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Smart Farming System Using Sensors for Agricultural Task Automation

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Abstract
The Automation the agricultural system is very useful for old people and normal persons who live far away from the agricultural field. If installed and programmed properly, automatic agricultural systems can even save us money and help in water conservation. In this project focused on atomizing the irrigation system for social welfare of Indian agricultural system and also to provide perfect irrigation in particular area. Soil moisture sensor sense the condition of the soil whether it is dry or wet and sends the information to microcontroller. Water level sensor senses the water level in the water source and sends the information to the microcontroller. Microcontroller monitoring the information to the relay then on/off of the motor is done.

Key Word: GSM, Arduino, AT Mega, PH Sensor, Soil Sensor, Temperature Sensor.

1. Introduction

As the world is trending into new technologies and implementations it is a necessary goal to trend up in agriculture also. Many researches are done in the field of agriculture. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. Hence this paper deals about developing smart agriculture using GSM and Arduino. Agriculture is the backbone of Indian economy. In India, around 70% of the population earns its livelihood from agriculture. The recent betterment in information and communication technologies has allowed farmers to acquire a vast amount of site-specific data for the fields. The main activities involved are data collection, processing, and variable rate of application of inputs. We can reduce a lot of manual work in the field of agriculture using automation. The major problem faced in many agricultural areas is that lack of mechanization in agricultural activities. In India agricultural activities is carried out by manual labor, using conventional tools such as plough, sickle etc. Our Smart Farming System reduces the manual work and automates the agricultural activities. The ground water is polluted due to the usage of synthetic fertilizers and pesticides. In Smart farming, they are replaced by organic fertilizers (e.g. compost, animal manure, green manure) and by using it the soil structure is enhanced.

2. LITERATURE REVIEW

We started to explore the recent trends in implementation of ICT in smart farming techniques. In the meantime, we did a brief literary survey on the published works of eminent scholars in this field. In

[1], a novel approach for Digital Agriculture was proposed describing Relationships between Precision Agriculture, Digital Earth, Information Agriculture, Virtual Agriculture, and Digital Agriculture. The requirement to put forward the concept of Digital Agriculture, was discussed. In

[2], sensor data collection and irrigation control was put forward on vegetable crop using smartphone and wireless sensor networks for smart farming. The environmental data can be collected and the irrigation system can be controlled using smartphone. In

[3], a novel cloud-computing-based smart farming system was proposed for early detection of borer insects in tomatoes. This problem is solved using Cloud computing and IOT. In

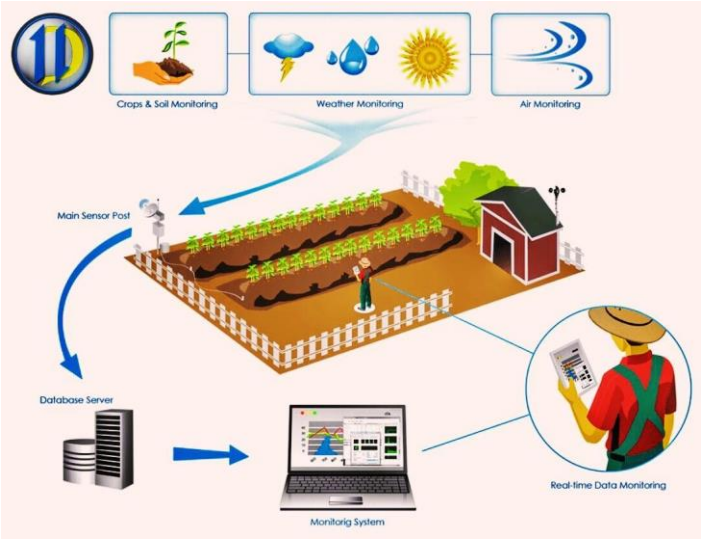
[4], a real-time monitoring of GPS-tracking was suggested for multifunctional vehicle path control and data acquisition based on Zig-Bee multi-hop mesh network. It summarizes portion that is related to path planning for a multifunctional vehicle. The vehicle tracking system uses the global positioning system (GPS)

and ZigBee wireless network based on to make the system communicate. In

[5], Web of Things case study for agriculture was put forward, which focuses on an experimental smart farm that uses a range of environmental sensors and livestock-monitoring technologies. A system that specifies the alert was tested in a farming area and the results were analysed. The linked cube was used which allows longer-term analysis and data sharing to a larger scale. From the above literary survey, we have found a novel approach using a smart sensing system that keeps track of the external environmental factors and does communication with the smart irrigator system to perform necessary tasks that are required for farming. In this system, we have furnished a resolution for the problems faced by the farmers. The main problems faced by them are electricity shortage, manual labour work, lack of mechanization, knowledge deficit about farming, and not knowing about the adequate usage of macro mineral contents (N, P, and K). Our system does the job of sensing and also habituates to the surroundings.

3. OBJECTIVE

The objectives of the thesis are,



(i) To realize digital garden and agricultural automations systems.
(ii) To construct a prototype and implement the sensor based soil maintenances and water management system.
(iii) To evaluate its performance and validate the simulated response obtained in this system.

