AUTOMATIC SOLAR POWER MULTIPURPOSE AGRICULTURE ROVER USING LORA

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***ABSTRACT:** In this project that is, one of the Grass cutting, Seed sowing and pesticide application, all these are implemented with one tool. This technological development is for making efficient and cost-effective grass cutter. Our aim is to study the various developments in grass cutter machines and their performance. Current technology commonly used for cutting the grass by the manually handled device from the survey we found that various types of grass cutter available in the market which are run by means of solar, electric and internal combustion engines. Grass cutters are available in the market having some limit to cut grass at some height. We are trying to make a new innovative concept mainly used in the agricultural fields. We are going to fabricate the grass cutting, Seed sowing and pesticide machine for the use of agricultural field, to cut the grass in the field.*

1. INTRODUCTION

In India, nearly about 70 percent of people are depending on agriculture. Numerous operations are performed in the agricultural field like seed sowing, grass cutting, etc. The present methods of seed sowing, pesticide spraying and grass cutting are difficult. The types of equipments used for the above actions are expensive and inconvenient to handle. So the agricultural system in India should be encouraged by developing a system that will reduce man power and time. This work aims to design, develop and design a rover which can sow the seeds, cut the grass and spray the pesticides, these all operations are performed by using battery and solar power. The automation in farming and in the agriculture field could be more effective and

efficient as compared to traditional methods of farming.

The idea of applying rover technology in the agriculture field could helps to the farmer to reduce their efforts and working time. The designed rover gets energy from solar panel and is operated using Bluetooth/Lora which sends the signals to the rover for the required mechanisms and movement of the device. It is also measuring temperature & Humidity moisture can make or break your agricultural operation. So, it's vital to get it right. Humidity and temperature go hand-in-hand when it comes to raising crops in a greenhouse. Partially because imbalances in either can often give similar results.
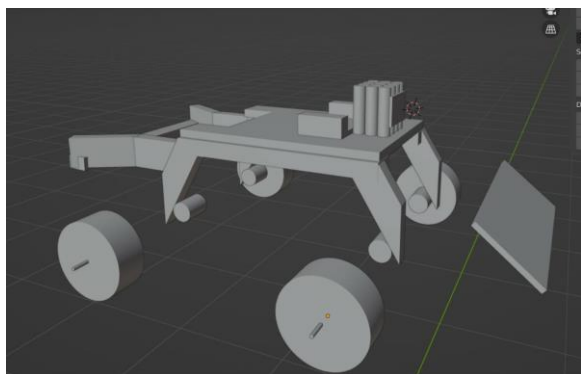

Rover Design

2. RELATED WORKS

1. Spoorthi AS, Sunil td, MZ Kurian "Multipurpose agriculture robot "Solar powered autonomous multipurpose agriculture robot using Bluetooth/Android application. In the agricultural field operations such as seed sowing, grass cutting, ploughing was performed. Old traditional ways are very tough and the tools used for those operations are not comfortable to handle. So, the agricultural system should develop in order to reduce the manpower and time. Seed metering device meters the quantity of the seed which is going into the farm. It gives the length or the distance which can be sowed. Thus   only required seed falls for every rotation of the wheel,2021.

2. Ranjitha B and Nikhitha M N."Solar powered autonomous multipurpose agriculture robot using Bluetooth/Android application". In the agricultural field operations such as seed sowing, grass cutting, ploughing was performed. Old traditional ways are very tough and the tools used for those operations are not comfortable to handle. So, the agricultural system should develop in order to reduce the manpower and time, 2021.

3. Amrita Sega, A, Abrams, E, Ankita, Mrs. R. Praveen, Mrs. R. Simeon: This paper strives to increase a robotic able to performing operations like computerized Ploughing and seed meting out. It also affords guide manage while required and

maintains tabs on the humidity with the assist of humidity sensors. The main aspect right here is the AVR At mega microcontroller that supervises the complete process. Have proposed a system that uses the sun-controlled power board,2021.

