International Journal of Engineering and Management Research
e-ISSN: 2250-0758 | p-ISSN: 2394-6962
https://ijemr.vandanapublications.com

Peer Reviewed & Refereed Journal
Volume-14, Issue-6 (December 2024)
https://doi.org/10.31033/ijemr.14.6.11-14

Review Paper on Multipurpose Agricultural Farming Machine used to enhance the Different Farming Operation for Indian Farmers

Prof. P.V. Lokhande[1], Shrutika Ashok Patil[2*] and Prof. A.S. Mali[3]
[1]Assistant Professor, Department of E&TC Engineering, Tatyasaheb Kore Institute of Engineering and Technology, Warananagar, INDIA
[2]M.Tech Student, Department of E&TC Engineering, Tatyasaheb Kore Institute of Engineering and Technology, Warananagar, INDIA
[3]Assistant Professor, Department of E&TC Engineering, Tatyasaheb Kore Institute of Engineering and Technology, Warananagar, INDIA

[*]**Corresponding Author:** Shrutika Ashok Patil

Received: 27-10-2024 Revised: 14-11-2024 Accepted: 01-12-2024

ABSTRACT

In India, agriculture provides a living for 70% of the population. However, as the population grows, we see that farms are shared among families; hence, Indian farmers usually owned just two acres of land. Farmers continue to use traditional agricultural practices because they are economically disadvantaged and cannot afford to buy tractors or other costly equipment. Generally, many Indian farmers use he-buffalo, horses, and bullocks for agricultural work. This will not be sufficient to meet the energy demands of the agricultural industry in compared to other countries. This machine is capable of doing four farming operations on a small scale: excavation, seeding, cultivating, and spraying. It will perform that operations using the android app.

***Keywords*—** Arduino, Android App, DC Motor, Motor Driver

I. INTRODUCTION

New ideas in agriculture are crucial for India's most significant vocation, notwithstanding previous efforts. In 1951, just a few tractors were in service, and they were all imported. The farmer's lack of understanding of modern farming methods affected their outlook on crop productivity. The world's biggest manufacturer of tractors is India. However, a tractor alone is insufficient for farm labor. A variety of operations are still carried out by individuals. A system that will carry out the identical activities in place of humans is required in order to increase the work and the agricultural process's capabilities. The tasks w like covering, planting, and excavating seeds. There is a lot of field labor involved in this area of agriculture, including weeding, reaping, seeding, etc. In addition to these tasks, farmers must also spray their crops to protect them against insects, pests, fungi, and diseases. Numerous insecticides, pesticides, fungicides, and fertilizers are sprayed on crops to provide protection.

Since farming was the primary source of income for the populace, farmers needed hand tools to complete tasks and increase labor productivity and quality; as a result, low yield and low productivity led to the development of MAE (Multipurpose Agriculture Equipment).

Since agriculture has evolved, it must discover new methods to increase productivity. One strategy is to use the information technologies that are currently accessible, such as smarter machines, to target and reduce energy inputs more efficiently than previously. A whole new line of agricultural equipment based on tiny, intelligent machines that can act appropriately in the correct way at the right time is made possible by the introduction of new concepts.

II. METHODOLOGY

The above graphic depicts the ESp32 camera module, which will transmit real-time data to the ES8266. The ESP8266 will be utilized to control the other machinery, which will be operated via the smartphone app. The user must link the farm equipment to an internet connection so that frames for the video recorder can be sent to the user and real-time films can be seen on the side, implying that the suggested system would work on an IoT system. Similarly, the remaining system is employed to regulate the motors' driving functions. The cutter motor is then powered by motor driver number one. Motor driver 2 was responsible for operating the wheel motor. Motor driver 3 is attached to a water pump, which is used to spray herbicides on fields. In this manner, a lot of operations are controlled by a single machine. The suggested block diagram is displayed below.

Peer Reviewed & Refereed Journal
Volume-14, Issue-6 (December 2024)
https://doi.org/10.31033/ijemr.14.6.11-14

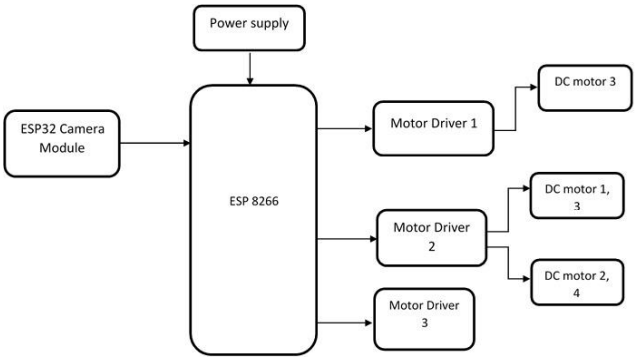

Figure 1: Block diagram of proposed system

III. LITERATURE SURVEY

M.V. Achutha, Nataraj, G.K., and Sharath Chandra, N.: The four design and development ideas have been stated by the paper's author. In order to prevent failure issues during project fabrication, they have examined the load situation. On each plan, they are performing one or two procedures. Since they are not using the engine, more labor is needed in this situation. Reducing the cost is the paper's conclusion. This study examines how they are conducting the analysis and the operation to minimize the cost.

