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SOCIALLY RELATED PROJECTS- MECHANICAL ENGINEERING

FABRICATION OF MULTI-SOURCE MULTI-FUNCTIONAL FARMING EQUIPMENT

Agriculture has been the backbone of the economy and it will continue to remain. Farming has undergone a great evolution in last 50 years. During initial days there was only hand spraying people use to do. Then slowly there has been development of various methods to spray out chemicals and dusts. Generally, cultivation of any crop involves various steps like ploughing, harvesting, sowing etc. Farmer has to use various agricultural equipment and labours for caring out these steps. One of the biggest issues facing the agricultural sector in India is low yield: India's farm yield is 30-50% lower than that of developed nations.

Average farm size, poor infrastructure, low use of farm technologies and best farming techniques, decrease of soil fertility due to over fertilization and sustained pesticide use, are leading contributors to low agricultural productivity. Indian farms are small (70% are less than 1 hectare, the national average is less than 2 hectares) and therefore have limited access to resources such as financial services, credit (or lenders), support expertise, educational services or irrigation solutions. In the short term, yield directly impacts a farmer's cash flow and the ability to respond to fluctuations in the market. Long-term, yield limits a farmer's ability to invest into their farm's future to increase productivity and decrease risks associated with their crops (via inputs such as seeds, fertilizer, crop insurance, market/weather info, livestock health support, etc.) but also to invest into their families in areas such as education, healthcare, training, etc.

Multi-source multi-functional agricultural machine mainly focuses on the basic problems faced by fellow farmers. i.e., Ploughing, seeding, water spraying, pesticide spraying all this can be done in this same machine. Our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications, suitable for all type of seed-to-seed cultivation with minimum cost as possible. Ploughing, seeding, water spraying, pesticide spraying all this can be done in this same machine. We are looking this project as revolution in small farms, which is most uncovered area in this sector, is cost and more efficient way. The multipurpose agriculture vehicle is designed for small farmers in future.



HARNESSING WIND ENERGY USING VERTICAL AXIS WIND MILL

This project aims to investigate the feasibility of harnessing energy using a vertical axis wind turbine (VAWT). The VAWT is a type of wind turbine that is designed to operate in various wind conditions, including low wind speeds and turbulent winds. This study will involve, conducting a thorough review of literature on VAWTs and their applications, followed by a design and fabrication of a small-scale VAWT prototype. The project will also investigate the economic viability of using VAWTs as an alternative source of renewable energy. The findings of the study will contribute to the knowledge base on VAWTs and their potential as a clean energy source.



FABRICATION OF PORTABLE HYDROPOWER GENERATOR

This Project aimed to develop horizontal spiral turbines for generating electricity by designing spiral turbines using the Golden Ratio function. The study analyzed the impact of the diameter-length ratio and the number of the turbine's blades (2 – 6 blades) on the torque of turbine. Then the prototype of the spiral turbine with a 0.6 meter diameter and 0.9 meter blade was designed to generate electricity with a water velocity of 1, 1.5 and 2 m/s in order to compare to the propeller turbine which had an identical diameter size. The results indicated that a 3-bladed spiral turbine with a $2/3$ of diameter-length ratio of turbine had maximum torque at 1 m/s of water velocity. The spiral turbine produced an optimal efficiency of 48% which was 15% higher than that of the propeller turbine. The basic principle of hydropower is that, if water is piped from a certain level to a lower level, the resulting water pressure can be used to do work. This work is a practical implementation of the theory of hydropower generation. It considers the design and installation of mini hydropower plant. A storage tank (fitted with siphons to increase water pressure) and a plastic pipe were used to represent the dam and the penstock respectively. The turbine and generator were constructed and the various parts were coupled together to form the hydropower plant. The hydro turbine converts water pressure into mechanical shaft power, which is used to drive the electric generator, and the result is a 12V alternating dc voltage of frequency 50Hz that is suitable for powering some household electrical appliances



DESIGN AND FABRICATION OF ELECTROMAGNETIC BRAKING SYSTEM

An electromagnetic braking system is a mechanism that utilizes the principles of electromagnetism to decelerate or stop the motion of an object. Unlike traditional braking systems that rely on friction, electromagnetic braking systems employ the interaction between magnetic fields and electrical currents to generate braking force. In an electromagnetic braking system, there are two

primary components: the braking mechanism and the control system. The braking mechanism consists of an electromagnet and a conductive material, typically a metal disc or rail.

