

Solar Powered Agribot With Multiple Operations

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Abstract

Agriculture is important part of indian economy. The major issue which are faced by the farmers while working on a field are water scarcity and another is the high costs expected by labour. This paper gives accurate solution by developing smart automated irrigation system and agriculture robot which does different task such as seed sowing, ploughing using raspberry pi 3 as microcontroller. moisture sensor and temperature sensor gives input based on this water is supplied to fields using relay. With the help of AGIBOT many operations like grass cutting ,Seed sowing and spraying of pesticides can be performed using mobile

Keywords: raspberry pi 3, automated, irrigation, water deficiency, GSM, GPRS , web page, Python.

1. Introduction

Agriculture is the backbone and the primary sector of Indian economy, as it occupies approx. 60% of population working in this sector. It needs to automated by the time and its needed to introduce new technologies which would help the sector to grow more efficiently. Automation in agricultural robotics system has been developed to implement a number of agricultural productions in many countries. In the field of agriculture various problems are faced by the farmers in the operations like seed sowing, plowing, and waste planet cutting, weeding, In the past, farmers use to work for many days just to cut grass and spray pesticides. By the help of this bot, it would help to achieve an effective way in which the dropping of seeds at desired position with a particular distance between two seeds and lines while sowing. This machine will help in sustainable development because it is mainly depended on the solar energy.

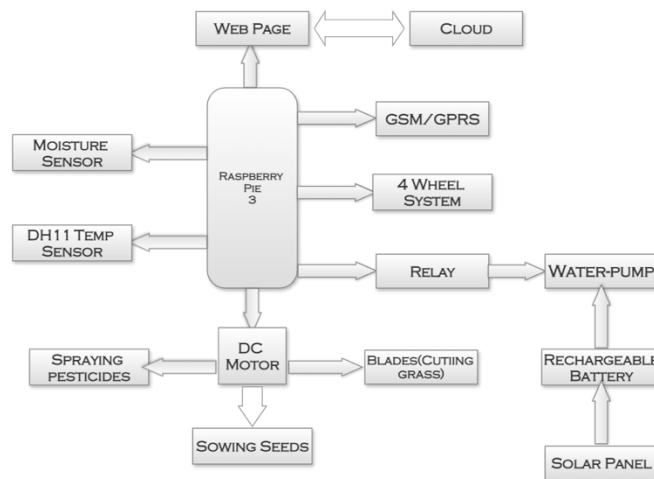
Agribot is prototype machine which has a solar panel on the top which will charge the rechargeable battery and will provide power to the micro controller for performing various task like cutting of grass, spraying of pesticides and sowing seeds. It allows us to monitor details about the soil moisture and temperature of the atmosphere through the cell phone. If the soil moisture goes beyond the threshold value it will automatically start pumping the water through the water pump. As it will save time and will reduce the labour cost, as it will have a effective mechanism of performing task ,this would increase the productivity of the sector.

2.Literature Survey

In this paper the system is Arduino based irrigation system was proposed with wi-fi technology and the system contains soil moisture, pH, temperature sensor where it detects values from the soil and according to which water is supplied. Arduino receives data from sensors and updates through the cloud. [1] In this paper, the robot begins its work by plowing a field, then sow the seeds in the planted area and end the process with to cover the seeds sown in the soil. It uses the basics such as DC motors, stepper motor, relay and PSoC as the primary controller [2]. As this paper indicates Agricultural statistics and forecasting are an important tool that the government did not scrutinize his conduct impact. This paper suggests the use of a smart portable system data mining and analysis that assists farmers in a variety of ways farming techniques, which help them determine the most suitable crops such as according to the current climate, soil conditions and location features of a defined region. [3] In this paper. The tools used to sow the seeds are problematic and problematic as they require a lot of male energy. Therefore, there is a need to develop equipment that will reduce farmers' efforts. The proposed system uses Agribot targets to sow in areas with a certain space between two seeds and positions while sowing seeds. The arm of the robot helps to eliminate unwanted vegetation the heart of the proposed system is a microcontroller that controls all operations. [4] As in this paper the use of machinery avoids loss or damage to inputs and reduces the amount required to obtain a high yield by adding savings of inputs accurately to the mat. This ensures better distribution and reduces the cost of production units with input storage and higher production. Several efforts have been made to improve access to agricultural inputs, tractors, irrigation pumps, and power tillers, including harvesters and other machinery. [5]

3.Methodology

The proposed project is divided into two parts: automatic irrigation system and agriculture task making robot. The irrigation part consists of moisture sensor which gives the moisture level of the soil and if the moisture level is less than preset value in controller than automatically water is supplied to field using relay and the above system is controlled using raspberry pi 3 microcontroller.

