

Smart Automated Agriculture Monitoring And Controlling System Using Arduino

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Abstract: Agriculture is backbone of our country. In this paper, we had presented a “SMART AUTOMATED AGRICULTURE MONITORING AND CONTROLLING SYSTEM USING ARDUINO”. Here we had developed an autonomous agriculture monitoring module. This autonomous unit will do Seed sowing, Pesticide Spraying, Fertilizer Spraying, Water Pumping automatically without human intervention. Here we use ARDUINO for setting the time slot for each process. After completion of this process, It sends the message automatically through GSM to user. This is the main advantage of our system; we can perform agricultural activities and monitor them without going to the agricultural field. It also reduces the capitation cost of agriculture. Thus our project encourages the next generation towards agriculture which in turn develops our country’s economy.

Keywords: Battery, soil sensor, DC motor, pump motor, GSM

I. Introduction

Agriculture in india constitutes more than 60% of the occupation. It serves to be the backbone of indian economy. Millions of people in rural areas depend on this agriculture. Agriculture had already being reduced due to the many reasons like urbanization, global Warming, climate changes using of lower quality fertilizers in soil, underground water crisis etc., Now a day, people want to live sophisticated lifestyle. So the younger generation is not opting agriculture as their profession. If this continuous there will be food scarcity in future. As a citizen we have the social responsibility to save agriculture and save our future generation from malnutrition. It is very important to improve the efficiency and productivity of agriculture by simultaneously providing safe cultivation of the farmers. Operations like spraying of pesticides, sprinkling fertilizers, seed sowing, water pumping are very tedious. Though spraying of pesticides and fertilizers, seed sowing water pumping has become mandatory it also proves to be a harmful procedure for the farmers. Farmers, especially when they spray pesticides and fertilizers take too many precautions like wearing appropriate outfits, masks, gloves etc., so that, it does not cause any harmful effects on them. Avoiding the pesticides and fertilizer is also not completely possible as the required outcome has to be met. So, use of robots in such cases gives the best of the solutions for these problems, along with the required productivity and efficiency. It is cost effective technology where we use components such as arduino for the control of agriculture robot. Continuous supervision of agricultural field is possible with automatic performance of such agricultural field is possible with automatic performance of such agricultural vehicles. Abilities of the agricultural vehicles can be categorized as guidance, detection, action and mapping. The way of navigation by the vehicle is termed as guidance, extraction of environmental features is termed as detection and execution of the assigned task is termed as action and mapping the field with its features is mapping. All four categories are independent. This paper is based on developing a robotic vehicle used in agriculture for spraying harmful pesticides and fertilizer and sowing seed, pumping water, then removing the unwanted grasses. This paper, involves the usage of arduino to control the movement of robot. This cost effective robotic vehicle can improve productivity, safety in agricultural applications and meet the demand for labor. An automatic vehicle which is used for main or secondary agricultural task is said to be a service unit. An intelligent master-slave system between the agricultural vehicles developed a semi-autonomous agricultural vehicle (slave) to follow a leading tractor (master) with a given lateral and longitudinal offset.To acquire aerial hyperspectral data, low-cost, small, lightweight hyperspectral sensor system that can be loaded onto small unmanned autonomous vehicle was developed. This system works efficiently even under unstable illumination conditions. All process will monitoring by use of connecting GSM.

II. Description Of The Proposed System Components

In our proposed system, we had done five process using the relays for each process. Here we use Arduino ATMEGA328, the inputs are given to the module by Battery. The Battery is used for producing the change, it feedback the charges to the DC generator. DC generator helps to producing the charges

simultaneously given to the arduino module. At first, the vehicle will sow the seed by moving around the field. After some days, the vehicle covers all over distance of that agricultures field. After finishing the seed sowing process, the vehicle will return back, it provides the water pumping when the soil is seems to be dry. We use a soil sensor to monitor the humidity and temperature of the soil. Side by side it provides the good quality pesticide spraying and fertilizer spraying. Even the plants grown well, some of them will die because they are affected by some insects and micro-organisms. The over usage of fertilizers are also leads to the plants death. To prevent the plants from over fertilizers, the time delays are set using the relays. It also provides the special function, which pick out the unwanted grass from the soil.