4. Block diagram

The smart garden monitoring system monitoring system block diagram connection and basic details are discussed in this chapter. The block is

- ✓ Power supply
- ✓ Arduino microcontroller
- ✓ Moisture sensor
- ✓ Ph sensor
- ✓ Temperature sensor
- ✓ Relay module
- ✓ GSM modem

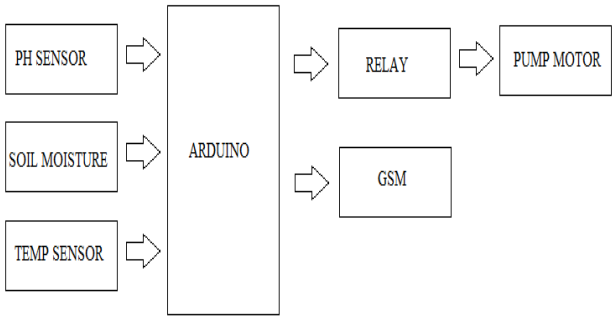


Fig 4.1 Block Diagram

5. Circuit Diagram

The basic construction working operation and the construction details of the smart garden monitoring system are discussed here. The protease Simulink software are help the design the circuit of the circuit diagram.

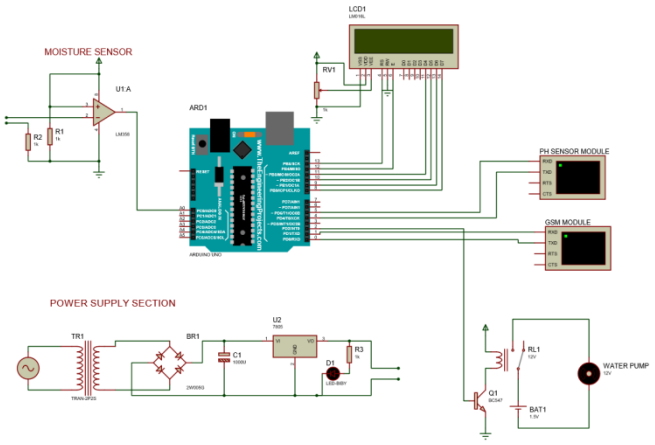


Fig 5.1 Over All Circuit Diagram

5.1 Circuit Construction

The total system getting the power from the power supply section. The power supply section contains

the step-down transformer and rectifier, filter, voltage regulator also. The primary side of the transformer are connected the 230V AC source and the secondary side connected to the input of the rectifier. The rectifier output connecter the filter section. In this section contain the 100 MFD capacitor. We are use in this project 16X2 display for help of monitoring purpose. The display are getting the data is from the microcontroller. The date pin are D7, D6, D5, D4 are getting from the 8,9,10,11 pins of the Arduino microcontroller. The control pin of the En and RW are getting from the pin 12,13. We are using GSM modem for communication module in this project and its type is sim800L.The RX and TX pin of the GSM modem connected the TX and RX pin of the microcontroller pin number 0,1The relay modules are used for the tripping purpose. The relay module having two parts one is relay coil and another one is switching transistor. The collector terminal of the BC 547 connected the coil 2 terminal of the relay coil and coil 1 terminal connected the 5C dc source and emitter terminal connected the GND. The Ph sensor are help to measure the PH level of the pumping water. The sensor module are constructed with help of at mega IC the module are connected the programmable grated serial port. Like pin 4,5 is programmable generated port. The Rx pin of the PH module are connected the pin 5 of the microcontroller. The moisture sensor are only constructed with the 2 rods pieces and one comparator IC that IC name called the comparator IC. Pin 8id the VCC and pin 4 is the GND pin of the lm358 IC. The 2-pin used for the reference value and pin 3 is used for the checking the moister with the help of copper rod. The 12V motor used for demonstrate the system the motor one terminal are directly connected the source and another one terminal connected the NO pin of the relay and source another terminal is connected the common pin of the relay coil. The total connection are pictures display the above. The main operation done with the help of Arduino microcontroller the microcontroller also getting the power from the power supply section.

5.2 WORKING OPERATION OF THE CIRCUIT DIAGRAM

Whenever power supply on the power supply section provided the determine level of the power to all the section. the moisture and PH sensor are ready to prepare the sense. If the moisture is wet the Arduino getting the low signal from the moisture sensor via pin number A0. So the Arduino giving the signal to the relay section to change the NO to NC it means the motor will be pumping the water to the garden. At the same time the PH sensors also read the PH value of the pumping water and send the ph level and the temperature to the determine mobile number of the Arduino microcontroller. The massage transfer operation done with the help of the GSM modem. In the operation are done with the AT commands. At commands means protocol call of the GSM modem. If the land soil going to cool condition the moisture sensor are given the high signal to the Arduino microcontroller so the motor was stopped with the help of relay dripping function. The same time motor stopped massage also send the same predefined mobile number. The total operation are predefined in the Arduino microcontroller using Arduino IDE compiler.

Application

- ✓ Gardens
- ✓ Agricultural lands
- ✓ We can some other uses simply modified of this system

Advantages

- ✓ Prototype
- ✓ Simple and easy operation
- ✓ No man power require to on of the motor
- ✓ Safe for the agricultural

6. CONCLUSION

In India 70% of its population earns it livelihood from agriculture. The inordinate majority contributes only 18% of the GDP. The key reason for this deprived performance is lack of agricultural task automation. Our Smart sensing system provides precise results and the Smart irrigator system manages to spray the necessary nutrients according to the requirements of the crops. Based on the moisture content results of the soil, adequate amount of water was sprinkled by the irrigator system. We are developing a user-friendly smart farming system which will liberate agricultural productive force greatly, change the mode of production, and realize a qualitative leap in agricultural activity

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