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Solar Seed Sowing Machine

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Abstract: *In the farming process, often used conventional seeding operation takes more time and more labor. The seed feed rate is more but the time required for the total operation is more and the total cost is increased due to labor, hiring of equipment. The conventional seed sowing machine is less efficient, time consuming. Today's era is marching towards the rapid growth of all sectors including the agricultural sector. To meet the future food demands, the farmers have to implement the new techniques which will not affect the soil texture but will increase the overall crop production. In the farming process, often used conventional seeding operation takes more time and more labor. The seed feed rate is more but the time required for the total operation is also more and the total cost is increased due to labor, hiring of equipment. This is a solar powered system, it runs on the renewable energy which is free in nature. This machine reduces the efforts and total cost of sowing the seeds and fertilizer placement.*

Keywords: Seed sowing machine (SSM),Agriculture Automation, Farminginnovation, Sustainable farming

I. INTRODUCTION

Overview of the increasing demand for sustainableagricultural solutions.
Introduction to the concept of solar-powered seedsowing robots as a response to these challenges.

Components of Solar-Powered Seed Sowing Robot:

- Solar panels: Harnessing solar energy to power therobot.
- Control unit: Brain of the system responsible formanaging operations.
- Seed hopper: Storage and dispensing of seeds.
- Conveyor system: Transporting seeds to theplanting mechanism.
- Planting mechanism: Precision placement of seedsinto the soil.
- GPS and mapping system: Navigation andoptimization of seed placement.

Working Principle:

Solar panels capture sunlight and convert it intoelectrical energy.
Control unit coordinates the movement of the robotand seed dispensing.
Seeds are dispensed from the hopper onto the conveyor system.
The planting mechanism places seeds into the soil at predefined intervals.

Advantages of Solar-Powered Seed SowingRobot

- Sustainability: Utilizes renewable solar energy, reducing reliance on fossil fuels.
- Efficiency: Automates seed sowing process, savingtime and labor costs.
- Precision: Ensures accurate seed placement, optimizing crop yield.
- Environmental impact: Minimizes soil compactionand chemical usage.
- Versatility: Adaptable to various terrains and crop types.

Applications:

- Agriculture: Large-scale farming operations, including row crops and orchards.
- Horticulture: Seedling production and greenhouse cultivation.
- Reforestation: Planting trees in remote orinaccessible areas.

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Potential Impact:

- Increased productivity: Enhances efficiency andreduces manual labor.
- Sustainability: Promotes eco-friendly farming practices, contributing to environmental conservation.
- Economic benefits: Reduces operational costs and improves profitability for farmers.
- Food security: Enhances crop yields and contributes to global food production.
- Challenges and Future Directions:
- Technological limitations: Improving batteryefficiency and durability.
- Cost-effectiveness: Optimizing the affordability ofsolar-powered robotics.
- Adoption and acceptance: Overcoming barriers to implementation and encouraging widespread adoption.

Fig 1. Seed Sowing machine.

II. COMPONENTS

DC Gear Motor :

A gear motor is a specific type of electrical motor that is designed to produce high torque while maintaining a low horsepower, or low speed, motoroutput. Gear motors can be found in many differentapplications, and are probably used in many devices in your home

Fig 2. DC Gear Motor :

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Solar Panel

A solar panel is a set of solar photovoltaic module electrically connected. A photovoltaic module is packaged, connected assembly of solar cells. The solar panel can be used as component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each module is rated by its dc output power under standard test conditions (etc) and typically ranges from 100 to 320 watts. The efficiency of a module determines the area of a module.

Fig 3. Solar Panel

L293D Motor Driver

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifierssince they take a low-current control signal and provide a higher-current signal. This higher currentsignal is used to drive the motors.
L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and10 will rotate it in clockwise and anticlockwise directions, respectively

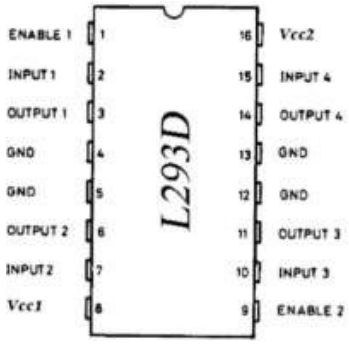

Fig 4. L293D Motor Driver

Zero PCB

General Purpose Zero PCB. As its name suggests, general purpose PCB's are widely used to embed circuits randomly for running of hardware. Its layeris coated with copper and allows proper soldering without any short circuit.