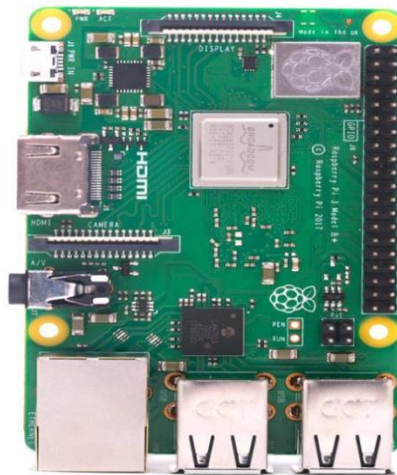


Block Diagram 1: Agribot block diagram.

Other part of the project it contains robot which performs task such as seed sowing ,ploughing and pesticides spraying these tasks are performed by moving robot which consists of respective materials to perform tasks. An android app is developed in order to move from ne place to other and these app is interfaced with the raspberry pi and for the entire system power is supplied using solar panel which is fixed above it.

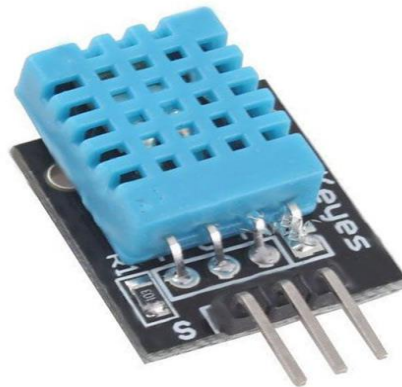
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Raspberry Pi 3



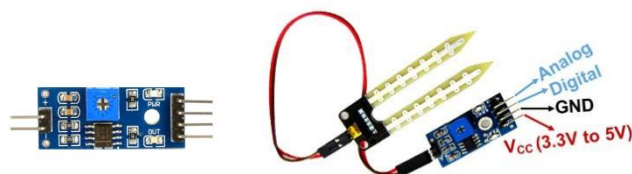
RASPBERRY PI 3 designed board in PI series. It is considered as a single board computer running in the LINUX/windows application. The board has many features and has a high processing speed that makes it suitable for advanced applications. The PI board is specially designed for advance algorithms where we need to connect the device with IOT and integrate the system

Temperature and Humidity Sensor



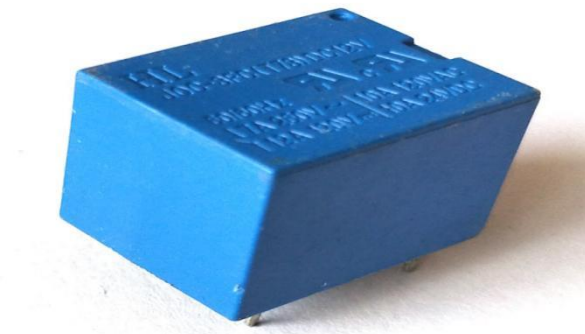
DHT11 device is a digital temperature sensor, which costs less and with help of the sensor moisture. It uses a capacitive humidity sensor and thermistor to measure moist air, and pulls the digital signal to the data pin (no analog input). It is simple to use but requires a bit of time while functioning.

Soil Moisture and Soil Sensor



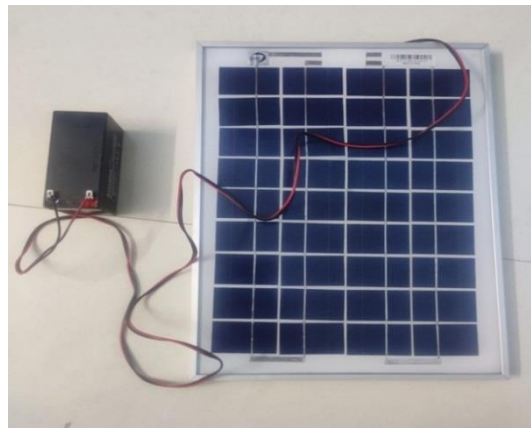
The soil moisture sensor detects the moisture level in the soil and calculates the content of moisture in soil and gives the same as output. Potentiometer is used to adjust the threshold level in soil moisture sensor.

