

Automation In Agricultural Robot For Farming And Seeding Purpose

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Received: 05.02.2022; Revised: 30.03.2022, Accepted: 08.04.2022, Published Online: 02.05.2022

DOI: 10.5489/nveo.5015923

Abstract—To help farmers by providing real time data about their cultivation land With the advancement of science and recent technologies the scientist is attracted towards agricultural field and the work is based on Robotic system. The field farming and robotics systems are merge together and it is efficiently worked together to overcome the issues. This issue is solved by the robotics and it is worked very well for the agriculture process and the robotics technology is played a good vital role in engineering, medical field, military, etc. The main topology of this paper deals with the robot for the farming seeds to reduce the man power intervention. In this work moisture sensor indicates the soil water content in the agricultural field. Ultrasonic sensor is used for distance calculating the obstacles to indicate the robot to turn the direction for seeding the cultivation land. Program is simulated using Arduino Software. In this paper the whole work reviews with the robot for cultivation.

Keywords—Arduino, Farmer, Man power, Robot, Farming, Robot, Moisture sensor, Ultrasonic sensor.

INTRODUCTION

Agriculture is becoming an important growing sector throughout the world due to the increasing population. The target of the work in the agriculture is to challenge the farm productivity and the quality of farming to bring it more success in the agriculture to meet the growing demand for the food [1]. This project design with the Arduino based

automatic seeding system using Arduino UNO which is automated by using controllable parameter such as moisture sensor because they are important factors to be controlled [1]. If the value of sensed data matches with the threshold values it starts seeding. Now due to population management in the world,

the growth demand is becoming higher, in order to minimize the resource technology, the farmer maximizes the output to reduce the wastage of seeds, farming, water, etc., in the agriculture area [1][2].

Agriculture robot is one of the most important machines in this technology to perform the work efficiently. Farming is the traditional method and it is used in nowadays technology for

agriculture process [2]. In this paper work, the robot work is based on seeding to maintain the moisture content soil.

Section I deals with the introduction. Section II presents the work motivation of agricultural robot. Section III discuss with the existing problem work of agricultural robot. Section IV discuss with the proposed topology idea of agricultural robot. Section V presents the objectives of work. Section VI discusses the methodology work of autonomous farming seeding robot. Section VII deals with the block diagram and proposed system components of Arduino based autonomous farming seeding robot for agricultural purpose. Section VIII presents the experimental analysis of Agriculture Robot. Section IX performs the results and discussion of the work. Finally, Section X discuss about the conclusion.

MOTIVATION OF WORK

In this work, we have used two different sensor techniques such as:

- Moisture sensor
- Ultrasonic sensor

The work is combined with the GSM module technology so that it will work efficiently and it act as between farmer and Arduino [3]. GSM technology provides the information between farmer and Arduino. By using this proposed technology, it receives the information to the farmer to take the necessary action to avoid the difficult situation while farming the land.

PROBLEM STATEMENT

- ✓ Productivity is low and time consumption is huge.
- ✓ The vehicle moves only on straight line and moisture content of a particular region is checked as the sensor is fixed in a location.
- ✓ It required frequent monitoring.

PROPOSED TOPOLOGY IDEA

- ✓ Robot is used for both sowing and moisture content analysis.
- ✓ It can meet the food demand to population growth.
- ✓ It doesn't require frequent monitoring.
- ✓ Capable of taking the decision of switching the water pump by using the sensor.

OBJECTIVES OF WORK

- ✓ To check the moisture content of the land in the farming area.
- ✓ To cultivate the land based on user selection.

- ✓ To automate the process without any human intervention.
- ✓ To increase the productivity for the farmer in the agriculture to meet the demand.

