**Project Reference Number**

**Academic Year**: 2018-2019

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<th>Batch No.</th>
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**Project Guide**: Mr. HARSHA D.N  
**Project Type**: Fabrication

**Project Title**: Fabrication of Sugarcane Harvester

**Introduction**: Sugarcane harvesting is a process of cutting grown sugarcane plants using different agricultural operations. In agricultural harvesting we require maximum manpower, money and also it is more time consuming process. In cutting process we face various problems and these are not easily solved. The design of this machine is very simple also easy to implement. In this manner we are designing the Sugarcane Cutting Machine to reduce effort and time. In sugar cane farms we are using this machine for cutting purpose. This is user friendly cutting machine, anyone can handle this machine in any working condition.

**Literature Review**

(Journal paper related to work): Caryn Elizabeth Benjamin [1] The project here involved the design and testing of a sugar cane yield monitoring system during the 1999 and 2000 harvest year. The system was mounted on a CAMECO CH 2500 1997 sugar cane combine harvester. The sugar cane yield monitoring system consisted of a scale, a data acquisition system, and a differential global positioning system (DGPS). The scale consisted of a weighing machine supported by load cells. The load cells were protected in an enclosed box, which mounted to the frame of this machine. The weighing equipment, which was mounted at the base of the elevator, directly recorded instantaneous figures of the sugar cane yield. A dump wagon equipped with a weighing equipment consisting of load cell was used for each test as the standard.

Experiments were conducted with different conditions of cane maturity, variety, row/section length, and flow rate. For each test, the scale readings were total and compared to the actual yield, which was measured by the weigh wagon. The yield sensor predicted the sugar cane yield with a slope of 0.900 and a R-squared of 0.966. The scale’s average percent error was 11.05 percent. It resulted into showing that the different cane varieties had an effect on the scale readings, but the maturity of the cane, section length, and the flow rate did not have a significant effect on the scale readings.

Dr. Sharad S. Chaudhari [2] There project aimed at designing and fabricating small scale sugarcane
A harvester for sugarcane harvesting to reduce farmer’s effort and to increase production of agricultural products. Machine consists of petrol engine and different mechanisms. When compare to manual harvesting by using this machine has a capacity to cut canes in faster rate and it is economical. The machine is helpful for both whom having small or big farms.

Joby Bastian [3] The mechanical properties of the plant material significantly influence the performance of the different unit operation in combine harvester. Hence, studies of these properties were done prior to the design of sugarcane harvesting system. The mechanical properties of sugarcane stalk viz., bending resistance, cutting resistance, penetration resistance and crushing resistance were studied in the laboratory. It is found that the Young’s modulus of the sugarcane stalks as 86MPa, The specific cutting resistance varies between 1764.56 and 957.48 KN/m², penetration resistance ranging from 29.74kN/m² to 56.33kN/m² and the crushing force varied from 0.75kN to 1.53kN. This study helped us very much while deciding the forces required to cut the cane in one knocking stroke.

R. R. Price [4] A fiber optic yield monitoring system was developed for a sugarcane chopper harvester that utilized a duty cycle type approach with three fiber optic sensors mounted in the elevator floor to estimate sugarcane yield.

Field testing of the monitor demonstrated that there was a zero intercept linear relationship between the optical sensor response and the actual sugarcane yields with an R² value of 0.98. The average observed prediction error on 0.5 to 1.6 Mg estimates was 7.5%; though, the magnitude of the error decreased as the harvested area (tonnage) increased, with an estimated error of 0.03% for 57.8 Mg loads. Factor testing indicated that the duty cycle reading was not affected by different conditions like sugarcane variety, harvester speed, harvested distance, or direction of cut. Field testing across several locations in the U.S. total was more than 557 h of operation and indicated that the system was robust, maintenance free, and self cleaning, but some obstruction of the fiber optic sensors did occur in wet, muddy soils. These obstructions were minimized by relocating the fiber optics closer to the bottom of the elevator and leaving holes on each side of the sensors to enhance cleaning and scouring. This monitoring system compares well with all previously tested methods and is very durable and easy to install.

Suleiman Samaila [5] Sugarcane harvesting is a labour concentrated operation and its mechanization is a modern development in Nigeria. The difficulties in providing the needed spare parts for the imported harvesting machines and labour shortages during harvesting periods hamper the country’s drive towards self-reliance in sugar production. To develop an effective and efficient machine for harvesting of sugarcane, a preliminary data on the energy requirement for the cutting and topping of sugarcane must be available for that a simple apparatus was developed to calculate the energy requirement for cutting and
The topping of sugarcane. The apparatus consists of: crank, sprocket, chain, freewheel, flange, front hub, spindle, frame and the base support. The result was 15.71 Joules and 23.83 Joules were needed for cutting the top and base of the sugarcane, respectively.

Prof. N.M. Pachkhand [6] In today’s world there is a need for faster rate of production of agricultural products. Agriculture is the backbone of India. In India almost all farmers facing problems of labour shortage. Day by day labour wages are increasing and in the same way demand of agriculture products are also increasing and today’s world need faster rate of production of agriculture products. This project aims to design and fabricate small scale sugarcane harvesting machine to reduce farmer’s effort and to increase production of agricultural products. This machine consists of petrol engine with different mechanisms. When compared to manual harvesting this machine has a capacity to cut canes in faster rate and it is economical.

**Problem Definition/Vision:**
In agricultural harvesting we require maximum man power, ample money and also it is more time consuming process. In cutting process we face various problems and these are not easily solved. The design of this machine is very simple also easy to implement. In this manner we are designing the Sugarcane Cutting Machine to reduce effort and time. In sugar cane farms we are using this machine for cutting purpose. This is user friendly cutting machine, anyone can handle this machine in any working condition.

**Objectives:**
- To design and fabricate sugarcane harvester which is economical and affordable to Indian farmers.
- To reduce farmers efforts in sugarcane harvesting.
- To increase the efficiency of work in sugarcane harvesting.
- To reduce the cost involved in harvesting process compared to traditional methods.

**Methodology:**
In this project the idea is to make the mechanization of small scale Sugarcane harvesting machine. Different parts of a machine will be mounted on strong chassis. The wheels will be attached to this chassis so that it can be moved in the farm. The petrol engine is mounted on the chassis which provides the power to the wheels to move by means of a gear and chain mechanism and it also provides the power to the cutter. The shaft of the gear box and the shaft which is connected to the wheels are inter connected by means gear and chain mechanism to provide variable speed. The pulley is connected to the output shaft of the engine which intern connected to the front pulley which is mounted on the shaft by using belt then by using bevel gear the power is transmitted to the cutter shaft.

**Proposed Solution/Outcome:**
- Reduced cost of the harvester
- Reduced the efforts of the farmers
- Increased efficiency

**Expected Reports/Results:**

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**Front view**

**Side view**

**Top view**

**Isometric view**

**Project merits & demerits:**

**Merits**
- Reduces harvesting time
- Reduces labour efforts and manpower
- Maintenance cost is low
- Skilled personalities are excused

**Demerits**
• Soil compaction
• Initial cost is high compared to labour work

References:
[1] Caryn Elizabeth Benjamin, “Sugar Cane Yield Monitoring System”, B.S. B.E., Louisiana State University, Graduate Faculty of the Louisiana State University, 2002.


Developed Model: