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Design and Fabrication of Ploughing, Sowing and Harvesting machine for Agricultural Purposes

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Abstract : *Agriculture is one of the most vital activities for survival as well as economy because it not only caters the nutritional or basic need for living beings, it also helps in business of connected activities like logistics, storage, sales etc. Hence agriculture is also called the backbone of any economy. Therefore, it is very important to facilitate agricultural activities using technology in order to meet the ever-growing demand for food grains and help the related activities in running the economy. This project particularly deals with helping farmers in their day to day activities in the field like ploughing, sowing seeds and basic harvesting that doesn't include separation of grains from the produce. It's a vehicle that has the above mentioned th ree functionalities which can be used one by one or simultaneously that can be accessed with the help of a remote/transmitter without the farmer physically doing the job. This vehicle can also be made autonomous and in large size so that all activities in the farm can be done with least or no human interference.*

Keywords *- Agriculture, economy, ploughing, sowing seeds, basic harvesting, remote access*

I. INTRODUCTION

India is majorly an agrarian dominated society where most of the population is involved in agricultural activities. Also agriculture is the backbone of any country so it is important to bring out innovations in that field to aid our farmers. For 28% of India's population agriculture is primary occupation.

Despite of large scale mechanism in most parts of India agricultura l operations are done by human labour using conventional tools like wooden plough, sickle.etc . Little or no use of machines is m a de in ploughing, sowing, irrigating, thinning, weeding, harvesting threshing a nd transporting the crops. This is especially true for small scale farmers. This results in huge wastage of human labour and in low yields per capita force.

There is need to automate the agricultural operations so that wastage of labour force is minimized a nd farming is m a de convenient a nd efficient. For increasing production and facilitating multi cropping agricultural equipments and machinery are a crucial input foe efficient and timely agricultural operations.

Farmers need to choose the most appropriate power source for a ny operatio n depending on the work to be done a nd on who is performing it.

Problem definition: Farmers find it difficult to plough, sow seeds and harvest due to labor issues, meaning the number of laborers involved and the wages that has to be paid. Major problem with these operations is that they can't be achieved using single machine. there are some machines available in market which fulfill this need but those machines were not fully automatic, were very costly and difficult for users to handle. The user needs to continuously guide the machine for a different operations every time.

II. HEADINGS

1. **Sprayers** is kind of farm equipment used to spray insecticide, pesticides a nd weedicides fertilizers a nd m a ny otherproducts m ea nt to be sprayed on the farm.
2. **Field cultivators** it can be used to get rid of weeds or to m a ke the soil softer shortly after the crop ha v e started to grow.
3. **shredders** a nd cutters this type of Machines m ea nt forshredding a nd cutting unwanted vegetative growth a nd weed.
4. **Plough** it is particularly m ea nt forploughing they m a ke the Earth soft so that the root of the crops planted can benefit the soil a nd get all the nutrients.
5. **Baler** is one of the most generally used for missionary. it is used to cut ha y a nd strawis capable of breaking a nd biting nails with twin for easy transportation a nd storage The main objective of this project is to help farmers in their da y to da y activities which might seem difficult in a large scale economically. Our idea is to m a ke a remote-controlled portable machine with multi-purpos e functionalities which helps them both during the start of the crop as well as during harvesting

III. METHODOLOGY

1 In the initial phase we are planning to take a small survey of farmers in our area regarding the problems that they face every da y for which they spend lot of money a nd time. As per our search online a nd local consultations we ca m e tofollowing conclusion

2 Farmers find it difficult to plough, sow seeds a nd harvest due to labour issues, meaning the number of laborers involved a nd the wages that must be paid. Also, these functions can be achieved using separate machinery, but all these machineries individually are costly.

3 After gathering all the da ta , we will compile a nd classify the problems into main objectives which should be achieved in this project.

4 Each of these objectives will be separately dealt by our team members a nd later combined without compromising any of the above-mentioned functionalities and a detailed design will be made.

5 Fabrication will be the last phase after a proper design is m a de a nd then it will be tested.

(Equation 1)
ΣMO = 0,
-F×130+750 ×250 = 0; F =
1442.3076N ΣMC = 0,
-50×750+1442.3076×170 = R×300; R = 692.3076
N Let the cross section have ‘b’ thickness and ‘2b’ as width. From the line diagram the stress occurred in the plough is only due to bending. Considering only bending stress, σ bending = MI×ι where M = bending moment about the critical section
I = Moment of inertia, c = top fiber to neutral axis distance Yield stress of Mild Steel material σ yield= 250 MPa Moment M = load × distance = 750×100 = 75000Nmm
Moment of inertia I for rectangular cross section I = b×d312 = 2b43 mm4 C = 2b2=b