Fig 5.Zero PCB

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Voltage Regulators :

7805

All voltage sources cannot able to give fixed output due to fluctuations in the circuit. For getting constant and steady output, the voltage regulators are implemented. The integrated circuits which are used for the regulation of voltage are termed as voltage regulator ICs. Here, we can discuss about IC 7805. The voltage regulator IC 7805 is actually a member of 78xx series of voltage regulator ICs. It is a fixed linear voltage regulator. The xx present in 78xx represents the value of the fixed output voltage that the particular IC provides. For 7805 IC, it is +5V DC regulated power supply. This regulator IC also adds a provision for a heat sink. The input voltage to this voltage regulator can be up to 35V, and this IC can give a constant 5V for any value of input less than or equal to 35V which is the threshold limit.

➢ **7805**

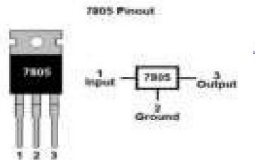

Fig 6.7805

IR Remote

A transmitter is often a light emitting diode (LED) which is built into the pointing end of the remote control handset. The infrared light pulses form a pattern unique to that button. The receiver in the device recognizes the pattern and causes the device to respond accordingly.

a) **IR Remote :-**

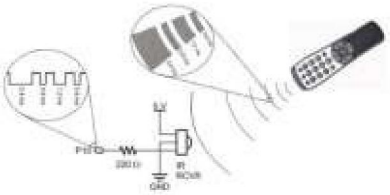

Fig 7. IR Remote.

IR Receiver

The TSOP Sensor is a miniaturized receiver for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor.

b) **IR Receiver :**

Fig 8. IR Receiver

Battery :

Solar cell module produces electricity only when the sun is shining. They do not store energy. It is necessary to store some of the energy produced. The most obvious solution is to use batteries. The batteries are used as a storage device for solar energy which can be further converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage, for small units with output less than one kilowatt.

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Batteries seem to be only technically and batteries are high in capital costs. It is necessary that the overall system must be optimized with respect to available energy and local demand pattern. Once the blade is mounted we searched for placing battery to sit. As it is movesattached to the operators back.

L298 Motor Driver

The L298 is an integrated monolithic circuit in a 15-lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DCand stepping motors. Two enable inputs are provided to enable or disable the deviceindependently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

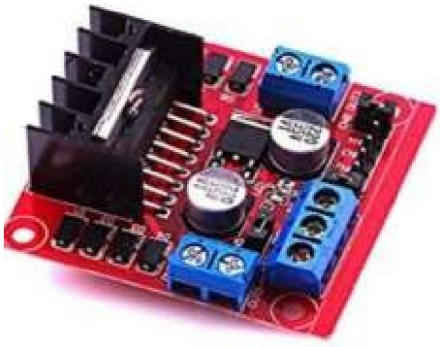

Fig 9. L298 Motor Driver

Microcontroller (ATmega328)

The high-performance Atmel 8-bit AVR RISC- based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between1.8-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Fig10. Microcontroller (ATmega328)

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III. BLOCK DAIGRAM

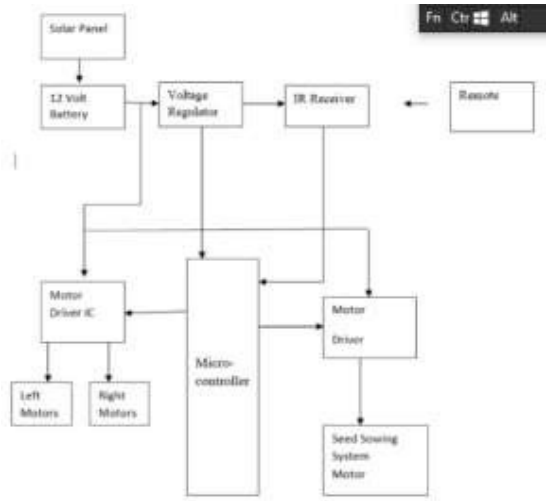

Fig 11.Block Diagram of solar seed sowing machine.

IV. CONCLUSION

the solar seed sowing project has demonstrated theintersection of innovation, sustainability, and agriculture. Harnessing the power of solar energy for seed sowing has not only reduced our environmental impact but also showcased the potential for eco-friendly technologies in farming practices.

Through the integration of solar-powered seed- sowing machinery, we have successfully automated and streamlined the sowing process. This not only increased efficiency but also minimized the need for traditional fossil fuel-powered equipment,contributing to a reduction in carbon emissions anda more sustainable agricultural model.

The solar seed sowing project has showcased the adaptability and scalability of renewable energy solutions in agriculture. By harnessing the abundant and clean energy from the sun, we have taken a significant step towards creating a more eco-friendly and resilient farming system.

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