1.ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform "Uno" means one in Italian and is named to mark the upcoming release of Arduino.

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2.BATTERY

Here is the circuit diagram of a simple and straight forward 12 V battery charger circuit with diagram. This circuit can be used to charge all type of 12V rechargeable batteries including car batteries. The circuit is nothing but a 12V DC power supply with an ammeter for monitoring the charging current. The two diodes forms a center tapped full wave rectifier. The capacitor filters the rectifier output to produce a clean 12V output.

3.LED

LED have two pins, anode(+) and cathode(-) ,anode connected with arduino P12 pin and cathode is connected with 5V in series with 220ohm resistor.

4.RELAY

Relay is a electrical operated switch. Relay is used to isolate electrical load.

Two configuration:

- 1.NO (normally open)
- 2.NC (normally close)

Relay have coil with is energize by 12V,When coil energized Switching action takes place.

5.MOTOR

DC motor is small in size, inexpensive and powerful. It in robotics for there small size and high energy out. A typical DC motor Operates at very Speeds. Gear reduces the speed of motor and increase the torque.

6.RF MODULE

Radio Frequency module is a electronic device used to transmit and receive radio signal between two device. Wireless communication is accomplished through radio frequency. Several carrier frequencies are commonly used in RF module. 433.92MHz, 315MHz, 868MHz, 915MHz and 2400MHz.By increasing the transmitted power, a large communication distance will be achieved. The performance of the overall system may be improved by using matched antennas at each end of the communication link.

RF MODULE consist of two part

- 1.Transmitter section
- 2.Receiver section

6.1.TRANSMITTER

An RF Transmitter module is capable of transmitting a radio wave and modulating that wave to carry data. Transmitter module connected with a micro controller which will provide data to the module which can be transmitted .

6.2.RECEIVER

An RF receiver receives the modulated RF signal, and demodulate it.

There are two type of RF receiver.

- 1.Super heterodyne receiver
- 2.Super regenerative receiver

7.SOIL SENSOR

Soil sensor measure the water content in soil. The soil sensor is used to measure the volumetric water content of soil. Soil moisture sensor has to probe through which current passes in soil. Then read the resistance of soil for reading moisture level. Water make the soil more prone two electric conductivity resulting less resistance in the soil where on the other hand dry soil has poor electrical conductivity thus more resistance in soil. Using these properties of electricity the sensor is designed. Inside the sensor there are circuitry and converting it into voltage as output.



Fig 8: Diagram of Soil Sensor

8.GSM

GSM stands for Global System for Mobile Communication. It is a Digital cellular technology used for transmitting a voice and data services. GSM operate on mobile communication band 900MHz and 1800MHz, It operate on 850MHz and 1900MHz. GSM use Narrow band time division multiple access technique for transmitting signals. At commands use to control the modem. In GSM mode for each functions like make call and to send message, to access internet, there is set of commands is used to activate the function.

GSM has different configuration:

- 1.Sim 300
- 2.Sim 900
- 3.Sim 900A

III. Proposed System

In our proposed system, we undergone by five process are done using the relays for each process. Here we use ArduinoATMEGA328,the inputs are given to the module by Battery. The Battery is used for producing the change, it feedback the charges to the DC generator .DC generator helps to producing the charges simultaneously given to the arduino provides the good quality pesticide spraying and fertilizer the soil is seems to be dry. We use a Soil Sensor The monitor because they are affected by some insects and micro-organisms. The over usage of fertilizers are also leads to the agricultures field. After finishing the seed sowing process,

