Multipurpose Farming Robot

Dr. Amruta Amune
Vishwakarma Institute of Technology
Pune, India

Dhanshree Tamkhane
Vishwakarma Institute of Technology
Pune,India

Nomaan Shaikh
Vishwakarma Institute of Technology
Pune, India

Pranav Tayade
Vishwakarma Institute of Technology
Pune,India

Abstract: The Multipurpose Farming Robot project proposes a new answer to the problems of agriculture through amalgamating Bluetooth, IoT (Internet of Things), and mobile application control in one single practical robot. The project will be a systematic research and development process to develop farm robot with the ability to do agriculture autonomously, such as planting seadlings, monitoring crops conditions like farming methods, how they can get water or manage air temperatures control etc. The main parts of this system is using bluetooth to connect the robot with an application (app) on mobile phone/tablet that can see and control it from remote. Plus, IoT technology collects sensor data from the robot to enable active decision support for optimized farm management. Combining these means leads to an increase of efficiency, productivity and sustainability in the agricultural field with turn it into a smarter connected farming ecosystem. In this paper, we present the Multipurpose Farming Robot design and development as well validate it along with its potential implications in modern agriculture alongside future research directions.

Keywords — Autonomous operation, Internet of Things (IoT), Remote field monitoring, Field sensors, Soil moisture monitoring.

I.INTRODUCTION:

This ground can be the backbone of numerous economies as resource for sustenance and industrial purposes is made available by agriculture. That said, modern agriculture is not without its problems — a lack of labour force in many countries as well an increased demand for yield and sustainable growing practices. That is why there are so many problems, and then this business depends more on labor than necessary with environmental pollution. A likely solution, and one that is showing early promise through proof of concept today are multi-tasking farming robots. Autonomous machine for cultivating various crops, which can perform multiple jobs like sowing seeds and harvesting fruits, cutting plants and so on… “appropriately multipurpose farming robots. These machines are outfitted with cutting-edge technological applications like robotics and the Internet of Things (IoT) which work in tandem so that these professional robots can perform even complicated tasks without human interference. These robots are highly adaptable and versatile, have a variety of applicable sensors and cameras that they can use in different agricultural tasks by using various actuators included with them. This study is to investigate the design, implementation and expected benefits of combined application farming robots in modern agriculture. The purpose of this paper is to present the technology driving these robots, i.e., navigation systems and mechanical design for targeted agricultural applications. This research paper outlines a new way of solving a lot of problems by employing modern tools like Bluetooth Technology, the Internet of Things, and mobile application control into fitting and independent robotic system. The use of Bluetooth technology in the robotic system allows the link up with the mobile app, thus enabling farmers to operate the robot at distance. This leads to quick decision making and modification on the operation of the robot eliminating a lot of manual work and supervision. In both cases, the advanced technologies that are offered

will help to develop a new well-connected and smart environment for agriculture instead of the existing traditional one. The objectives of the Multipurpose Farming Robot move towards enhancing efficiency and effectiveness in agriculture by eliminating tedious work and availing real-time information for decision-making processes.

II. LITERATURE REVIEW:

This paper describes the construction of an all-purpose autonomous agricultural robot which incorporates several functions including ploughing, sowing, and watering. The paper suggests the use of Bluetooth for remote control in an effort to increase efficiency and overcome the problem of labor shortage in the agricultural sector. [1]. The authors have presented "Agribot" a small-sized and affordable multi-functional robotic system for agricultural purposes. The paper underlines the ability of Agribot to carry out seeding operations and detect obstacles using ultrasonic sensors thus minimizing the human input in the agriculture activities[2]. The research in context is concentrated on a Global Positioning System based intelligent agricultural robot capable of tilling and planting, among other operations. It also includes mathematical modeling of the working mechanism of the robot in relation with precision farming and enhancing food production[3]. The document presents an IoT powered multi-functional agricultural bot with a crop surveillance system. It also explains the need for real-time data acquisition and distance management as a means of improving efficiency in farm operations and sustainability [4]. The study presents the design and construction of a multipurpose agricultural robot designed to handle basic operations including ploughing and planting of seeds. It underpins the advantages of autonomous robots in agriculture, which include reducing the cost of labor and increasing the amount of crops grown[5]. The writers introduce a sophisticated multi-functional agricultural robot meant to facilitate the working of farmers in different tasks. This robot works on solar energy, and is operated with the help of a joystick to reduce human operations and enhance efficient utilization of resources[6]. The construction of the Autonomous Robot for Precise Agriculture is studied within this paper. More specifically in this paper the inclusion of various sensors for soil and plant health monitoring has the objective of enhancing efficient agricultural practices[7]. The authors examine the application of drones in the agricultural industry for the purposes of assessing the health of crops and enhancing the distribution of resources. A part of this paper draws attention to the benefits of data collection through the means of aerial sources which is a component of precision farming and its ability in improving the ability to make decisions[8]. This journal explores the use of automated farming techniques and emphasizes the role of machine learning algorithms. It points out the optimization of farming activities with the aid of analysis and decisions within the ai/machine learning systems[9]. The article comprehensively analyzes the existing literature on agriculture centered robotic systems and their applications. It stresses the fact that more studies are needed in the area in order to tackle some of the issues such as affordability and degree of adoption which would eventually facilitate the use of robotics technology in agriculture [10].

