Abstract:

Solar energy is an alternative renewable energy that is increasingly becoming mainstream due to cost feasibility and higher efficiency. Apart from producing power for offices and household, solar energy can be used to power dryers, cookers, solar stills, lighting, refrigeration and even air conditioning. There is increasing usage of solar energy for agriculture purposes, which consumes considerable amount of power in India. Solar power technology would be a reasonable choice for agricultural tools. Solar photovoltaic cells (SPV) directly convert the light energy from the sun into electricity. Concentrated solar power (CSP) systems use an indirect method for the conversion process. Other than SPVs and CSPs, there are other new techniques such as dye-sensitized solar cells, luminescent solar concentrators, bio-hybrid solar cells, photon enhanced thermionic emission system, etc. All these tools can be produce in small volumes; they are portable which makes it easier to use them in agriculture.

The main aim of the project is to design the smart agriculture system to meet the increasing demand of energy in field of agriculture using solar energy for formers. Agriculture plays a crucial role in the economy of a country. The inclusion of automation in the field of agriculture makes the former lives easier. The application of automatic irrigation system requires large amount of elastic power. The subsidies paid for the power consumption by agriculture is less. So, in order to reduce the consumption of power from main grid, solar energy system is implemented in the soil to supply required amount of water for the crops, detection of intruders to the load during the night time, motor lifting, dry run and insect repellent.

A solar operated agricultural chopper uses solar panel to observe the spectrum of solar energy is quite wide and its intensity, we review solar energy conversion into electricity with particular emphasis on photovoltaic system. The project is completely eliminates the cost of electricity, and it is portable to carry over anywhere and it might be helpful to formers by incorporation of modern technology in agriculture. It is also used to produce a manure for plantation and can also be used to cut the Shrubs, long leafs for domestic animals. The design is very easy to analyse and simple in construction and also user-friendly. It can be operated in small farming land with the standard spacing decreasing the labour cost and human effort.

Key Words: Solar Energy, Agriculture, Chopper.

Objectives:

To design and fabrication of chaff cutter machines which can allow the farmer to not only cut the sugarcane in a form which can be utilized as a fodder for animal but can also grind various feeding materials such as dry corn straw, grass, soya bean, white stalk, with ease and thus reducing the manual work of laminar and increases the fodder production with less cost and it is portable.
Some of the major objectives are as follows:

- To ensure safety and make it compact.
- To reduce the dependency on electricity.
- To provide good fodder for animal.
- To save work time.
- To save electricity consumption.
- To get protection from dust.
- To reduce noisy.
- To make it portable.
- To reduce pollution.
- To make it eco-friendly.

**Methodology:**

In the proposed system solar panel is used to absorb light energy from the sun and to convert it in to electrical energy required for chopping the leaves. The converted electrical energy is stored in sealed battery which is used to run the motor for cutting (chopping) operation.

- **New cutting technology:** the research work in this domain was studied and new methods [using solar energy] were developed to achieve desired goal.
- **Single phase operation:** The power supplied to machine is single phase so to make it easy to operate at any location.
- **Portable:** the power supply to machine is stored in a battery and it is easy and to operate at any location.
- **Safety:** highest priority is given to safety of the operation.
- **Study of the Problem Statement:** The problems associated with existing chaff cutter are rectified and design, fabricate a new machine to overcome those problems.
- **Solid Model:** The model is designed by using CAD software AUTODESK, SOLID WORKS and AUTO CAD-2015
- **Motor Selection Calculation:** Selection of the motor is a major problem because it depends on the torque require, by using the formulas the motor has been selected. The battery selection also plays an important role, the required power to the system by the battery.
- **Selection of Material:** The choice of material for the frame is the first and most important factor for the design. In this we used Mild steel bar as the base material, which provides maximum strength and minimum deflection compared to other material.
- **Fabrication:** The Selected material is fabricated by permanent joints as well as temporary joints. All the components are fitted and connected as in electronic circuit.
- **Demonstration and Troubleshooting:** The studies demonstrated that each stage has potential to be the most cost effective solution to perform well in agricultural land and there are two failure modes which the solar system may experience. This two condition which may require troubleshooting are Zero power output (no power), low voltage issues and solar panel defects.

**Conclusion and Result:**

By implementing the proposed system there are various benefits for the government and the formers. For the government a solution for energy crises is proposes. By using the solar powered smart formers. The need for the construction of a automatic feed controlled agricultural chopper (solar operated) arose as an alternative to solve the solar energy needs of the populace. This will also reduce the total dependency on electrical energy,
The need to utilize the free abundant natural resource of solar energy which is freely in availability requires no recurrent expenses as other source of energy. Thus, it is regarded as the cheapest sources for human life.

**Future Scope:**

- The battery is also charged by dynamo connected to the rotating motor.
- It will also possible to reduce the size of the machine and made it compatible that will help to carry in hands.

The blade cutter can be design for different sizes of chaff and various requirements in both vertical and horizontal chopper machine.

**Electronic Circuit Diagram**

![FlowDiagram of Chopper Machine](image)

Fig. : FlowDiagram of Chopper Machine.

**Note:**

1. This Project is recently **Patent Filled**.  
   (Application No.: 201941003687, Date of filled: 15/02/2019)

2. This Project Proposal **Selected to KSCST, IISc, Bengaluru**.  
   Reference No: 42S_BE_1510, Funding amount: 8000/-

3. This Project is Selected and also **Sponsored by VTU**  
   Funding amount: 5000/-
Actual Agricultural Chopper Model Pictures