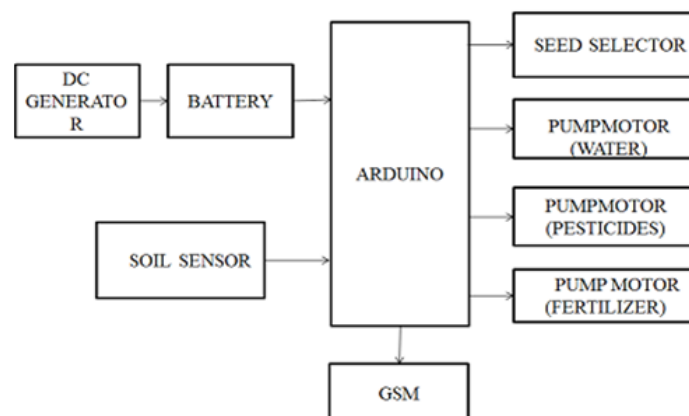


Fig 2: Proposed system

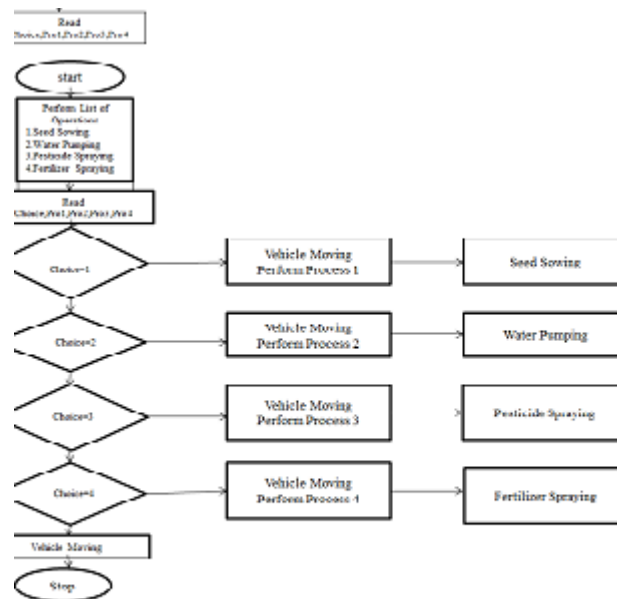


Fig 3: Flow chart

Vehicle will return back, it provides the water pumping to when module. At first, the vehicle sow the seed by moving around the field. After some days, the vehicle covers all over distance of the Humidity and Temperature of the soil Side by side it spraying. Even the plants grown well, Some of them died that plants death. To prevent the plants from over fertilizers, the time delays are set using the relays .It also provides the special function, which pick out the unwanted grass from the soil.

IV. Project Description

MODULE 1: DC GENERATOR

The Battery is the charging device. Which is connected to the two motors. The one is the primary motor which is connected parallel to the another motor which is secondary motor. The primary motor receives the charging, from the battery and starts running. Simultaneously the secondary motor also starts running because it is connected parallel to primary motor. Then the charging is feedback again to the battery. So it is said to be rechargeable battery.

MODULE 2: WATER PUMPING

This module which contains the special sensor which is the soil sensor. The soil sensor is connected with the Arduino in the pin” “.It is dipped in the soil to sense the humidity and temperature in the soil. If the soil dry it senses and given to the information to the arduino. Then arduino which given the command to the water pumping motor Then they provides the water pumping to the soil.

MODULE 3: SEED SOWING

It is initial process, where the vehicle starts to move towards the soil. The vehicle starts moving by using the four relays.(R1,R2,R3,R4).While moving, they command the arduino to “ON” the seed motor which helps to sowing the seeds to the soil. This seeds motor which is located on both sides of the vehicle. This process continuous till they sowing seeds to the entire allocated path.

MODULE 4: PESTICIDE SPRAYING AND FERTILIZER SPRAYING

After completion of the seed sowing, the seed sowing motor off. And it transfer the command the arduino. The arduino starts to give the command for the other process pesticide spraying and fertilizer spraying. Then, the pesticide spraying and fertilizer spraying is done from the both sides of the vehicle.

MODULE 5: GRASSES REMOVING

After completion of these process, the vehicle is running towards this path. For removing the unwanted grass in the agriculture field by using the cutter. The cutter is located in front of the vehicle.

V. Conclusion

To be a citizen, we like to preserve our nation and its our proud to conserve our nation. By doing our project in at present generation and future generation, we can develop the agriculture even if we are in another field. Then our country will become a developed country.

VI. Future Work

We know at present generation is smarter; the future generation will be more and more smart than us. For that future generation, we use the advance cameras. By using this, we fully monitoring and do their work automatically without human activities. Then we added a another agriculture process also like harvesting and etc.

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