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AUTOMATED SEED SOWING MACHINE

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Abstract- The aim of our project is to perform agriculture work, By using this robotic technology the farmer can perform these all operations just by sitting in a cool place and can do plowing, seeding, and grass cutting. The basic idea of this paper is to develop a mechanized device that helps farmers to perform operations like seeding/seed sowing at pre-designated distances and depths. So now it's not necessary to do seeding in sunlight. More than 40% of the population in the world chooses agriculture as the primary occupation, in recent years the development of autonomous vehicles in agriculture has experienced increased interest. By using robot technology one can easily perform these all operations by providing the input to the robot it performs the operation according to the data given by the user.

keywords: Farmers, Remote control, Arduino boards, Sowing mechanism

I. INTRODUCTION

Agriculture is the backbone of India. The history of Agriculture in India dates back to Indus Valley Civilization Era and even before that in some parts of Southern India. Today, India ranks second worldwide in farm output. depending upon the topic Traditional methods of farming are broadcasting,Ploughing,seed dibbling, drilling, opening furrows by a plough and various types dropping seeds by hand or dropping seeds in the furrow with a bamboo/metal funnel attached to a plough.. For seed sowing in small areas dibbling i.e., making holes by a stick or tool for dropping seeds by hand has been practiced for many years. The vehicles are being developed for the processes for plowing, seed sowing, leveling, water spraying. All of these functions have not yet been performed using a single- vehicle. In this the robots are developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the vehicle to perform the functions such as ploughing, seed sowing, water spraying..These functions can be integrated into a single vehicle and then performed.

II. LITERATURE REVIEW

In agriculture, the use of robots enhances the productivity and reduces the human effort and cost. The automation of various agricultural activities by robots is envisioned. It has been described that the present robot can perform better and can automate more than one work simultaneously. This robot can be effectively used by the farmers. In the future this robot can be enhanced with some more cognitive capabilities It's the foremost preliminary step for proceeding with any research. and also to take appropriate actions even in the absence of the farmers. It can be induced with human interaction and also learning from experience,as given by Blackmore, S.(2007). Central to this idea was the proposal of the implementation of the PFDS and PADS, and their strong interaction. The PFDS is primarily used for relaying spatial accuracy information for machinery navigation, while the PADS are used to communicate the agronomy information about, and requirements of, the crop, given by R. Eaton, R. Eaton, J. Katupitiya, S D Pathirana (2008) Ramesh & Girishkumar(2014).worked for seed sowing equipment. The objective of the sowing operation is to insert the seed in the field in a row at a certain depth and with equal spacing, covering the seeds with soil and providing proper compacting in soil. The recommended equal row spacing,how many seeds are inserted in soil with spacing and depth of seed whichh varies in different climatic conditions to achieve optimal yields. Seed sowing devices play a most important role in the agriculture field From the above literature review, we conclude that- there are many mechanisms of sowing seeds some are traditional and some are modern. The traditional one is hand-driven or human and animal efforts are needed. And the modern mechanism is highly complicated which cannot be used by the small farmers because they are highly automated and also they are more expensive to afford.

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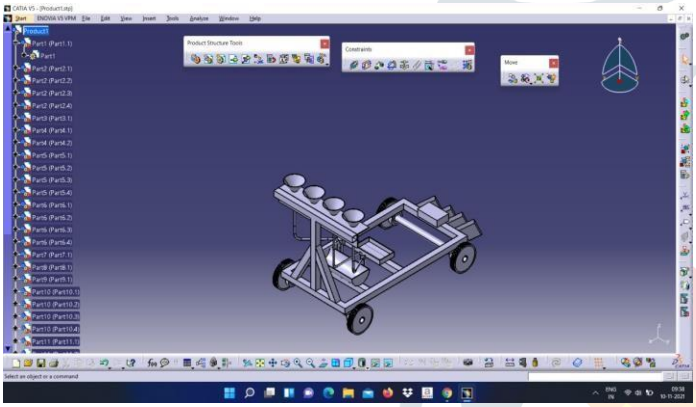
DESIGN AND CALCULATION

In some cases, the pump selection is determined by some stringent requirements for a number of design or process parameters. Unlike piston-type pumps, centrifugal pumps can provide uniform delivery of pumped medium, whereas in order to meet uniformity condition on a piston-type pump its design has to be made noticeably complicated, by arranging on the crankshaft several pistons making reciprocating movements with certain delay from each other. At the same time, delivery of pumped medium in discrete portions of set volume can also be a process requirement. Example of definitive design requirements can be the use of submerged pumps in cases, when it is necessary and only possible to install the pump below level of the pumped fluid.



