MULTIFUNCTION AGRO MACHINE

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Introduction

A multi-function agriculture machine represents a significant advancement in modern farming technology. These machines are designed to streamline agricultural operations by integrating multiple functions into a single unit, enhancing efficiency, productivity, and resource management on farms of all sizes. In the dynamic landscape of modern agriculture, where efficiency and sustainability are paramount, the role of machinery has evolved to meet the demands of contemporary farming practices. Multi-function agriculture machines typically combine various tasks that were traditionally performed by separate implements or equipment. These tasks may include seeding, fertilizing, spraying pesticides, and harvesting. By consolidating these functions, farmers can save time, reduce labour costs, and optimize the use of agricultural inputs such as seeds, fertilizers, and pesticides. At the forefront of this evolution stands the multi-function agro machine, a versatile and indispensable tool revolutionizing the way we cultivate, manage, and harvest crops. Combining several agricultural functions into a single unit, the multi-function agro machine epitomizes efficiency and resource optimization. From tilling and planting to irrigation and harvesting, these machines streamline a myriad of tasks, reducing labor, time, and operational costs while maximizing productivity. One of the defining features of these machines is their adaptability across diverse agricultural operations and terrains. Whether on small family farms or large-scale commercial enterprises, multi-function agro machines exhibit remarkable versatility, capable of performing a range of tasks with precision and consistency. Moreover, in an era increasingly shaped by environmental consciousness and sustainability, these machines play a pivotal role in promoting responsible farming practices. By integrating advanced

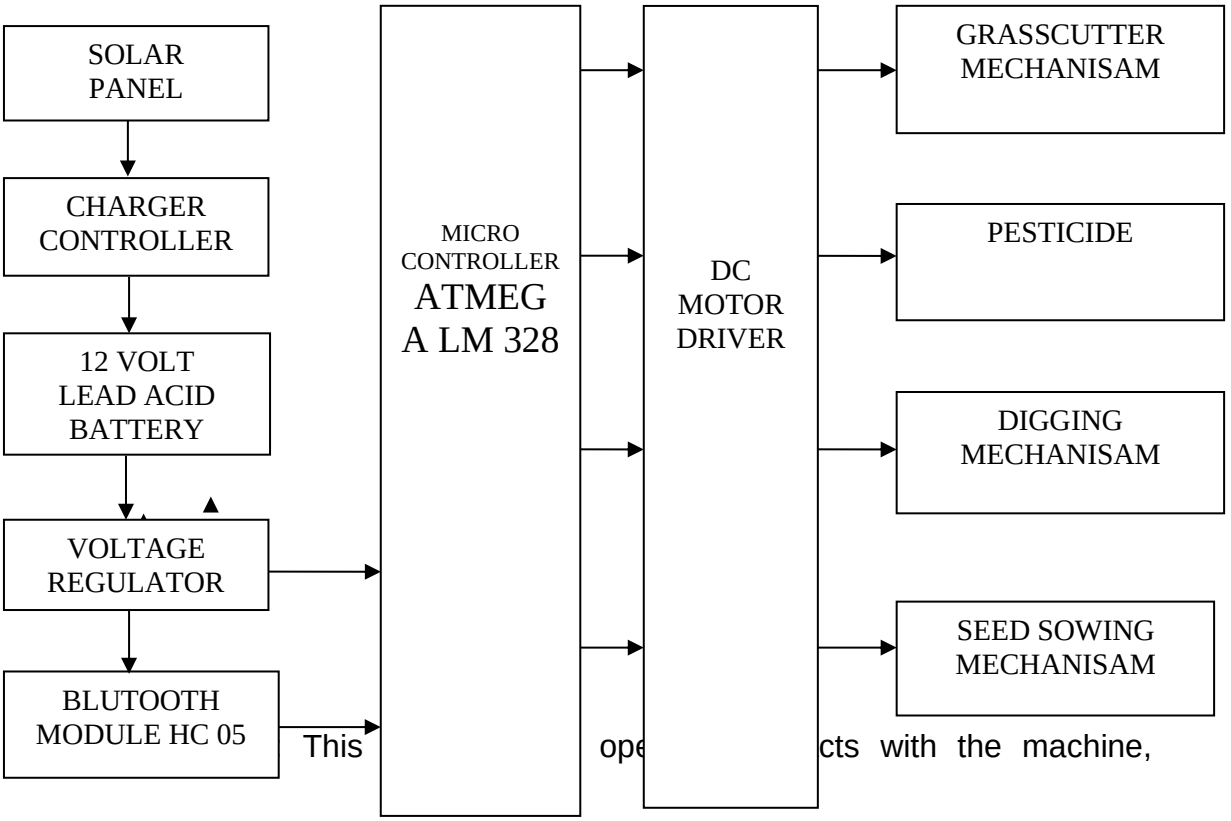
technologies such as GPS-guided navigation, precision farming, and eco-friendly power sources, they minimize environmental impact while optimizing resource utilization