3. BLOCK DIAGRAM
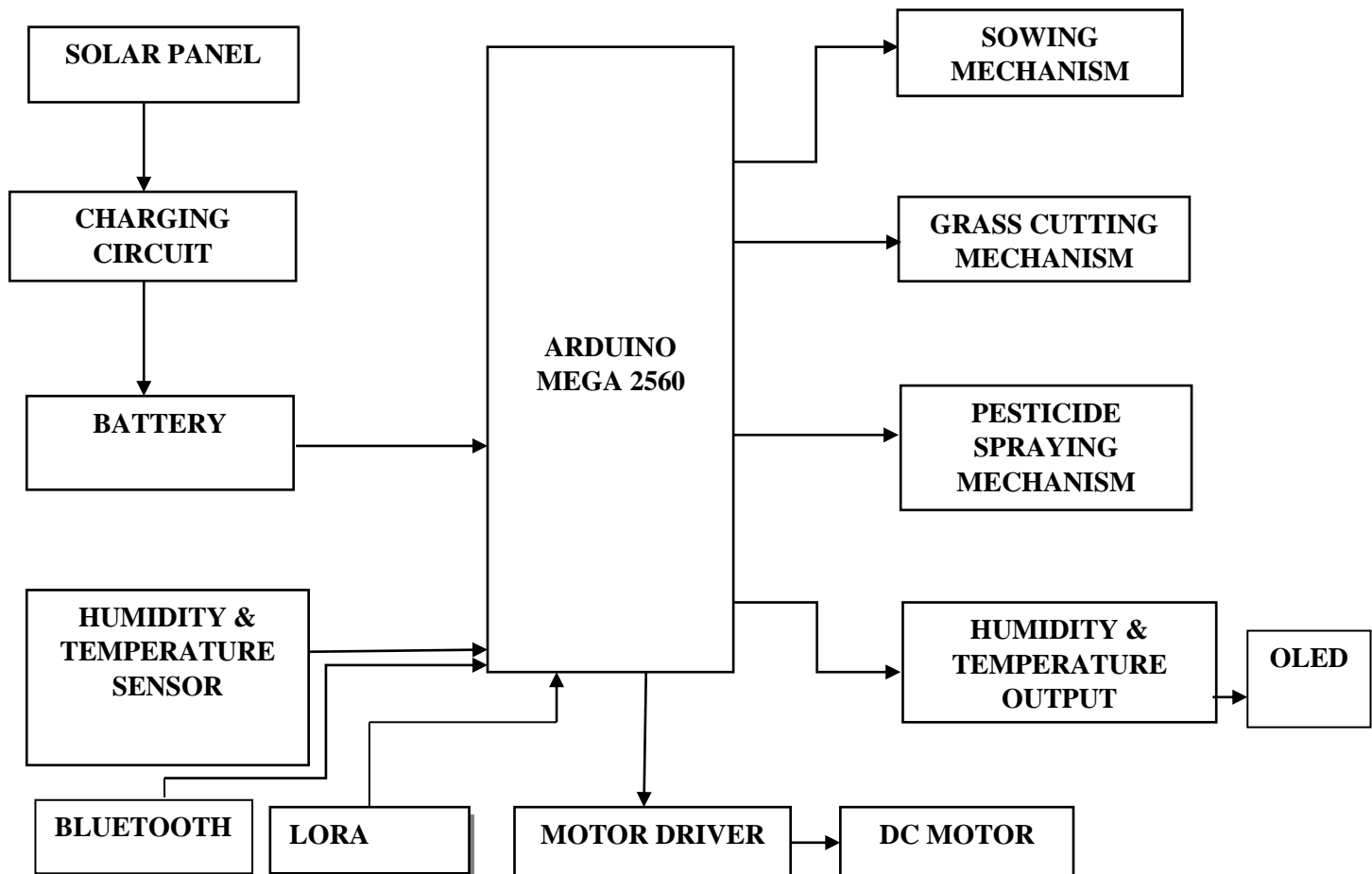
4. COMPONENTS

1. 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, motor output. Gear motors can be found in many different applications, and are probably used in many devices. Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs and

even electric alarm clocks. Common commercial applications of a gear motor include hospital beds, commercial jacks, cranes and many other applications that are too many to list. Gear motors are primarily used to reduce speed in a series of gears, which in turn creates more torque. This is accomplished by an integrated series of gears or a gear boxes being attached to the main motor rotor and shaft via a second reduction shaft. The second shaft is then connected to the series of gears or gearbox to create what is known as a series of reduction gears. Generally speaking, the longer the train of reduction gears, the lower the output of the end, or final, gear will be.