Relay



Transfer is a switch that opens and closes circuits electronically or electronically. Transfers controls one electrical circuit by opening and closing contacts in another circuit. When a transferred contact is normally closed (NC), there is a closed contact when the transfer is powerless.

Solar Panel



Solar panels contain many solar cells, some of which have a coating of silicon ,phosphorus which is negatively charged whereas boron which is positively charged .It absorbs photons from the sunlight and initiate the flow of electricity .

Water Pump



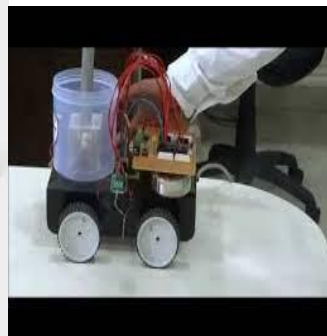
Water pump is the 5V operating device while helps to circulate / pump water , it's a mini device which costs less .it can supply around 120 per hour with a low consumption of current of 220mA.It is connected with a switch and power supply which will help in the operating the on and off of the device.

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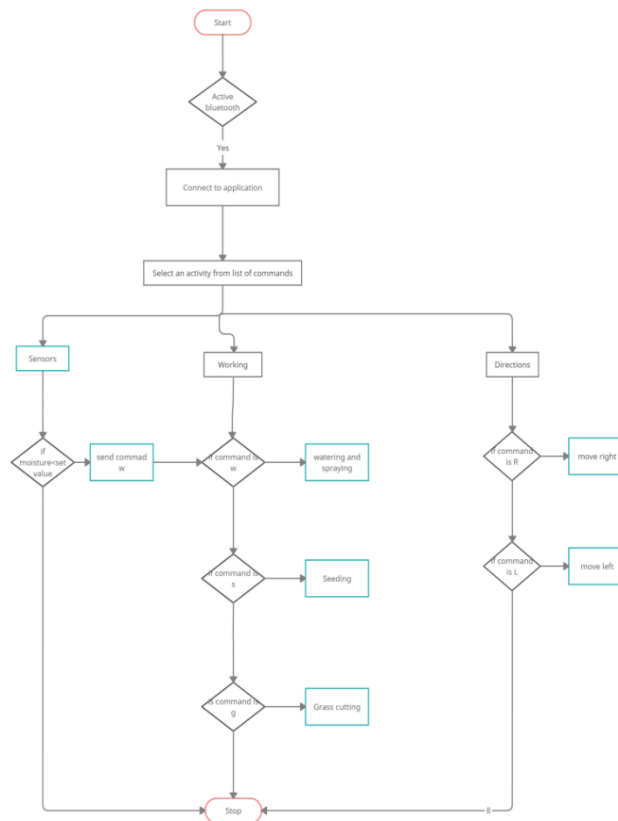
Dc Motor And Wheels



Blades And Seed Sowing



Flow Diagram



Flow Chart 1: Data flow of the working of agri-bot system

4.Results

The designed Agribot which is made using raspberry pi 3 in Fig 1 Agribot is controlled webpage which enables the movement of the robot. Entire system is powered by solar panel which is placed above. Soil moisture sensor records soil moisture. At point when the humidity level is below the threshold level, the pump is turned on and off automatically when it reaches the boundary level and the temperature sensor senses the temperature from the Earth. As a result irrigation will start automatically which will be powered by the solar panel through battery. It will contain many operations in which the seeding , cutting grass and sparying of pesiticise will be done .All the things will be controlled through the mobile.



Fig1.Agribot with Multiple operations

5.Conclusion

It has been concluded that agribot prepared using raspberry pi 3 module does multitasking such as ploughing, seed sowing and pesticides spraying which eases the work of farmers in field .Automatic irrigation system reduces the wastage of water .The entire system is controlled with help of website/android app which will be developed with the help of python and the system is cost efficient and power efficient as it includes solar energy usage.

6.Future Work

In the field of agriculture there could be more advancement could be done as per the development of the new technologies. This would lead us to increase the dependance on the bots and would increase the productivity of the work. Some of them are as follows:

- Cameras can be installed to the AGRIBOT for security purposes
- Introducing machine learning to the system for great reliability.
- Drilling machine can installed for a ploughing the filed with a great efficiency.
- Various Alarm can be introduced to the system for safety purpose.
- Drip irrigation and drilling can be done with more effectively .

Farming can be done on disaster land using AGRIBOTS

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