Objectives

- To develop proto-type module of multi-function agro machine.
- To implement different functions involved in seed sowing process in a single machine.
- To streamline the process of sowing seeds by automating various tasks, reducing time and labour requirement. To offer a cost-efficient alternative to manual seed sowing, reducing operational expenses and maximizing returns for farmers. To design the machine with greater control by mobile using Bluetooth module.
- To control the entire operation of the multi function seed sowing machine using Bluetooth module.
- To utilize the solar panels for charging the battery, ensuring sustainable and eco-friendly power supply for the system.

Methodology

Block Diagram:



This ope cts with the machine,

providing inputs such as commands, settings, and raw materials.

- Power Source: The machine needs a power source to operate. This could be an internal combustion engine, an electric motor, or even renewable energy sources like solar power, depending on the design and application.
- Control System: The control system manages and coordinates the operation of different functions within the machine. It receives inputs from the operator, sensors, and other control devices, and sends commands to various components to perform specific tasks.
- Processing Modules: These modules perform specific agricultural functions such as plowing, seeding, fertilizing, spraying pesticides, harvesting, etc. Each module may consist of mechanical, hydraulic, pneumatic, or electronic components tailored to its particular task.
- Communication Interface: In modern agro machines, there may be interfaces for communication with external devices or systems. This could include wireless connectivity for remote monitoring and control, data logging for performance analysis,
- Output Section: This is where the results of the machine's operation are delivered. Depending on the specific function, outputs could include harvested crops, treated soil, or other agricultural products.

MATERIALS (COMPONENTS)

ARDUINO NANO: Arduino is an open-source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

SOLAR PANEL: The capacity of solar panel is 12v, 5watts. When it comes to manufacturing technology the most expensive one is Hybrid and the cheapest is Amorphous PV cells. Hybrid Solar Cell is newest technologies. Organic and

chemical substances are used together in its structure. Even though it has quite a high rate of energy efficiency, it is not yet in the industrial manufacturing phase.

HC-05 BLUETOOTH MODULE: The HC-05 Bluetooth module is a compact and versatile device designed for enabling wireless communication between electronic devices over short distances. It operates on the Bluetooth 2.0 standard and supports both the Bluetooth Basic Rate (BR) and Enhanced Data Rate (EDR) modes, providing reliable and efficient data transmission. The HC-05 module typically has an LED indicator that blinks to show connection status. Some variants may require voltage level shifters for proper communication with 5V microcontrollers. Enables wireless communication between a microcontroller and Bluetooth devices like smartphones, tablets, or PCs.

LEAD-ACID BATTERY: Battery capacity of 12v, 4.5Ah. A lead-acid battery is a type of rechargeable battery that uses lead dioxide as the positive electrode, lead metal as the negative electrode, and sulfuric acid as the electrolyte. As they are inexpensive compared to newer technologies, Fig 3.4 shows Lead- acid battery lead–acid batteries are widely used even when surge current is not important and other designs could provide higher energy densities. Large-format lead–acid designs are widely used for storage in backup power supplies in cell phone towers, high-availability settings like hospitals, and stand-alone power systems.