The pump process and design requirements are seldom definitive, and ranges of suitable types of pumps for various specific cases of application are known as a matter of experience accumulated by humanity, and there is no need to enumerate them in detail.

Several kinds of power are singled out according to transmission losses taken into account by different efficiency coefficients. Power spent directly on transmission of pumped fluid energy is calculated by the formula:

$N_П = \rho \cdot g \cdot Q \cdot H$

$N_П$ – useful power, W

ρ – density of the pumped medium, kg/m^3

g – gravity acceleration, m/s^2

Q – flow rate, m^3/s

H – total head, m

$N_В = N_П/\eta_Н$

$N_В$ – power on pump shaft, W

$N_П$ – useful power, W

$\eta_Н$ – pump efficiency

In its turn, power developed by motor exceeds the shaft power, which is necessary to compensate for energy losses in its transmission from motor to pump. Electric motor power and shaft power are linked by efficiencies of transmission and motor.

$N_Д = N_В/(\eta_П \cdot \eta_Д)$

$N_Д$ – motor power consumption, W

$N_В$ – shaft power, W

$\eta_П$ – transmission efficiency

$\eta_Н$ – motor efficiency

Final motor generating capacity is calculated from motor power with regard to potential overload during start up.

$N_У = \beta \cdot N_Д$

$N_У$ – motor generating capacity, W

$N_Д$ – motor power consumption, W

β – power safety margin

Q= As per pump specifications,240litres/hour

Therefore, Q= 6.667*10ˆ-5 m^3/hr

We calculate useful power consumed directly for medium pumping:

$N_П = \rho \cdot g \cdot Q \cdot H$ = 997*9.81*6.667*10 ˆ-5/3600*0.24 =4342W

We refer some research paper and assume 997kg/m3 density of water.

Calculation-:

Motor

Power Required for drive:-

Load (f) = 98.1 N

For Wheels:-

Load Distribution for wheels

Load on wheels = Load / No of wheels

= 98.¼

Load on per Wheels = 24.525 N

T = f × r

r = radius of Wheels = 55.5 mm

T = 25.525 × 0.0555

T= 1.3611375 Nm

DC motor

25000 Rpm DC motor 12 V

25000 Rpm no load Speed at 12V

No load current 1 amp

Stall Current - 10 Amp

0.36 kg cm torque

Material selected for body Mild steel or low carbon steel, Square hollow pipe

Size of section: 25x25 mm

Thickness of section: 2 mm

Total weight of acted is considered as: 15 kg

= 15 X 9.81 N

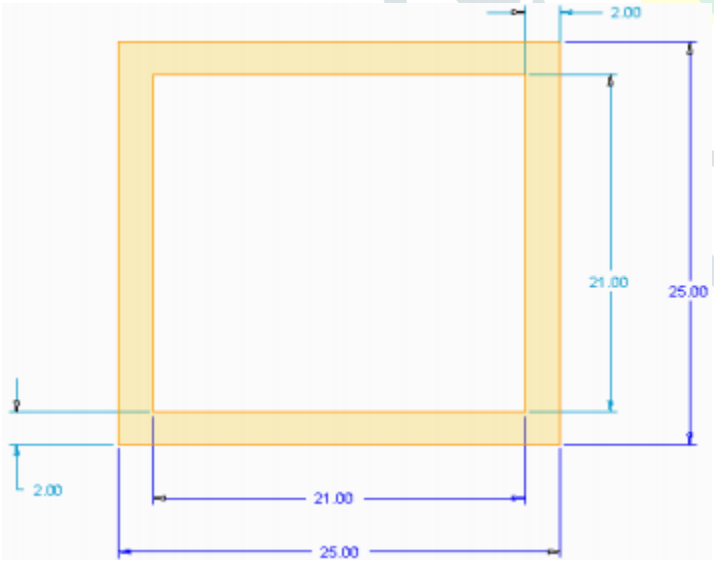
= 147.15 N

Weight on one hollow Square bar = 7.5 kg

= 7.5 X 9.81 N= 73.58 N

x = y = 12.5mm

Area of cross-section is = 174mm^2



As the load is distributed on the pipe which is subjected to the load as simply supported beam with uniformly distributed load the bending moment on the pipe is calculated as