2. MOTOR DRIVER
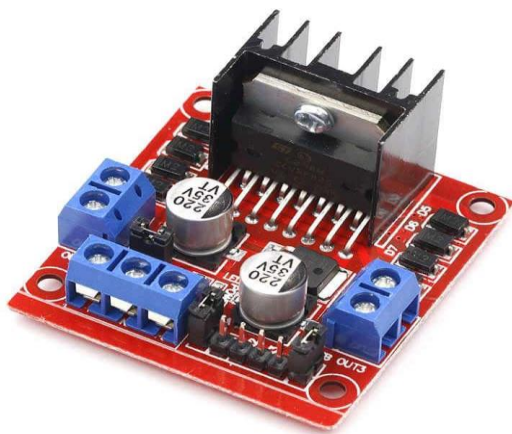
The L298 is an integrated monolithic circuit in a 15-lead Multi watt and PowerSO20 package. It is a high voltage, a high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently 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.

3. SOLAR PANEL

A solar panel is a set of solar photovoltaic module electrically connected. A photovoltaic modules packaged, connected assembly of solar cells.

The solar panel can be used as a 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 10 to 320 watts. The efficiency of a module determines the area of a module.

4. KEY PARAMETERS FOR ATMEGA328

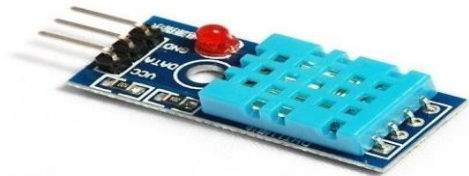Flash (KB):32kBytes, Pin count: 28, Max. Operating Frequency (MHz): 20MHz, CPU: 8-bit AVR, Touch channels: 16, Hardware touch Acquisition: No, Max I/o pins: 22, Ext Interrupts:24, SPI: 221, TWI(12c):1, UART:1, ADC Channels:8 ADC Resolution (bits): 10, ADC speed (kbps): 15, Analog comparator:1, DAC Resolution:0, Temperature sensor: yes, Operating voltage: 1.8 to 5.5.

5. THERMISTORS:

Thermistors are temperature-dependent resistors, changing resistance with changes in temperature.

They are very sensitive and react to very small changes in temperature. They are best used when a specific temperature needs to be maintained, and when monitoring temperatures within 50°C of ambient.

ATMega328P and Arduino Uno Pin Mapping

Arduino function				Arduino function
reset	(PCINT14/RESET) PC6	1	28 PC5 (ADC5/SCL/PCINT13)	analog input 5
digital pin 0 (RX)	(PCINT16/RXD) PD0	2	27 PC4 (ADC4/SDA/PCINT12)	analog input 4
digital pin 1 (TX)	(PCINT17/TXD) PD1	3	26 PC3 (ADC3/PCINT11)	analog input 3
digital pin 2	(PCINT18/INT0) PD2	4	25 PC2 (ADC2/PCINT10)	analog input 2
digital pin 3 (PWM)	(PCINT19/OC2B/INT1) PD3	5	24 PC1 (ADC1/PCINT9)	analog input 1
digital pin 4	(PCINT20/XCK/T0) PD4	6	23 PC0 (ADC0/PCINT8)	analog input 0
VCC	VCC	7	22 GND	GND
GND	GND	8	21 AREF	analog reference
crystal	(PCINT6/XTAL1/TOSC1) PB6	9	20 AVCC	VCC
crystal	(PCINT7/XTAL2/TOSC2) PB7	10	19 PB5 (SCK/PCINT5)	digital pin 13
digital pin 5 (PWM)	(PCINT21/OC0B/T1) PD5	11	18 PB4 (MISO/PCINT4)	digital pin 12
digital pin 6 (PWM)	(PCINT22/OC0A/AIN0) PD6	12	17 PB3 (MOSI/OC2A/PCINT3)	digital pin 11(PWM)
digital pin 7	(PCINT23/AIN1) PD7	13	16 PB2 (SS/OC1B/PCINT2)	digital pin 10 (PWM)
digital pin 8	(PCINT0/CLKO/ICP1) PB0	14	15 PB1 (OC1A/PCINT1)	digital pin 9 (PWM)

Digital Pins 11,12 & 13 are used by the ICSP header for MOSI, MISO, SCK connections (Atmega168 pins 17,18 & 19). Avoid low-impedance loads on these pins when using the ICSP header.

