

Design of Smart and Automated Seed Sowing and Grass Cutting Rover

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Abstract - Sowing machines should be appropriate for all farms, all styles of crops, strong construction, additionally it should be reliable, that is a simple requirement of sowing system. Thus, we're designing a sowing system this is operated manually however reduces farmers' efforts of farmers accordingly growing the performance of seeding and lowering the hassle encountered in guide seeding. For this system, we will plant special styles of seeds additionally. This additionally will increase the seeding performance and accuracy. We are designing it without difficulty to be had substances accordingly it'll be reasonably-priced and usable for small-scale farmers. For powerful managing of the system through any farmer or any untrained employee we simplified its design. Also, its adjusting and upkeep approach is additionally simplified. It additionally allows grass reducing in a uniform ratio and, it may additionally tillage the land for sowing seeds.

1. INTRODUCTION

In India, agriculture is the primary occupation; greater than 50% of the populace is depending on agriculture. It is the spine of our economic system. Despite the focal point on industrialization, agriculture stays a dominant zone of the Indian economic system each in phrases of contribution to gross home product (GDP) in addition to a supply of employment to tens of thousands and thousands throughout the country. So, the improvement in agriculture will raise the economic system in industry, trade, and transport. To raise the economic system there may be a want to boom the productiveness of crops. The extent of manufacturing relies upon now no longer best at the capital investments and advertising and marketing techniques however additionally at the generation used all through the manufacturing and processing stage. Indian farmers lack current technology. Farmers are without delay concerned in agricultural practice. In the olden days, generation becomes now no longer evolved that much. So, they have been seeding and slicing plant life with the aid of using hands. But nowadays the generation is evolved. So now it's no longer vital to do seeding in sunlight. Today's agricultural subject needs to locate new methods of agricultural operation to enhance overall performance efficiency. Also, the system used earlier than to carry out the operations becomes very heavy. Due to the migration of human beings inside the cities, hard work trouble occurs. We could make the usage of to be had technology and rover generation inside the farming machine

to lessen the efforts of farmers and additionally to lessen the time, power, and required value. Now the method of this assignment is to broaden the system to reduce the operating value and added to lessen the time for digging and seed sowing operation with the aid of using utilizing sun power to run the system. In this system, the solar panel is used to seize sun power after which it's far transformed into electric power which in flip is used to price a 12V battery, which then offers the vital electricity to a shunt wound DC motor. This electricity is then transmitted to the motor motive force to power the motor. The want of the use of solar power right here is to replace renewable assets from non-renewable assets, as non-renewable assets are onerous, there may be a want to store them with the aid of using switching into renewable assets due to the fact they may be non-onerous assets and additionally it does now no longer purpose pollution, it's far environmentally pleasant and additionally, it reduces the gasoline value. on account that it could be maintained effortlessly below low fees it has ended up user-pleasant. there are numerous renewable assets however the sun is effortless to be had and appropriate for this subject and these surroundings consequently we're the use of solar power.

2. PROPOSED SYSTEM

This gadget has little or no cost. This planter is quite simple to apply hence, the unskilled farmer is likewise capable of manage this gadget. We simplified the layout additionally made it less expensive and cheap for each rural farmer. We made numerous modifications and simplified it from controlling and retaining factors of view. In this layout, we linked the pressure shaft to a metering mechanism that removes the attachments which include pulleys and belts system. DC motor drives the shaft of the motor that is coupled with a battery bank. As the motor begins off evolved it actions this robotic in addition to operates the metering mechanism. The seed garage tank is attached to the pinnacle of the robotic close to the rear wheels. The sensor is suited for it which senses the extent of seed in it and offers the alarm whilst the tank is empty. The front sensor serves the feature of guiding the robotic. As any impediment is available in the front of the robotic it offers the sign to the robotic and diverts the direction of the robotic. For each

rotation of the wheel consistent with the adjustment, it permits the exact seed to fall into the hopper so that there's no wastage of the seeds additionally the sowing manner does smoothly. When the robotic reach a different stop and whilst it completes the mission, it creates an alarm so that we can offer the required facility

3. BLOCK DIAGRAM

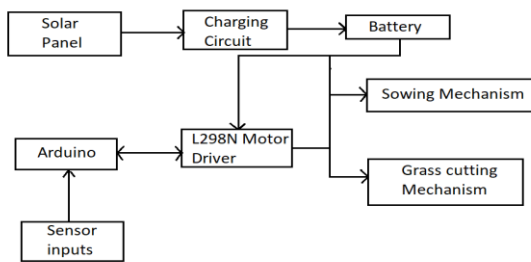


Fig -1: The block diagram of smart seed sowing and grass cutting rover

4. PROPOSED METHODOLOGY

Arduino Uno

The Arduino Uno is a small, complete, and breadboard-pleasant board primarily based totally on the ATmega328 (Arduino Uno three. x). It has extra or much less the equal capability of the Arduino Duemilanove, however in one-of-a-kind packages. It lacks the most effective DC energy jack and works with a Mini-B USB cable as opposed to a well-known one.