M / I = σb / Y

I = BH3/12 – bh3/12

I= 32552-16206 = 16346 mm4

Mb = WL^2 /8 = 147.15 x 1/ 8= 18.3937 N-m

Mb = 18393 N-mm

18393 / 16346 = σb / 12.5

σb =14.06 N/mm^2

So the theoretical bending stress is more than the induced bending stress so the design is safe.

Another pipe we are using is 40x40mm Sq. pipe

Size of section: 40 x 40 mm

Thickness of section: 2 mm

Total weight of act on body : 30kg

= 30 X 9.81 N

= 294.3N

Assume that weight on one hollow sq. pipe = 15kg

= 15 X 9.81= 147.15 N

X=Y= 20 mm

Area of cross section = (A^2-a^2) = 1600-1296 = 304mm^2

Moment of Inertia = BH^3/12 – bh^3/12 = 73365 mm^4

Distance of neutral axis = 20 mm

Mb = wl^2/ 8= 147.5 X 1^2 / 8 = 18.44 N-m

18440N-mm

$$\frac{Mb}{I} = \frac{\sigma b}{y}$$

$\sigma b = \frac{18440\ X\ 20}{14800}$ = 24.91 N/mm^2

Now, theoretical bending stress is given by the equation.

$\sigma b = \frac{Syt}{f.s}$ = 250/1 = 250 N/mm^2

So the theoretical bending stress is more than the induced bending stress so the design is safe.

RESULT AND DISCUSSION

Vegetables	Obtain distance between plant	Obtained plant depth
corn	12-25	2-4
Beet	3-7	2-4
onion	4-8	2-4

Improved efficiency in planting Increased yielding and reliability in crop. Increased cropping frequency.Increased speed of seed planting. Seed planting accuracy. Durable and cheap as low-cost materials are used. Less maintenance cost.Since seed can be poured at any required depth, the plant germination is improved. Dependency on labor also decreased. Also it saves time of sowing. Uniform placement of seeds in row with required distance. Proper compaction over the seeds is provided.

FUTURE SCOPE

1) Introduction of a Cutter in place of a drill can be used as grasscutter equipment.

2) Using a remote control machine can be made automatic.

3) Addition of multi-hopper can be attached side by side for the sowing of large a farm.

4) Water dripping unit could be included in the seed sowing machine.

CONCLUSION

This seed plantation machine has great potential for increasing the productivity of the planting. Till now tractor was the main traction unit for nourishment in farming. With the adaptation of this seed planting machine, its purpose will be done. Hence there is need to promote this technology and made it available to even small scale farmers with affordable prices. This machine can be made by raw materials also which saves the cost of whole project and is easily manufactured in available workshops. The only cost is of metering device and sensors. Hence by using this machine we can achieve flexibility of distance and control depth variation for different seeds.hence usable to all seeds.

REFERENCES

1. IOT BASED SMART AGRICULTURE AND AUTOMATIC SEED SOWING ROBOT
by Avula likhitha, B.mamatha, Agamanti sai kiran, Dondeti pranitha
2. Wireless Controlled Multipurpose Agricultural Robot
By Shubham Dhage, Pradip Patil, Data Kande, Dr. Prakash Patil
3. Bluetooth Based Agriculture Three in One Machine
By S.Senthilraja, S.Dinesh Raja, S.Sabarinathan, K.Gowtham , P.Balamurugan
4. REMOTE- CONTROLLED AGRICULTURAL ROBOT WITH SOWING SEED MECHANISM: A PROPOSED SYSTEM.
By A.A Phansopkar, Dr. S. N. Waghmare, R. G. Gupta, Y. S. Ughade, D. P. Bavdhane
5. MULTIPURPOSE AGRICULTURAL ROBOT
By Gowtham kumar S N, Anand G Warrier, Chirag B Shetty, Gerard Elston Shawn D'souza
6. SMART PHONE OPERATED MULTIPURPOSE AGRICULTURAL ROBOT
By Shivakumara M C, Sunil Y S,Yamuna A S, Shruthi M