III.METHODOLOGY:

The process of developing a multipurpose farming robot that can perform functions like seed sowing, cutting of grass or spraying of water has different stages. First, the agricultural needs and problems are thoroughly explored to assess the robot’s necessary functionality and characteristics. It takes into account soil types, types of crops, landscape as well as climatic conditions. After the requirements are specified, the next step deals with the modeling and the strain design of the robot components. This involves choosing the right materials for weight and strength and designing the environmentally friendly mechanisms such as seed sowing, grass cutting, and spray mechanism systems. Also, the mobility system of the robot should be designed so that it can work effectively on different surfaces and may include the standard wheels or tracks for stability. With the completion of the mechanical design phase attention is paid to the electronic and software design for the robot. The control system within the robot is the one that ensures synchronous movement and action of the robot when performing the tasks assigned to it so that the tasks are completed accurately and on time. Also, during the entire design process, there are measures to carry out risk management. Safety systems are installed in the robot to avoid its uncontrolled movement, enable its use around people and animals without risk, and minimize the consequences of system failures and external bad weather. After the prototype is created, comprehensive testing and validation processes are provided to determine the performance of the robot in dynamic conditions. This encompasses testing the robot in the field with users for its intended purpose in agriculture and making improvements where necessary.

Seed Sowing Mechanism: In this segment, we conceptualize and fabricate a fully automated seed sower, which is activated when the user presses on the 'seed sower' button on the app. Its distinct funnel-shaped seed collector is designed to supply the seed in a wheel. On a shaft, to which a motor is mounted, there is a small bracket that aids in Whelan the seeds. The seeds sower starts sowing when the toggle switch is activated. It

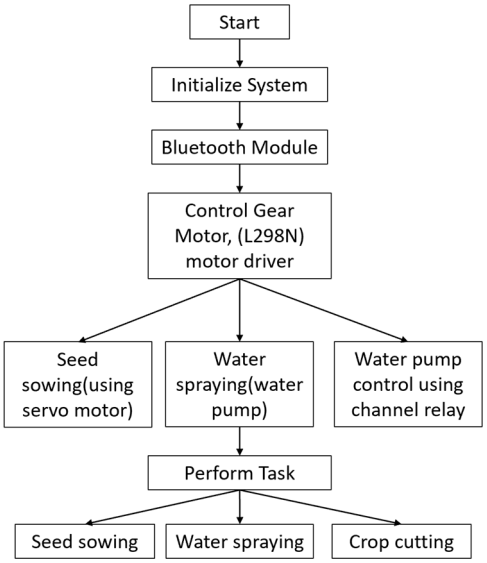
ensures that the seeds are sown uniformly in the given area.

Grass Cutting Mechanism: This section deals with the analysis and implementation of a complete automation of a crop cutting machine, which activation takes place upon clicking on the crop cutting button on the app. It consists of a. The blade that will be cutting down the crops is connected to the motor. Once the switch is pressed, the activity of cutting down of crops commences.

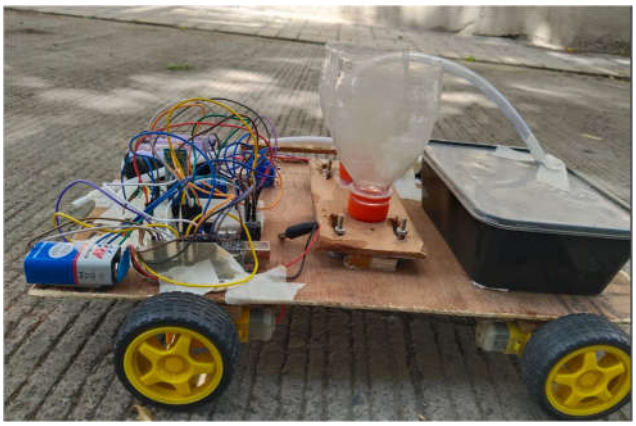
This guarantees that the crop is cut uniformly across the field.

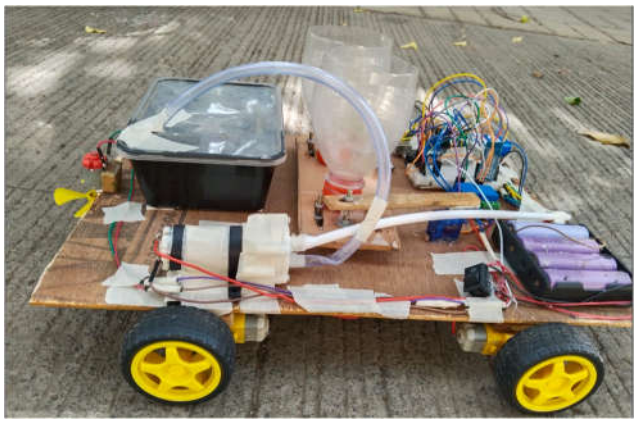
Water Spraying Mechanism: Weeds and water are put in bottles. It also uses a pump to transfer the water then spray it.

IV.FLOWCHART:



V.RESULTS:





VI. CONCLUSION:

To sum up, the article gives an ample account of the factors involved in designing and creating multipurpose agricultural robots and the sectors they can be employed. The survey paper examines the economic advantages that can be derived from autonomous robotic vehicles over traditional systems, emphasizing the labor saving aspects only, the implications to the farm structure, environmental issues, energy consumption, safety thresholds and so on. It further points out the contribution of precision agriculture in achieving optimal yield and improving the economy of the agrarian countries. Moreover, the survey paper describes how agricultural robots can revolutionize farming practices, enhance efficiency and tackle issues of high expenses and work force shortage in the agriculture industry. It emphasizes the importance of modern strategies and additional progress to make sure that these state-of-the-art techniques can be effectively expanded.

VII. FUTURE SCOPE:

Below are some of the prospective regions for future development and expansion of a dog care website: Advanced AI and Automation: Picture robots with cutting-edge artificial intelligence (AI) that performs a number of functions and is flexible enough to change its operation due to external environments, weather, or even recognize and respond to crop diseases.

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