L298N MOTOR DRIVER

This L298N Motor Driver Module is an excessive energy motor driving force module for riding DC and Stepper Motors. This module includes an L298 motor driving force IC and a 78M05 5V regulator. L298N Module can manipulate as much as four DC automobiles, or 2 DC automobiles with directional and velocity manipulation.

BLUETOOTH MODULE

RN42 Bluetooth Module is clean to apply Bluetooth SPP (Serial Port Protocol) module, designed for obvious wi-fi serial connection setup. Its verbal exchange is through a serial verbal exchange which makes a clean manner to interface with controller or PC. RN42 Bluetooth module affords to switch mode among grasp and slave mode this

means that is capable of use neither receiving nor transmitting data. 100RPM DC GEARED MOTOR DC Motor – 100RPM – 12Volts geared automobiles are commonly easy DC motors with a gearbox connected to them. This may be utilized in all-terrain robots and forms of robot applications. These automobiles have a three mm threaded drill hollow inside the center of the shaft consequently making it easy to attach it to the wheels or some other mechanical assembly. one hundred RPM 12V DC geared automobiles are broadly used for robotics applications. Very clean to apply and to be had in well-known size. Also, you don't need to spend numerous cash to govern automobiles with an Arduino or well-suited board. The maximum famous L298N H-bridge module with on-board voltage regulator motor driving force may be used with this motor that has a voltage of among five and 35V DC or you could pick the maximum specific motor diver module from the extensive variety to be had in our Motor driving force class as in line with your precise requirements. Nut and threads at the shaft to effortlessly join and internally threaded shaft for effortlessly connecting it to the wheel. DC Geared automobiles with sturdy steel gearbox for heavy-responsibility applications, to be had inside the extensive RPM variety and perfectly suited for robotics and commercial applications. Very clean to apply and to be had in well-known size. Nut and threads at the shaft to effortlessly join and internally threaded shaft for effortlessly connecting it to the wheel.

100RPM DC GEARED MOTOR

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RPM variety and perfectly suited for robotics and commercial applications. Very clean to apply and to be had in trendy size. Nut and threads at the shaft to without problems join and internally threaded shaft without problems connecting it to the wheel.

SOLAR PANEL

Solar electricity is clean, reasonably priced, and abundantly available. Here we're the usage of polycrystalline kind sun panel. The grasscutter works at the photovoltaic principle. When photons from solar are absorbed in a semiconductor that produces loose electrons with higher. These electrons are combining with holes in the semiconductor and produce electron hollow pairs and for this reason, the outside conductor constitutes an electric current.

A sun panel is truly a group of sun (or photovoltaic) cells, which may be used to generate energy through the photovoltaic effect. These cells are organized in a grid-like sample at the floor of solar panels. Thus, it can additionally be defined as a hard and fast of photovoltaic modules, set up on a shape helping it. A photovoltaic (PV) module is a packaged and related meeting of 6×10 sun cells.

When it involves putting on-and-tear, those panels are very hardy. Solar panels placed on out quite slow. In a year, their effectiveness decreases simplest approximately one to 2 consistent with cent (at times, even lesser). Most solar panels are made up the usage of crystalline silicon solar cells.

Installation of solar panels in houses facilitates in preventing the damaging emissions of greenhouse gases and hence facilitates lessen international warming. Solar panels do now not bring about any form of pollution and are clean. They additionally lower our reliance on fossil fuels (which can be limited) and conventional energy sources.

This 10W sun panel is inflexible with a steel frame. Superior sturdiness over bendy panels. Great for transportable or everlasting installations. Can be used to fee any 12V battery, for example, the ones powering electric powered fence energizers, camping, recharging automobile batteries, etc. The panel may be bought with a fee controller so it's far secure to be used in charging 12V lead-acid batteries.

BATTERY

The battery makes use of sponge lead and leads peroxide for the conversion of the chemical power into electric electricity,

such form of battery is referred to as a lead-acid battery. The lead-acid battery is maximum generally used inside electricity stations and substations as it has better molecular voltage and decreases cost.

The battery is used to keeping the solar power which may be in addition transformed into electric power. The battery needs to calls for the following properties, The battery should require following properties,

- Long life
- High reliability
- Low cost
- High overall efficiency

MOTOR SPEED CONTROLLER

Digital pace management or ESC is a digital circuit that controls and regulates the rate of an electric-powered motor. It may additionally offer to reverse the motor and dynamic braking. Miniature digital pace controls are utilized in electrically powered radio-managed models. Full-length electric-powered motors additionally have structures to govern the rate in their power automobiles.

A digital pace manage follows a pace reference signal (derived from a throttle lever, joystick, or one-of-a-kind manual input) and varies the switching charge of a network of challenge effect transistors (FETs). By adjusting the responsibility cycle or switching frequency of the transistors, the rate of the motor is changed. The speedy switching of the transistors is what reasons the motor itself to emit its feature high-pitched whine important at decrease speeds.

