

Fabrication of Small Scale Sugarcane Harvesting Machine

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ABSTRACT: Majority of the sugarcane harvesters are small scale farmers. The small scale farmers are facing serious problems in harvesting the canes. Firstly, there is a labour scarcity for sugarcane harvesting.

There are number of machines available for the large scale cultivation. This makes it difficult for small scale farmers to bring their canes to the market on time during the season.

In order to help the small scale farmers we have designed a small scale sugarcane harvesting machine with the affordable cost. It will help the farmers to harvest the sugarcane with less labour charge and health issues will be avoided.

The main aim of this project is use readily available simple mechanism to develop a more efficient machine which can harvest sugarcane as fast as possible and reduce time and work.

The project aims to design and fabricate small scale sugarcane harvesting machine with bevel gear mechanism operated for sugarcane harvesting to reduce farmer's effort and to increase the output of agricultural products by using Bluetooth control.

I. INTRODUCTION

Now-a-days in industries especially in automobile and other industries the automatic plate bending machines are widely used. Earlier the bending machines were operated manually. So the output of machine was very less. Now the technique of bending operation of the component is changed.

Once the plate is loaded the operator should not only use once push button to start the machine, but he has operated two push buttons so that both the hands of the operator are engaged. This arrangement is made in order to avoid injuries to operators. The main aim of this project is to have the complete know how of pneumatic devices, sensors etc. by which the manually operated press or any machine can be converted into a semi or fully automatic unit. In this project the bending

machine is a semi-automatic bending machine, in which the loading and unloading of the component is done manually and the bending of the rod is done pneumatically.

Construction site requires a large number of labour and effort required. As population is increasing the need for construction. Use of machines is making life much easier and also increased in production rate. Stirrups are used in construction of a column or a beam. Stirrups are tied to steel rod with wire. Sizes of stirrups vary as per the application. Three Stirrups are prepared at a time, which makes the machine more productive. The use of Scotch yoke Mechanism is used to convert the reciprocating motion of pneumatic cylinder into rotary motion. Main purpose of use of pneumatic System is to save cost of overall machine. Main purpose of automation is fast and continuous production without much attention on machine. Need of automation was felt and so the machine is made automatic.

Since long time ago the labour work has essential role in constructions including mixing coarse aggregate-sand-water- cement, ramming sand, land levelling, and digging the foundation for base of structure, cutting rod in required length, rod bending and pouring the mixture of concrete in columns and beams. Now days, due to development in technology it is required to reduce the labour work and time since there are lot of available resources. As population increasing very rapidly, demand of the construction to build the buildings for industries, overhead bridges, human livings and population is continuously increases. Several problems come in to the picture when we consider human work with respect to automation. By using conventional method, it is not possible to reduce construction time and building it as early as possible. So, Automation in construction system is requires.

Harvesting is the process of gathering a ripe crop from the fields. Reaping is the cutting of

grain or pulse for harvest, typically using a scythe, sickle, or reaper.[1] On smaller farms with minimal mechanization, harvesting is the most labor-intensive activity of the growing season. Process automation has increased the efficiency of both the seeding and harvesting process. Specialized harvesting equipment utilizing conveyor belts to mimic gentle gripping and mass transport replaces the manual task of removing each seedling by hand.

II. LITERATURE REVIEW

AkshayGavsane, AbhijeetMadane, SurajAdmile, AkashMaral Prof. Kolgiri S.G

This paper is focused on development of sugarcane harvesting machines and threshing mechanism develop inside harvester. Nowadays there are need of fast production of agricultural products. 75% Indian economy is based on agriculture. So development of agriculture field is considered as development of India. But nowadays because of industrialization shortage of labor found in agriculture field. . Day by day labor demands about their salary are also increased. This review paper is a small work towards analyzing sugarcane harvester machine aspects for economical harvesting which will help to minimize the working fatigue and to reduce labor cost. Today's world there is a heavy demand for sugar and its byproducts. The major states growing sugarcane are Maharashtra, Uttar Pradesh and Karnataka. Now India is the leading producer of sugarcane in the world Karengula Gopi, Jinukala Srinivas, Nenavath Manikyam, RamineniHarsha Nag,