F.A. Adamu, B. Babangida, and B. G. Jahun: The authors of this study stress how crucial a power tiller's performance is. The most common option for people seeking lightweight power was the tiller. Additionally taken into account are factors like field capacity and fuel economy. We kept these things in mind when designing a sustainable multifunctional farm vehicle.

K. Mahalle and Pundkar, Mahesh R.: Does the evaluation include a quick overview of the many types of advancements achieved in plantation seed sowing devices? An essential component of the agricultural sector is the seed-sowing machine. The cost and yield of agricultural goods are significantly impacted by the performance of seed sowing equipment. There are currently several ways to determine if seed-sowing machinery is operating properly.

Laukik P. Raut and Al.: In order to supply the food demands of a fast expanding population and industrializing world, agriculture must modernize. By guaranteeing improved distribution, lowering the amount needed for improved response, and avoiding losses or waste of applied inputs, mechanization makes input conservation possible. Mechanization reduces the cost of manufacturing per unit by boosting output and preserving inputs.

Girish Kumar H. P. and Ramesh D.: An overview of the several kinds of advancements in seed-sowing equipment is given in this publication. Placing the seed and seedlings in rows at the appropriate depth and seed-to-seed spacing, covering the seeds with soil, and compacting the soil over the seed are the main objectives of the sowing process. The optimum row-to-row spacing, seed rate, seed-to-seed spacing, and seed placement depth for achieving optimal yields change depending on the crop and the agroclimatic conditions. In agriculture, seed sowing equipment are crucial.

Satya Prakash Kumar, A. Ashok Kumar, V.K. Tewari, and Brajesh Nare: This research article's author clearly illustrates India's availability and progress through a case study on farm mechanization in West Bengal, a region of India. This made sure we did the right things compared to the current phases.

Mahai, D.A. Mada: The author of this study has provided examples to illustrate the extent of automation in the agriculture sector. The necessity of a multipurpose vehicle for pre- and post-harvesting was the paper's conclusion.

This has served as the foundation for our investigation, and we have made additional adjustments to the manufacturing of our multifunctional farm vehicle

IV. MECHANICAL DESIGNING

The Following sensors are used in the proposed system,

a) Chassis Frame: A is made up of an internal structure that allows an artificial thing to be built and function properly. It resembles an animal's skeleton. A chassis is the framework beneath a car that includes the frame to which the body is attached. If the unit contains running gear, such as wheels, it is referred to as a rolling chassis.

The chassis is one of the most significant structural components of a car. The frame supports both the machine's body and its power train. Several mechanical pieces, including the drive train and engine, as well as axle assemblies including the wheels, suspension, brakes, steering, and other components, are linked to the chassis.

D = 25mm B = 25mm d = 21mm
b = 21mm
M.S. material yield strength =200mpa
I = (BD3 /12)-(bd3 /12)
I = (0.025)4 /12 – (0.021)4 /12
I = 1.63*10-8 m 4
y = 0.0225m
m = w*l2 /8……..2 ft length
m = 1500*0.6096/8 m = 114.3 N.m
σ = m*y/I
=114.3*0.0225/1.63*10-8
σ = 157.77*103

Peer Reviewed & Refereed Journal
Volume-14, Issue-6 (December 2024)
https://doi.org/10.31033/ijemr.14.6.11-14

Wheel capacity to take load : Wheel material-=harden plastic Diameter= 14inch
The wheel can carry a load of 84 to 100 kg and is designed to have four wheels so, the selected wheel can easily carry the load of the component and provide suitable height for operating, and gives a long lifetime.

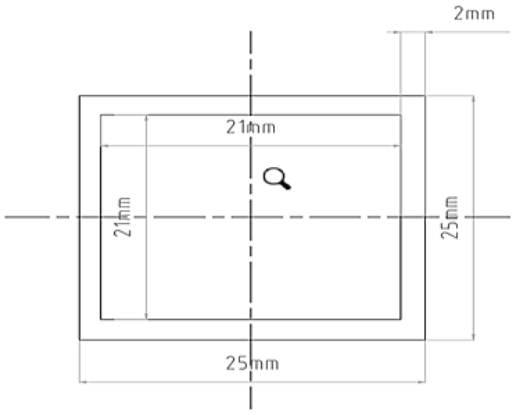

Figure 2: Chassis for farm machine

b) Hopper: A hopper is positioned on the chassis back to the engine to hold stored seeds. Shank is the shaft of a hopper used for bending seeds.