When the braking action is initiated, an electrical current is applied to the electromagnet, generating a magnetic field. The conductive material, which is in close proximity to the electromagnet, experiences a force due to the interaction between the magnetic field and the induced electrical current. This force creates a braking torque that opposes the rotational or linear motion of the object. As a result, the kinetic energy of the moving object is converted into electrical energy, heat, and mechanical work, causing the object to slow down or come to a complete stop. The control system of an electromagnetic braking system regulates the application of electrical current to the electromagnet. It ensures precise control of the braking force, allowing for modulation of the braking intensity and duration. By adjusting the current supplied to the electromagnet, the braking system can accommodate varying braking requirements and provide smooth and controlled deceleration.

Electromagnetic braking systems are commonly used in various applications, including electric and hybrid vehicles, trains, elevators, and industrial machinery. They offer several advantages over traditional friction-based braking systems, such as reduced wear and tear, faster response times, and improved control. Additionally, electromagnetic braking systems can also contribute to energy regeneration, where the electrical energy generated during braking is stored and reused, and increasing overall energy efficiency. In summary, electromagnetic braking systems utilize the interaction between magnetic fields and electrical currents to generate braking force, providing efficient and controlled deceleration in a wide range of applications.



DESIGN AND FABRICATION OF ELECTRICITY GENERATOR USING SPEED BREAKER

Energy is the primary need for survival of all organisms in the universe. Everything what happens in the surrounding is the expression of flow of energy in one of the forms. But in this fast moving world, population is increasing day by day and the conventional energy sources are lessening. The extensive usage of energy has resulted in an energy crisis over the few years.

Therefore to overcome this problem we need to implement the techniques of optimal utilization of conventional sources for conservation of energy. This project includes how to utilize the energy which is wasted when the vehicles passes over a speed breaker. Lots of energy is generated when vehicle passes over it. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy of the shaft through rack and pinion mechanism. Then, this mechanical energy will be converted to electrical energy using generator which will be saved with the use of a battery. The energy we save during the day light can be used in the night time for lighting street lights. Therefore, by using this arrangement we can save lot of energy which can be used for the fulfillment of future demands.



SOLAR OPERATED EVAPORATIVE COOLING SYSTEM

Solar energy has always seemed the ideal power source for operating anything. we are proposing to make small table top evaporative air cooler, of size 600mm x 450mmx 450mm which is suitable to be kept on the table, run by the DC motor and backed by DC batteries. Air cooler which is operated by the 12Volt DC batteries, separate charger for the battery which can be charged by the solar panel and also by main A/C supply, make the control circuit to sense the movement near the front side of the cooler and put on automatically.

The present air cooling methods are evaporative coolers, air conditioning, fans and dehumidifiers. But running these products need a source called electricity. The producing of electricity is ultimately responsible for hot and humid conditions i.e. global warming. In hot and humid conditions the need to feel relaxed and comfortable has become one of few needs and for this purpose utilization of systems like air-conditioning and refrigeration has increased rapidly. These systems are most of the time not suitable for villages due to longer power cut durations and high cost of products.

Solar power systems being considered as one of the path towards more sustainable energy systems, considering solar-cooling systems in villages would comprise of many attractive features. This technology can efficiently serve large latent loads and greatly improve indoor air quality by allowing more ventilation while tightly controlling humidity. Despite increasing performance and mandatory energy efficiency requirements, peak electricity demand is growing and there is currently no prevalent solar air cooling technology suited to residential application especially for villages, schools and offices. This project reviews solar powered air cooler for residential applications.