India is one of the most sugarcane producing countries in the world which covers 18.52% area and contributes 18.45% sugarcane production of the world. Medak is the leading producer of sugarcane in Telangana. With a goal to establish performance measures for sugarcane harvesting, four field trials were conducted in the sugarcane crop fields of KohirMandal, Medak district. The height of cut of canes above the ground by sugarcane harvester was observed to be at an average of 4.1 cm whereas by manual harvesting, it was at an average of 10.8 cm. The total time taken to harvest one acre by sugarcane harvester was 3 hours whereas by manual harvesting was about 9 hours. The field capacity obtained for mechanical harvesting was 0.141 ha/h whereas for manual harvesting, it was 0.045 ha/h. From the present study in four different field trials, total harvesting cost per ton was calculated to be Rs.841 and Rs.1500 for mechanical harvesting and manual harvesting respectively. Wider row spacing with mechanized harvesting would prove to be

profitable in terms of cane yield and harvesting cost rather than adopting narrow spacing with manual harvesting means.

Prashant N. Chakurkar¹, Dattatraya P. Dudhal², Kumar B. Mali

In India the number of population working under agriculture is nearly about 70% in which rural population is 80%. The agriculture is contributing in India's national income very fast. The agriculture share 20.5% in GDP of India, hence we can say that agriculture is the backbone of Indian economy. In today's world of competition, there is need for faster rate of production of agricultural product. In India farmers are facing problems of labor shortage and the Indian agriculture sector is still depends on labors. The need for faster production of agricultural products and labor shortage encourages the need of mechanization in agriculture. Sugarcane is majorly taking crop in India, after cutting of sugarcane starts reducing its weight, hence it is necessary to send sugarcane as early as possible to sugar factory. The speed of loading sugarcane in trucks or tractors is a time consuming process with labors. Thus we are making a mechanism which reduces time of loading and provide prevention to accidents which happens during loading bunches of sugarcane. The project aims at design and fabrication of small sugarcane harvesting mechanism which is operated by engine.

Siddaling et al, his work was focused on producing A semi-automatic sugarcane harvesting machine is designed driven by a two stroke petrol engine, the engine is placed over a rigid structure, the engine prime mover rotates the driver sprocket which in turn tends to drive the connected sprocket through the chain mechanism and as the driven sprocket is connected to a solid shaft which will rotate and transmit power to the bevel gears which is connected to the either sides of the vertical shaft which is supported by a Plummer blocks, the rotating Plummer blocks will drive the cutters, which are placed at the both the ends of the vertical shaft, and provision can also be made to ensure that the height of the shaft holding cutters are variable hence the cutters cut the sugar cane and the whole structure is placed over wheels so that the operation and handling the harvesting machine is easy for the farmers, hence the harvesting of sugarcane can be done easily with the sugarcane harvesting machine and the labours required is also less to carry out the work

III. COMPONENTS USED

FRAME:

A frame is a structural system that supports other components of a physical construction. Frame is used to carry the total setup of arrangement. It has to be able to sustain the total weight of arrangement. It would be joined by arc welding to get permanent joint.



Material used; MILDSTEEL

BATTERY; We have used lead acid battery for storing the electrical energy. The battery capacity is 12V,



D.C.MOTOR : The electrical motor is an instrument, which converts electrical energy into mechanical energy. The specification is 12V dc motor, 120rpm.



WHEEL : Wheels must be strong enough to support the vehicle and withstand the forces caused by normal operation

BEVEL GEAR : Bevel gears are gears where the axes of the two shafts intersect and the tooth bearing faces of the gears themselves are conically shaped. D.C motor which drives the shaft connected with bevel gear, it turns gives 90° power transmission to the cutter.



BLUETOOTH MODULE :

HC-05 module is an easy to use bluetooth (serial port protocol) module, designed for transparent wireless serial connection setup.

ARDUINO:

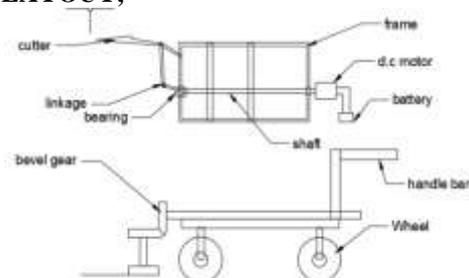
It is an open source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs.