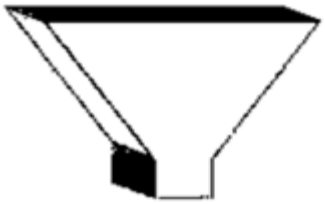

Figure 3: Hopper

c) Cultivation Tool: The cultivation tool is attached between two rear wheels and is controlled manually. User need to press it manually on the farm at initial stage after it will start cultivate the farm easily.

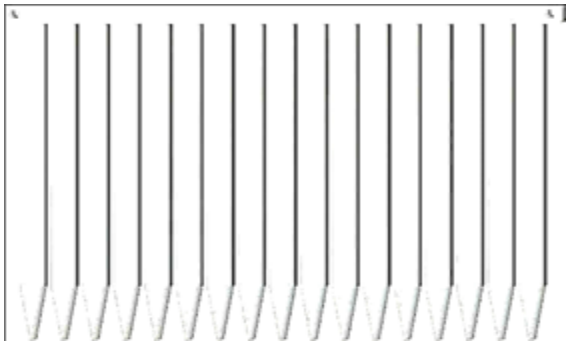

Figure 4: Cultivate tool

d) Fertilizer Tank: It is positioned between the motor and battery on the rear of the chassis. The motor-connected hose for the tank's spraying function

Figure 5: Fertilizer tank

e) Spray Pipe: Spray pipe is installed near to the hopper that will spray fertilizers or the water. It there is fertilizer water. The fertilizer will be taken from fertilizer tank.

Figure 6: Spray Pipe

V. RESULT

Software simulation is developed for the proposed project to check the system accuracy and how system will be operated. According to that the resulting circuit diagram is as follows,

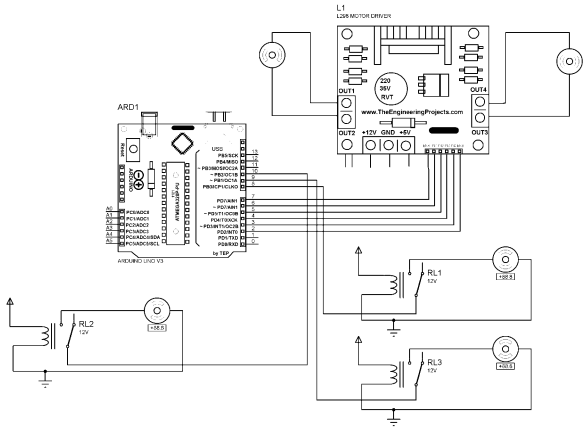

Figure 6: Actual Working Diagram of Proposed System

Two motors are connected with the arduino using the L298N motor driver that will be used to drive the robot from one position to another position. Ate remaining 3 motors are operated using the relay driver circuit. The relay driver will be used to operate the motors attached with sprayer, cultivator tool and the hoper. We can add the motor or use the manually feeding for the fertilizer section. The circuit is connected with the wifi module using esp32

Peer Reviewed & Refereed Journal
Volume-14, Issue-6 (December 2024)
https://doi.org/10.31033/ijemr.14.6.11-14

wifi module as well as the camera module. Entire system is worked on the android mobile app.

VI. CONCLUSION

The development of multifunctional farming equipment is encouraging, especially in terms of improving agricultural productivity and tackling the manpower crisis. These machines may drastically cut down on the time and expense involved with traditional farming methods because they are made to do a variety of activities, including excavating, planting, growing, and spraying. Small-scale farmers may find that multifunctional machines offer a practical answer to the problems facing the agriculture industry, such as limited land holdings and financial limitations. Although there are many benefits to multifunctional agricultural equipment, some farmers may be discouraged from implementing these advances due to concerns about the initial outlay of funds. The secret to its broad acceptability will be striking a balance between cost and technical innovation.

REFERENCES

[1] Ashwin Chandran ,K. Varun Krishnan,T.V Arjun, Vignesh & Nitin Joshwa. (2020). Design and Fabrication of multipurpose farming equipment. *International Journal of Research in Engineering, Science & Management*.

[2] Jayshree Kurakula. An efficient design and development of multipurpose agro machine. *Journal of Xi'an University of Architecture and Technology*.

[3] Senthilnathan N, Shivangi Gupta, Keshav Pureha & Shreya Verma. (2018). Fabrication and automation of seed sowing machine using IOT. *International Journal of Mechanical Engineering and Technology (IJMET)*.

[4] Patil Nikhil, Shaikh Ajaharuddin, Deore Ganesh, Choure Ganesh & prof. P.G. Tathe. (2018). Multipurpose agriculture vehicle. *International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)*.

[5] Prof. P.V. Butet, Shailesh Deshmukh, Govind Rai, Chetan Patil & Vishal Deshmukh. (2018). Design and fabrication of multipurpose agro system. *International Research Journal of Engineering and Technology (IRJET)*.