SOLAR CHARGE CONTROLLER: A solar charge controller, acting as the guardian of your battery in a solar power system, oversees the electricity flowing from solar panels. It prevents the battery from being overwhelmed by regulating incoming current, thus stopping harmful overcharging. By ensuring the battery receives the correct voltage, the charge controller safeguards its lifespan and keeps the system functioning safely. Some controllers offer additional protection against the battery draining too much, and even maximize power output in systems with varying sunlight conditions.

DC MOTOR: Motor capacity 17watts,300 rpm shunt type motor ,12 volt, 1 amps. The stator typically contains permanent magnets or electromagnets that produce a magnetic field.The rotor, usually made of coils of wire wrapped around a metal

core, is placed within the magnetic field of the stator. When an electric current flows through the coils of the rotor (supplied through brushes and a commutator), it generates a magnetic field that interacts with the magnetic field of the stator, causing the rotor to rotate. By controlling the direction and magnitude of the electric current supplied to the rotor, the speed and direction of rotation of the DC motor can be controlled.

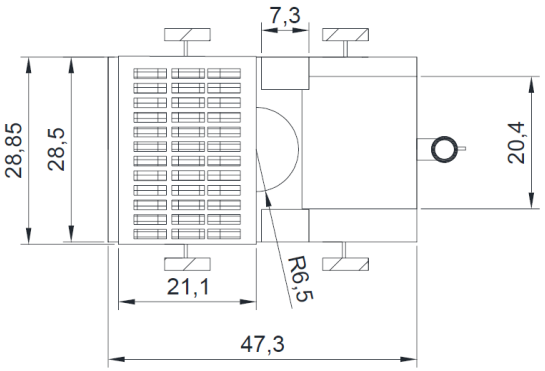
7805 VOLTAGE REGULATOR: The 7805 takes an unregulated input voltage, ranging from 7V to 35V, and regulates it to a steady +5V output voltage. This ensures that your electronic devices receive a stable voltage, regardless of fluctuations in the input supply. The 7805 IC incorporates an internal voltage reference, error amplifier, and series pass transistor to regulate the output voltage. These components work together to monitor and adjust the output voltage as required. It's important to note that the 7805 regulator dissipates power as heat, especially when handling higher input-output voltage differentials or supplying close to its maximum current rating.

RELAY: A small current flowing through the control circuit can be used to switch a much larger current in the controlled circuit. This allows delicate control circuits to manage high-power devices. The control circuit and the controlled circuit are electrically isolated. This separation enhances safety by preventing high voltage from reaching the control circuit and reduces electrical noise interference between circuits. A single control signal can be used to simultaneously switch several independent circuits.

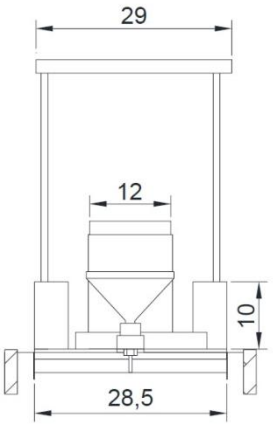
Details Of Work Carried Out

2D and 3D cad designs done to build our muti function agro machine.