6. COOLER FAN

Their operating principle is basic physics: moving air is effective in cooling objects by absorbing heat from the object and then transferring that heat elsewhere to be dissipated.

7.DHTSENSOR

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easilyDHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any microcontroller such as Arduino, Raspberry Pi, etc…to measure humidity and temperature instantaneously.

8.SERVOMOTOR

MG995 servo is a simple, commonly used standard servo for your mechanical needs such as a robotic head or robotic arm. It comes with a standard 3-pin power and control cable for easy use and metal gears for high torque. Continuous Rotation 360° Metal Gear Servo Motor is a high-speed standard servo that can rotate 360 degrees.

9. WATER PUMP

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water.

10. SPRINKLERS

Pesticide spraying is distributed through a system of pipes usually by pumping.

It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground.

11. BATTERY

A lithium-ion or Li-ion battery is a type of rechargeable battery that uses the reversible reduction of lithium ions to store energy. The

anode of a conventional lithium-ion cell is typically graphite made from carbon.

The cathode is typically a metal oxide. The electrolyte is typically a lithium salt in an organic solvent. Li-ion batteries have high energy densities, low self-discharge, and no memory effect.

5. WORKING PRINCIPLES

In this project multipurpose agriculture rover is to be fabricated for the purpose of grass cutting, pesticide spraying, seed sowing, and temperature & humidity measurement. In seed sowing, we are using driller bit to put the hole and the seed is put into the hole and then the rover moves the soil will close the hole. For Pesticide spraying the tank was connected with the rover through pipe. The rover is connected to the sprinkler.

The TX Lora was connected with the Rover. The RX Lora was connected to the Tank. When the rover was moved, it sprays the pesticide/water on the whole form. If it reaches the destination TX Lora sends the information to the RX Lora then the motor would stop the water/pesticide pumping.

The rover was connected with temperature and humidity sensors. It is used to measure the temperature and humidity of the field and is displayed in the display unit. For obstacle avoidance ultrasonic sensors were used.

Fig :Final Implementation

Fig: Seed Distributor

Fig: Grass Cutter

By using an ultrasonic sensor will find out, Whether the obstacle is here or not. If the obstacle is there then it will stop the movement and compare the distance received from three ultrasonic sensors which one has the longest distance. By this result, the rover moves in that direction.

When the rover was launched for the first time we can give the data using Bluetooth then next time it will follow the previous data. Whenever we need to change the data, we use Bluetooth to give data otherwise it will follow the previous data.

After getting input the machine will be turned on grass cutting, Seed sowing and pesticide spraying mechanism to be working smoothly.

6. ADVANTAGES

a. Low Maintenance Cost.

b. The grass cutter is based on the solar system so we cannot use any fuel for the operation.

c. No. of man works reduced. one human is enough for doing that work.

d. Avoid injuries due to grass cutting.

e. Easy to move from one place to another

7. DISADVANTAGES

a. Whenever we want to change the data, we use Bluetooth to give data.

b. Can not handle tall or thick areas of grass efficiently.

8. CONCLUSION

An automatic multipurpose agricultural rover was designed to perform complex farming tasks like seed sowing, grass cutting and pesticide spraying. This work is designed to perform the sowing of two different-sized seeds. The benefits of the rover were reduced human intervention and efficient resource utilization. The rover is solar powered hence it is the renewable energy source. Innovative seed sowing, grass cutting and pesticide sprayer equipment have a significant influence on agriculture. By using this advanced work We can easily reduce the farmer's efforts and time. The machine required less manpower and less time compared to the traditional method. We hope this will satisfy the partial thrust of Indian agriculture. So in this way, we can overcome the labour problem and also reduce many labor salaries that is the need for today's farming in India.

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