Different forms of pace controls are required for brushed DC automobiles and brushless DC automobiles. A brushed motor may have its pace managed via way of means of various the voltage on its armature. (Industrially, automobiles with electromagnet subject windings in preference to everlasting magnets also can have their pace managed via way of means of adjusting the electricity of the motor subject modern-day.)

A brushless motor calls for a distinctive working principle. The pace of the motor is various via way of means of adjusting the timing of pulses of modern-day introduced to the numerous windings of the motor. Brushless ESC structures essentially create 3-segment AC power, as in a variable frequency power, to run brushless automobiles.

Brushless automobiles are famous with radio-managed plane hobbyists due to their efficiency, power, durability, and mild weight in evaluation to standard brushed automobiles. Brushless AC motor controllers are a lot greater complex than brushed motor controllers.

The accurate segment varies with the motor rotation, which is to be taken under consideration via way of means of the ESC: Usually, again EMF from the motor is used to discover this rotation, however, versions exist that use magnetic (Hall impact) or optical detectors. Computer-programmable pace controls usually have user-specific alternatives which permit putting low voltage cut-off limits, timing, acceleration, braking, and path of rotation. Reversing the motor's path will also be performed via way of means of switching any of the 3 leads from the ESC to the motor

BLADES

The blades should have high mechanical strength and great sharpness. Here we are using linear blades to cut the grass.

DC-DC BOOST CONVERTER

This DC-DC switching raise converter can ride a 4A load with brilliant line and cargo regulation. The essential switching aspect XL6009 IC is to be had in constant output voltages of three. 3V, 5V, 12V, and an adjustable output model. It is a good switching regulator and the output performance is drastically better in assessment with the famous raise regulators. At better enter voltages, the regulator operates at a switching frequency of four hundred kHz consequently permitting the general board length to be smaller and space-saving.

The XL6009 module is a DC to DC BUCK-BOOST converter module that operates at a switching frequency of 400 kHz. In such excessive frequency, it affords smaller-sized clear-out out additives as compared with low frequency switching regulators. It is the upgraded model of the LM2577 primarily based on the total module.

5. DISCUSSION AND RESULT

The sun radiations that are absorbed by the solar panel do not makeup to the required value of voltage and hence a boost converter in the charging circuit would level them up to the desired voltage rating i.e., 13.6 volts and thereby charging the battery bank. Else an adapter can be used to charge the same. From the battery 5v supply is given to the

Arduino module through a buck converter. Forming a connection via Bluetooth between the android app and Arduino, the rover movements can be monitored. The Arduino module is further interphase to the L298 motor driver to run the DC motor. A continuous supply voltage of 12v is given to the grass cutter consisting of a high-speed motor. The speed of this motor is controlled by a motor speed controller. The same supply voltage is available to the seed sower as well were in a Pelton wheel attached to the DC motor. Upon this, a funnel filled with seeds is placed. As the motor rotates, the seeds will spread around the chosen area at a uniform distance The panels are placed at the top of the rover in such a way that high-intensity solar radiation can easily be received from the sun. Solar panels convert electrical energy from solar energy. This electric power is now stored in batteries. Using the Boost converter to obtain the necessary solar voltage of 13.6V to charge the battery faster. The Arduino Nano power is powered from the battery source where a buck converter is used to step down the voltage to the required 5V. Then the motor is connected to the batteries through connecting wires. Between the four motors, a driver is provided. It begins and ends the working of the motor. The power transmits from this motor to the mechanism, which makes the blade spin at high speed, and this makes the grass cut. The Motor Speed Controller module is used to control the speed of the high-speed dc motor. Similarly, the power is transferred to the Pelton wheel-connected motor and the Pelton wheel also rotates simultaneously with the speed of the motor. The speed of the motor is directly proportional to the number of seeds to be sown. and the rover is manually controlled by interfacing with the Bluetooth module.

The Rover is designed and is controlled using the RN 42 Bluetooth module and Android Application. The grass cutting machine is also implemented using the high-speed DC motor (5000 rpm) and motor speed controller module through which the speed of the motor/blade can be controlled using a knob.



Fig -2: Rover with solar panel interfaced

6. CONCLUSIONS

This seed plantation device has the super ability for growing the productiveness of the planting. Till tractor became the principal traction unit for nourishment in farming. With the variation of this seed planting device, its reason can be done. Hence there's want to sell this era and made to be had to even small-scale farmers with less expensive prices. This device may be made via way of means uncooked substances additionally which saves the fee of the complete undertaking and is without difficulty synthetic in to be had workshops. The handiest fee is for metering tools and sensors. Hence via way of means of the use of this device, we will obtain flexibility of distance and manipulate intensity version for one-of-a-kind seeds. Hence usable for all seeds.

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