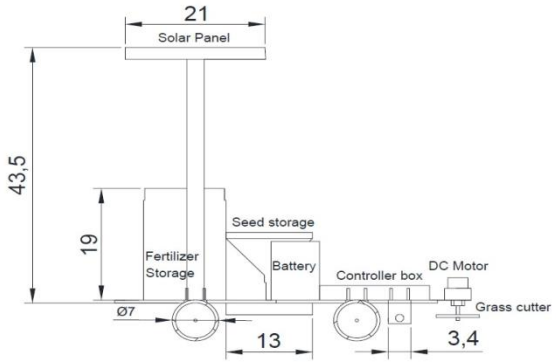
CAD DESIGN



Top view of the model

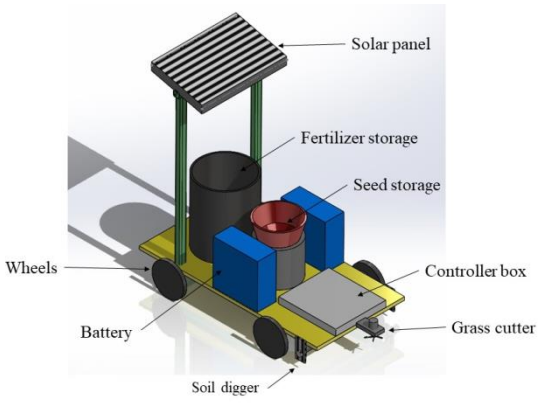


Front view of the model

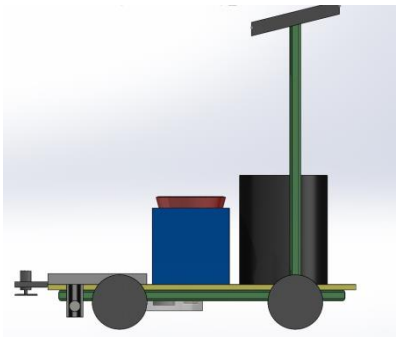


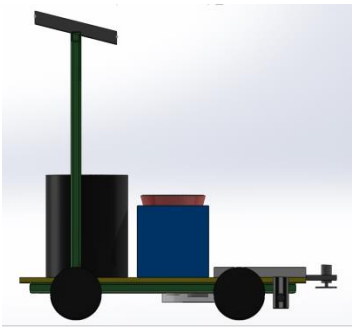
Side view of the model

3D MODEL:

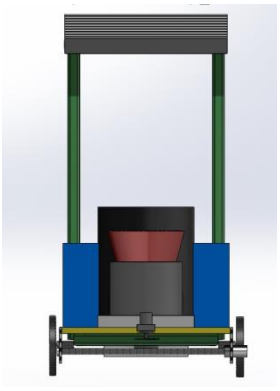


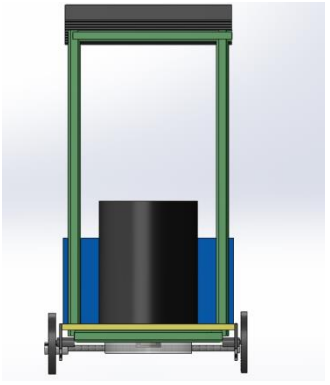
360-degree view of model





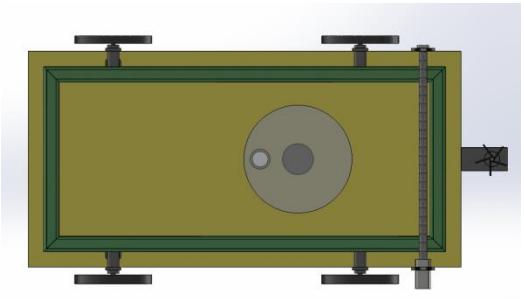
Side views of model

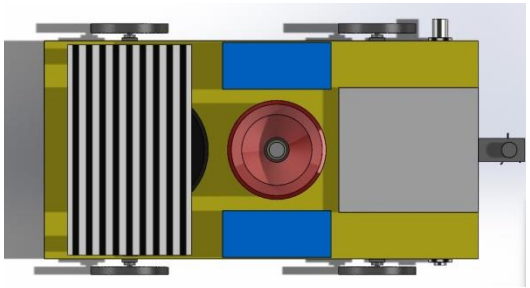




Front view of model

Back view of model



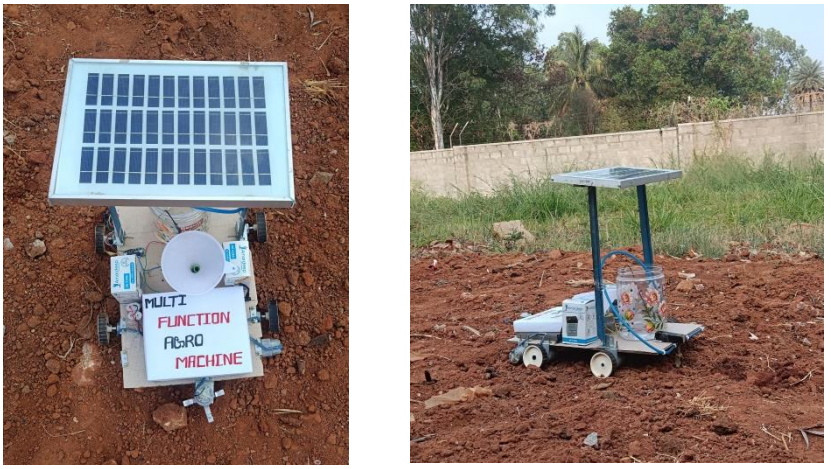


Top view of model

Bottom view of model

Conclusion And Results

By consolidating multiple functions into a single platform, farmers can significantly reduce their reliance on multiple pieces of equipment, mitigating associated costs and streamlining maintenance efforts. Moreover, the integrated design optimizes resource utilization, minimizing wastage of crucial inputs such as fuel, water, and labor, thus enhancing overall sustainability. The versatility of these machines empowers farmers to swiftly adapt to dynamic environmental conditions, crop requirements, and field layouts, ensuring resilience in the face of uncertainty. Furthermore, the labor-saving features and automation capabilities alleviate the burden on farm laborers, enabling them to focus on more specialized tasks or reducing the need for seasonal hires. The integration of precision agriculture technologies further amplifies the efficacy of multi-function agriculture machines, facilitating precise and data-driven decision-making in farm management. In essence, multi-function agriculture machines herald a new chapter in agricultural innovation, empowering farmers to navigate the complexities of modern agriculture with unprecedented efficiency and sustainability.



Final setup of Multi function agro machine

Innovations

- seed sowing, cultivation, fertilizer application,grass cutter,Bluetooth control, solar power for efficient operation, and durable design, all functions were carried out through a single machine which optimizes efficiency, sustainability, and yield in a single operation.
- Designing the machine to handle a wide range of seeds, from small grains to medium size seeds like wheat,jower,green dram dhal.

- Enabling Bluetooth control and connectivity features to allow farmers to monitor and manage the machine from their smartphones or computers.
- Implemention of a voltage controller in a multi-function agro machine which indicates solar charge and voltage and also that ensures precise power regulation, optimizing performance across various operating conditions and enhancing overall efficiency.
- Solar panels can charge the machine's batteries during daylight hours, allowing for extended operating hours even in remote or off-grid locations. power management systems can optimize energy usage, ensuring that solar power is utilized efficiently and effectively throughout the machine's operation.

Scope For Future

- With fully-automated farms in the future, robots can perform all the tasks like mowing, fertilizing, monitoring of pests and diseases, harvesting, tilling, etc. This also enables the farmers to just supervise the robots without the need to operate them. In future robot also run on PLC and SCADA with fully automated. Integrating advanced sensors, GPS technology, and artificial intelligence, future multi-function agriculture machines can enable precision agriculture practices. These machines could analyze soil conditions, monitor crop health, and apply inputs precisely where needed, maximizing yields while minimizing resource use. Future multi-function agriculture machines should be designed to adapt to different types of crops, terrains, and weather conditions. Modular designs and customizable attachments could allow farmers to tailor the machines to their specific needs and environments. With advancements in robotics and automation, future agriculture machines could become increasingly autonomous. They could operate 24/7, reducing the need for human intervention and labor costs. Robotics could also enable finer control and precision in tasks such as harvesting delicate fruits or vegetables. Future multi-function agriculture machines should prioritize energy efficiency and sustainability. This could involve the use of renewable energy sources such as solar or wind power, as well as the adoption of eco-friendly materials and technologies to minimize environmental impact.