IV. WORKING PRINCIPLE;

In our project we have designed and fabricated sugarcane harvesting machine which works with the help of D.C motor. D.C motor which drives the shaft connected with bevel gear. Bevel gear which turns gives a 90° power transmission to the knife which generates power to cut sugarcane

2D LAYOUT;



V. IMPLEMENTATION;

1. The steel frame work is done according to the dimension of the project.
2. The 12V D.C motor is fixed in the frame with the couple of bevel gear, which convert the rotatory motion of the horizontal shaft to the vertical shaft.
3. The stainless steel blade is connected to the flat round plate. This round plate is connected to the shaft of the bevel gear. Once the motor is connected to 12V battery and switched on, the blade rotates and cuts the object.
4. The above work done frame consists of four wheels. The rear wheels are connected to a servo motor to increase the pulling capacity of the

vehicle.

- The servo motor connected to the wheel and 12V dc motor connected to the cutter are operated by bluetooth encompassed arduino kit. By using arduino bluetooth controller application connected with arduino kit, we can control the movement of the vehicle and rotation of the cutter

PROTOTYPE:



ADVANTAGES;

- Using this machine labour problems can be reduced
- It makes the process faster.
- More better than manual harvesting
- Skill workers are not required

VI. RESULT AND DISCUSSION:

Finally we observed that small scalesugarcane harvesting machine will be beneficial for farmers. by using our machine farmers can reduce the time consumed for manual processing. cost of the model for the sugarcane harvesting machine is also less and based on the output of the machine the investments on the machine will be returned in a short period of time..

VII. CONCLUSION;

The machine sugarcane harvesting machine is a useful machine which saves time and energy of the farmer also it reduces the cost and time.

If the farmer has to harvesting the sugarcane Manually The time taken to harvest one acre of land is approximately 4 hours can shell a total of 100 kg of sugarcane in an day. This harvesting machine makes the reduction effort to harvest 300kg to 400 kg of sugarcane in a day The prototype is made in order to control the machine automatically this will help the

farmers to bring their crops to market on time.

REFERENCE

- Siddaling S. and Ravaikiran B.S. (2015), Design and Fabrication of Sugarcane Harvesting Machine, International Journal of Engineering Research and General Science, 3(4) p.p. 293-298
- Jain A.J., Karne S., Rathod L.S., Thotad V.N., Kiran P. (2013), Design and Fabrication of Sugarcane Harvesting Machine, Inter. J. of Mechanical Engineering and Robotics, 2(3), p.p. 2014-210.
- Ma Kang,Zhu Yawei,Xu Xue. —2017-2026 Outlook of Chinese Sugar Marketl in Global Agriculture, vol.8, 2017, pp.147-151.
- Ou Yinggang, Malcolm Wegener, —Yang Dantong, et al. Mechanization technology: The key to sugarcane production in China in International Journal of Agricultural and Biological Engineering, 6(1), 2003, pp.1—27.
- Caryn Elizabeth Benjamin, —Sugar Cane Yield Monitoring Systeml, B.S. B.E., Louisiana State University, Graduate Faculty of the Louisiana State University, 2002.
- Mr. Rohit J.Masute, Dr. Sharad S.Chaudhari and Prof .S. S. Khedkar, —Design And Fabrication Of Small Scale Sugarcane Harvesterl, IJRDO-Journal Of Mechanical And Civil Engineering, 2015.
- N.M. Pachkhande, Dhiraj V. Rade, Vikas G. Nagapure “SMALL SCALE SUGARCANE CUTTER MACHINE”, International Journal For Engineering Applications and Technology, Manthan-15, ISSN: 2321-8134S.
- G.D Shelke, S.S Borikar, M.P Awathale, A.P Khante ,“ DESIGN OF SUGARCANE HARVESTING MACHINE” International Journal for Innovative Research in Science & Technology, Volume 1 , Issue 11 , April 2015, ISSN (online): 2349-6010
- Makrand Patil, P. D. Patil, Optimization of blade angle for cutting system of sugarcane harvester, International indexed and referred research journal, march 2013,ISSN-09753486,vol-4



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