METHODOLOGY WORK-AUTONOMOUS FARMING SEEDING ROBOT

Agriculture farming is performing of modern art technology such as sensors, robotics for changing monotonous operation to computerized process. Latest achievements in agricultural robotics are used for sovereign tidy control, field reconnaissance and harvesting. It implies in research focus that agricultural robots edifice a small scale of work and drones to optimize the farming inputs to the land. Replacing man made power work with automations a growing trend in the field of agriculture. Robotics and Autonomous system is combining together to transform the global industries. By using these technologies in the world, it has the greatest impact in the agriculture field; hence it reduces the productivity farm. The advent of using autonomous farm in the agriculture field it reducers the input by using robot and it works as a more efficient way. The recent focus is based on agri-robotics it is used to identify the agriculture applications where the automation is been used as more efficient than a traditional human being [4]. By using this agri-robotics, it improves the life quality of farm workers by reducing the human work and tedious process in agriculture. Most of the current and recent agriculture technology falls into methods of smart farm such as: autonomous robots, drones and sensors.

BLOCK DIAGRAM AND PROPOSED SYSTEM COMPONENTS DESCRIPTION

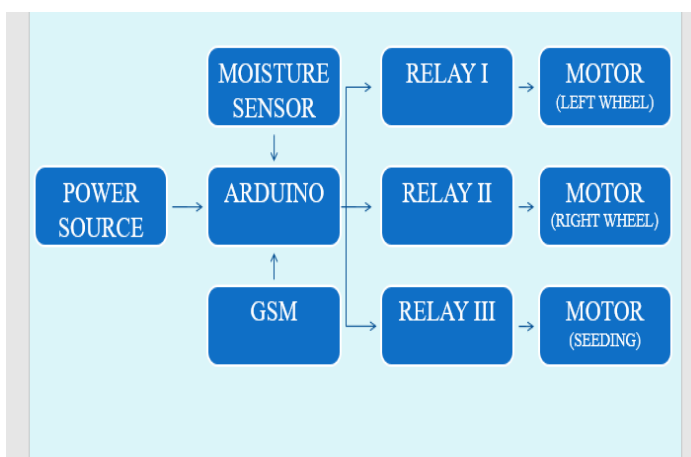


Fig.1 Block diagram of Agriculture Robot Work

The above diagram shows the agriculture robot and it is depicted as Fig.1. The description of block diagram is explain by each component.

A. AURDINO



Fig.2. Arduino UNO

ARDUINO UNO is used to generate the pulse of required frequency which is given as input to the power module. It is a software and hardware component which consist of an ATMEL 7-bit AVR microcontroller with complementary components. The board is designed and equipped with a components viz., microprocessors and controllers. The board is enveloped with digital and analog input and output pins that are compute with breadboards or some other circuits [5]. It provides various features (i.e.) Universal Serial Bus and the program is done and loaded to the Personal Computers. ARDUINO UNO is shown in Fig.2.

B. MOISTURE SENSOR

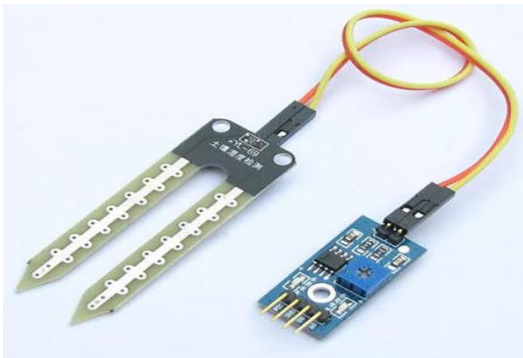


Fig.3. Moisture Sensor

Fig.3. shows the moisture sensor. It measures the volumetric water content in soil-reflected microwave. [6]. The aim purpose of moisture sensor work is, it will be senses the moisture level of the soil in the agriculture land. This sensor implements the work in the land and it produce the voltage reading which is directly proportional to the dielectric permittivity.

C. ULTRASONIC SENSOR

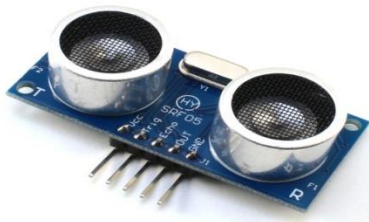


Fig.4.Ultrasonic Sensor

Fig.4 shows the ultrasonic sensor. Ultrasonic is used for distance calculating the obstacles to indicate the robot to turn the direction for seeding the cultivation land. Most commonly used- to detect hidden tracks, discontinuities in metals a water level detection [7]. The module of the ultrasonic sensor includes transmitter, receiver and control circuit. Ultrasonic receiver would stop timing when it receives the direction the reflected wave and it also senses the obstacles in the farming area.