Equating yield stress to the bending stress equation, we get b=7mm and d=14mm. taking factor of safety of 2 and variations in load, the required dimensions are

b = 14mm; d = 24mm

IV. FIGURES AND TABLES

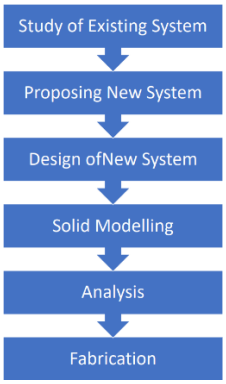

Fig No 4.1: Methodology

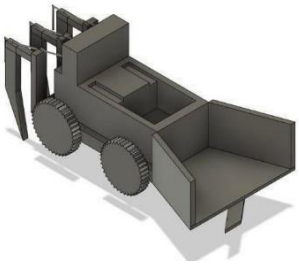

Fig No 4.2: Isometric View

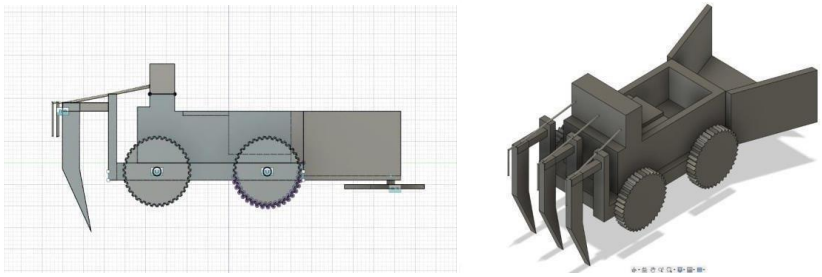

Fig No 4.3: Side View

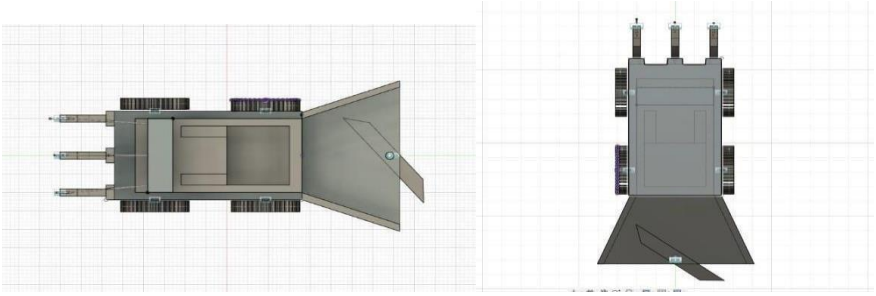

Fig No 4.4: Top View

Table No 4.1: Cost Estimations

COMPONENTS	**COSTS**
24 GHz transmitter and receiver	4500/-
Arduino UNO	900/-
12V Battery	1050/-
4* DC Motor	4*454.30/-
RS-775 High DC motor	350/-
L298 Motor driver	129/-
Sheet Metal	500/-
Wheels	4*500/-
Miscellaneous	4000/-
Total Estimate	15245/-

V. CONCLUSION

An economical machine that has most features which is beneficial for the farmer. A machine that takes less time compared to the labour required to do the same work on the field. Ability to monitor and control the machine with the help of a remote/controller/smartphone. Portability and modula rity based on the type of work required to be done. This project can be used to do daily activities in a farm without much human interference effectively without compromising on the procedure and practices followed to get the required yield.

REFERENCES

[1] LeasieFelderhof, D. Gillieson, “Linking UAV (unmanned aerial vehicle) technology with precisionagriculture”, Taylor & Francis, Vol. 37, No. 4, pp. 376386, 2011 (2008)

[2] PAOLO BALSARI, MARCO MANZONE “Evaluation of seed dressing dust diperion from maize sowing machine” (2013)

[3] M. Jaivignesh1 and B. Vijaya Ramna th "Design and Analysis of Disc Plough for Agricultural Industry",[2013]Ms Ra cha na P.Koli “Android Application Agriculture Decision Support System” Vol. 4, Issue 4(Version 6), pp.63-66(2014)

[4] Owen Bawden,"Alightweight, modular robotic vehicle for the sustainable intensification of agriculture",(2014)

[5] Deanna Cavallaro "A New Rice Sowing Technology:Inform ing Small-scale farmers about Improved Methods of Planing" (2014)

[6] Saurabh Chauhan "Motor Torque Calculations For Electric Vehicle" VOLUME 4, ISSUE 08 (2015)

[7] Sasko Dimitrov, "Design of hydrostatic transmission of agriculture machines" (2017).

[8] James Wilson D. A. "Time of sowing grass seed," Bulletin: Vol.2 : No. 15 , Article 7.(2017)

[9] Sarathkumar, "Ground Nut Harvesting Machine Using Embedded Control" Vol 04,no2 (2018)

[10] VassoMarinoidiet , "Robotics and labour in agriculture", (2019)

[11] Jukanti Vishwas ,"Design and analysis of plough for agricultural mechanized robot" special issue (2019)

[12] Burra Hymavathi , J Hariharan , K Manideep , D V Srikanth, "Design and Structure of Multi-Purpose Agricultural Robot", volume 09, issue 05 (2020)