A DESIGN OF SOLAR POWERED AGRICULTURE ROBOT

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ABSTRACT
The idea of applying robotics in agriculture is very new. The ultimate goal is to optimize the performance of robot in an efficient manner with green energy. The main reason behind the automation of farming processes are saving time and energy required for performing repetitive faming task. The paper deals with agriculture device for fertilizer spraying and grass cutting at a time by using solar energy. Therefore these unpredictable features like use of renewable source of energy and complete automation makes it most economical, unique and compatible.

KEYWORDS– High torque DC motor, Bluetooth modem, DC drive unit.

INTRODUCTION

In India, conventional methods for agriculture are generally involved which are more complicated and time and labour intensive. Farmers mainly use hand operated or fuel operated spray pump for this task. This conventional sprayer causes user fatigue due to excessive bulky and heavy construction. In our design, here we can eliminate the back mounting of sprayer ergonomically it is not good for farmers health. This device operates on solar energy and charge controller circuit is used for increasing the lifetime of battery. Solar energy stored in DC battery which is connected to microcontroller which is common power supply to the vehicle. Robotic wheels are controlled by DC drive and whole system is controlled by Bluetooth technique. Spraying pump and cutting blades taps the power from DC motors. The grass cutting and fertilizer spraying are the important stages in agriculture field. The design of a solar operated agriculture device will helps in Indian farmers in rural side and small scale farmers as it is easy to handle and will help to increase economic standard of an Indian farmers.

BLOCK DIAGRAM WITH DISCRIPTION

Components of the solar operated agriculture device are:

- Solar plate
- Charge controller
- Battery
- ATmega328 pic
- DC motor
- Spraying fluid tank
- Spraying pump
- Bluetooth modem
- Cutting blade
- Jet spray

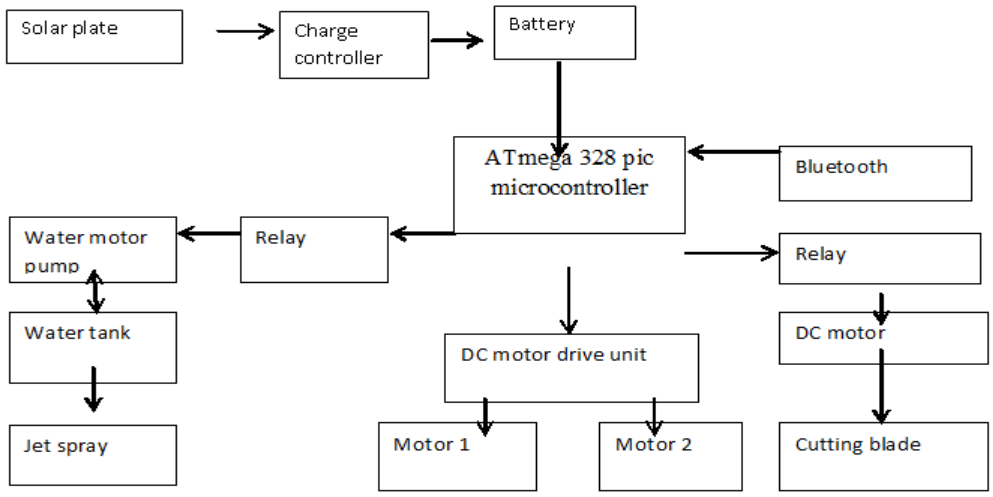

Figure1: Block Diagram

1. SOLAR PLATE:

A solar panel is packaged connected assembly of photovoltaic cells. As PV cell is exposed to sunlight some photons are absorbed by solar cells. The energy of absorbed light is transferred to electrons in the atoms of PV cell with their new found energy, these electrons escape from their normal position in the atoms of semiconductor PV material and it becomes part of electrical flow or current, in an electrical circuit.

2. ATMEGA328PIC:

The high performance Atmel pic 8-bit AVR RISC- based microcontroller combines 32KB ISP flash memory with read while write capabilities, 1024B is EEPROM, 2KB SRAM 23general I/O lines, SPI serial port 6 channel 10 bit A/D converter. The device operates between the range of 1.8-5.5 volt.

3. DC MOTOR:

A DC Motor is a mechanically commutated electric motor powered from direct current. This paper gives idea to use three Johnson's metal geared motors. Two motors having rating12v,30 rpm for controlling robotic wheel.Another motor12v, 1000 rpm for grass cutting purpose. High starting torque is required for this device so DC series motor will fulfill the requirement.

4. CUTTING BLADES:

The blade is seldom sharp enough to give a neat cutting. Rotating blades continuously cut the grass. Height of cut is adjusted by means of the link mechanism via the lift rod. A blade may be made from flaking stone, such as flint, metal (usually steel), ceramic, or other material. They are usually made up of sturdy metals as they must be able to withstand high speed contact with variety of objects in addition to grass.

5. WATER MOTOR PUMP:

A pump is a device that moves fluids or sometimes slurries, by mechanical action. Pump is used to suck spraying liquid from sprayer tank and spray it through nozzle. Nozzle is a device designed to control the direction or characteristics of a fluid flow (especially to increase the velocity) as it exits (or enters) can enclose chamber or pipe. In a nozzle, the velocity of fluid increases at the expense of its pressure energy.

6. BLUETOOTH:

Bluetooth is a technology for wireless communication. It is designed to replace the cable connections. Usually it connects small devices like mobile phones, PDA's and TV's using a short range wireless connection. A HC05 module is easy to use. Bluetooth SPP (serial port protocol) module, designed for transparent wireless serial connection set up.

ADVANTAGES

1. Zero emission and zero waste of conventional sources.
2. Easy to move from one place to another place for cutting.
3. Non skilled person can operate this device.
4. Reduces the labour cost and human efforts.

LIMITATIONS

1. Solar energy is weather dependent so during rainy season its efficiency will get decreased.
2. There is requirement to fulfill the sprinkler tank after the quantity its inside gets over.

FUTURE SCOPE

- Continuous running of device may be heated or damages so LM35 temperature sensor will be used.
- More equipment like soil testing task could be added.

CONCLUSION

There is a single system which contains two functions fertilizer spraying and grass cutting operates at a time. It can be carried easily in farm land or college campus. It will reduce the external charges like fuels, electricity etc. and this will be useful for the poor farmers. This equipment will design to reduce the cost of spraying and grass cutting and it is full automated. Asian countries are facing electricity and power scarcity problems which results in twelve to fourteen hours load shedding in rural area especially in India. Therefore, there is need to develop a locally, fabricated multipurpose agriculture device.

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