The LM35 series are built in ultrasonic sensor and it has more advantage when compared to other sensor. It does not require any calibration and it provides typical accuracy [8].

D. SEEDING MECHANISM

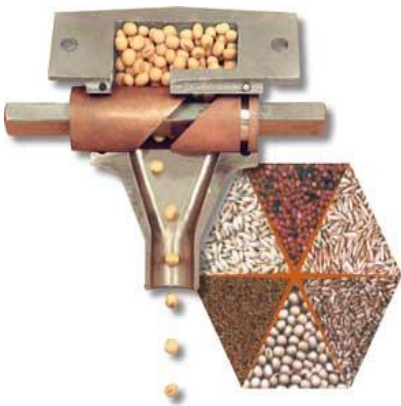


Fig.5.Seeding Mechanism

Fig.5 shows the seeding mechanism. Agricultural robot is design for seeding mechanism. In this field of agriculture, the sowing or seeding mechanism with long toothed gears actuated with motors [9] [10].The structure of the seeding mechanism is partially divided into two portions and it act completely as a container for seeds. Successor holds electronics for automating and actuation and there is a gear at the back of the robot rotate.

EXPERIMENTAL ANALYSIS

A hardware structure for the agriculture robot is developed and tested in the laboratory. The circuit components used for hardware implementation are listed in Table 1. Fig. 6(a) indicates the Hardware prototype of Agriculture Robot. Fig.6(b) shows the output of Hardware prototype of Agriculture Robot.

Table I. Hardware Components for Agriculture Robot

Components	Specifications
Arduino (ATMEGA 328P)	12V
Relay	12V
LCD	16X2
Motor	12V/BDCM
Oscillator	4MhZ
Transformer	230V/12V
Regulator	LM7805 LM7812
OP-AMP	LM358
Moisture Sensor	3.3-5V



Fig.6 (a) Hardware prototype of Agriculture Robot

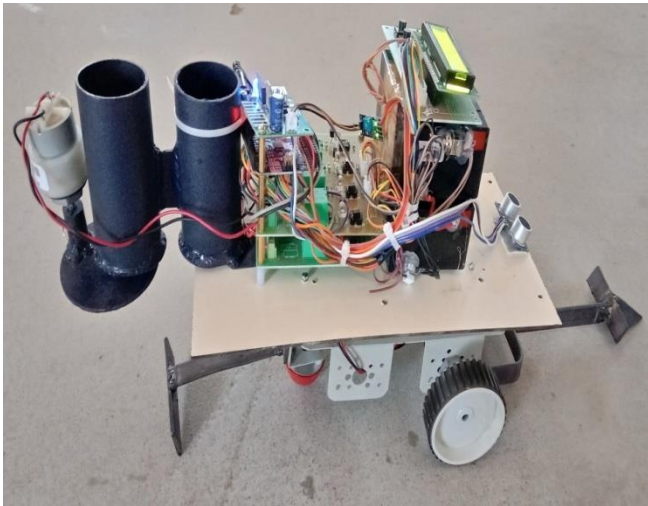


Fig.6(b) Hardware prototype output of Agriculture Robot

RESULTS AND DISCUSSION

This enlargement has been possible due to mounting development of moisture and ultrasonic sensors and the reduction equipment costs due to mass production and innovative technologies. As a result, it shows that robotics has been successfully implemented in agricultural tasks to reduce the work load of the man power and optimize the process time.

CONCLUSION

In this work, Arduino based autonomous farming seeding robot for agricultural purpose are analyzed in detail. Automatic Cultivation is possible without human intervention. Seeding, Manuaring and supplying water is possible due to high production rate. Due to the presence of Ultrasonic sensors the robot moves throughout the field. This automatic way of sowing seeds using a robot reduces the labor requirement. Here the wastage of seeds is also been reduced to a greater extent. Here with the help of a robot the seeds are been dispensed in the soil in a proper sequence hereby reducing the wastage of seeds. This robot will help the farmers to do the farming process efficiently.

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