gate. A recent focus of the agri-robotics community has been to identify applications where automation of repetitive tasks

is more efficient or effective than traditional human or large machine approaches. A wide range of technologies will enable the transition to the field of agricultural robotics. Agricultural platforms can be divided into domain and task-specific robots designed to perform a specific task at a given crop in predetermined domains, and generic platforms designed to perform multiple tasks across different platforms. Challenges range from domain funded aspects such as intuitive design, immersive display (such as virtual and augmented reality) and tactile feedback to very specific challenges that stem from in-field situations.Artificial intelligence technology, in particular machine learning, is expected to play a major role in most of the above technology areas, and will be the enablers required for agricultural robots.This white paper is about the future development of UK agriculture. RAS technologies in agriculture will become ubiquitous over the next 5 to 10 years. Robots are helping us to determine the input quantity to achieve the desired result [6]

III. PROBLEMS FACED IN TRADITIONAL FARMING

Inappropriate Knowledge:

Considerable amount of fertilizer will benefit farmers but surplus amount damages the crops. Insufficient knowledge of using fertilizers will damage the crops and hence give rise to problems to farmers.

Lack of manpower:

The wages of farm workers is less than construction labors so for living they choose different path but not farming.

Farmer suicide:

According to the report from an agriculture region Maharashtra, Andhra Pradesh, Karnataka states where more than 10,000 farmer committed suicide and ended their lives every year. These crises can be eliminated and the method of Indian farming and agriculture sector can be extended by using robotics and Artificial Intelligence and by designing smart robots that benefit the agricultural sectors. All the researches are on process and we need considerable amount of time to establish these technologies in farming.

IV. FUTURE SCOPE

Scientists from all over the world are working on a newly proposed Robot that is flying micro Robot. Scientists are reverse engineering the mechanics of insects as they design midget robots which can be used for recording images in agricultural field. Robots will replace the human labor and, in every aspect, which will make agricultural sector much more efficient than today's time.

Artificial intelligence technologies, especially in machine learning, are expected to play a serious role in most of the above technology areas, and can be essential enablers for agricultural robots. Agricultural environments are subject to changes throughout the lifetime of a robotic system. For example, there could also be new crop varieties, weeds, pests, diseases, treatments, legislation, temperature change, etc., as well as new robotic technologies. In AI terms this suggests managing an open world, so techniques to enable adaptation during operation rather than at the planning phase are going to be crucial. Techniques that allow robots to find out from experience include reinforcement learning, learning from demonstration, and transfer learning to exploit prior knowledge, e.g. from another domain or task. Ongoing research is investigating deep learning methods, especially in perception-related tasks involving the interpretation of sensor data, including recognition and segmentation tasks in automated weeding and fruit picking. Robots also will have to leverage human knowledge, especially when facing situations that weren't foreseen at design time. This extra input may be given by end-users, maintainers, and/or domain experts. It might also be provided through direct control (i.e. teleoperation), natural interaction (e.g. via language or gestures) or by the means of labelled examples and data sets. These developments will link naturally into the employment of massive Data in smart farming, alongside the employment of satellite imaging, UAVs and ground robots for more localized and richer, multimodal data collection. These developments coupled with cloud-based storage will create an abundance of information that might potentially be utilized for smart planning and control of agriculture. a crucial requirement is the standardization of information to ease the exchange between robots, domains, farms, countries and firms.

V. ADVANTAGES

The above-mentioned crisis to which the robots will make a noticeable difference i.e. perfect entry into the agriculture.

Following are the advantages of robotics in farming:

1. The farmers are now free from hectic work like ploughing, seed sowing, feeding and supervision of animal, etc.

2. Robots does not get sick or tired as that of human and there is no break required so the efficiency and productivity increases.
3. With High speed and narrow tolerance, the efficiency is high
4. The robotics industry gives us an opportunity to replace human labor with good returns in investment by providing effective solutions.
5. We can use cameras and sensors for the monitoring of the farms and detecting weeds and identifying pests, parasites or disease.
6. As robots are specially oriented for specific task so there is no opportunity for the gross error.
7. Using various sensors and technologies we can get the data of seeds, crops, weather, soil etc. and we can predict for better result.
8. As we are using Robots and various mechanism so it creates job opportunity for people.
9. People who doesn't belongs to agricultural background can also do farming effectively with new technologies and robots.

VI. DISADVANTAGES

Following are the Disadvantages of robotics in farming:

1. As robots use in future having different technologies it ultimately increases the cost of robot.
2. Robot need maintenance to work precisely and efficiently.
3. It may lead to lack of access to poor and illiterate farmers.
4. Initially Capital cost require for Research and Development is very high.

VII. CONCLUSION

In agriculture the number of robots will increase as they are coming in various forms. The autonomous farming will be evolved and will become more efficient with technology over the years. The main reason is it should replace the human driver with a computer. We have to rethink on it and how will be the crop production is done. It will always be the cheaper and better with the help of small machines and few large ones. The quality of the product can be sense with the help of robots and will make the life standard.

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