



Dragon Fruit: E-Farming Based on Weather Forecasting

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Abstract: This fruit plant grows in poor soil conditions and temperature variations. So, the tropical climate conditions are perfect for dragon fruit farming. The ideal annual rainfall for Protected Cultivation is 50 cm. The temperature for dragon fruit cultivation must be between 20 °C to 30 °C. Internet of Things (IoT) is an emerging area to assist agriculture related applications. Applications such as smart gardening, water maintenance, other equipment automatic installations based on human actions, etc., can be implemented using IoT. In this project, a wireless sensor-based networking system is proposed to address water pumping system to crop. The first problem is to automate the process of pumping the water to crop in a garden. Atmospheric Pressure, Temperature and humidity sensor are used to monitor the temperature in order to initiate the water pumping system, while soil moisture sensors are used for sensing the water level and initiate the process of pumping the water to the crops in the garden. Rain sensor is used to check the rain, if rain is coming it is going to stop all the motors. The data collection is applied to collect and store the information in server for further processing. Proposed systems are deployed and demonstrated using open-source hardware such as micro controller, GSM, etc.

Index Terms - Arduino, Soil Moisture Sensor, DHT11 Sensor, Raindrop Sensor, GSM, DC pump, LCD.

I. INTRODUCTION:

An Embedded system is a special-purpose system in which the computer is completely encapsulated by or dedicated to the device or system it controls. Unlike a general-purpose computer, such as a personal computer, an embedded system performs one or a few predefined tasks, usually with very specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. In this digital world, we need every possible thing around us to be automatic which reduces human effort. There are increasing electronic circuits that make today's life easier and simple. Nowadays, energy crises and water crises are the big problems faced by everyone. So, there is a need to conserve water. The aim of this is to make an irrigation system to irrigate the field automatically. Imagine how helpful it will be when you are busy doing your next task and your field is being irrigated automatically at a low cost.

II. EXISTING SYSTEM:

In the Existing System, people used to check and verify the moisture content in the fields manually. This is very difficult and risk process to check the condition in the mid-night. Even though the climate is good the humidity is unknown, so in the previous system we have some disadvantages.



Fig2.1: Existing system

III. PROPOSED SYSTEM:

In the Proposed System the user has sufficiently used the technology in the agricultural sector; here in this system we are using the Moisture Sensor to identify the moisture content in soil and DHT11 sensor to monitor the Humidity and Temperature levels at the Fields. The Data of these Sensors is directly displayed on the LCD; with this user can easily can have the Climatic, Moisture Conditions at the Fields. BMP180 sensor will monitor the pressure in the air. If the pressure increases then GSM will send message to the former. LDR will detect the light intensity based on the light intensity Bulb will ON and OFF. All the sensors data will upload to the server through GSM.



Fig3.1: Proposed system

3.1: BLOCK DIAGRAM

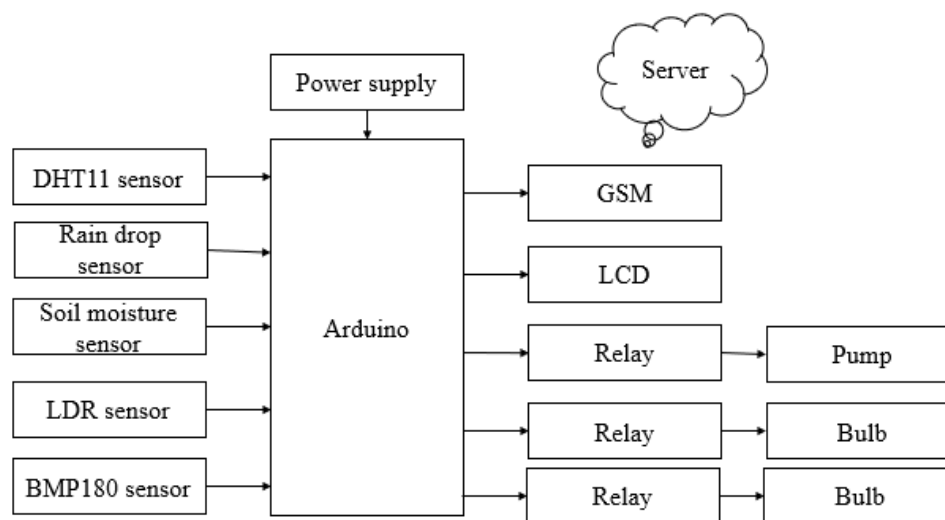


Fig 3.1: Block Diagram of Proposed System

3.2: ADVANTAGES:

1. Provides a healthy, beautiful landscape
2. Reduces water waste
3. Saves money
4. Provides convenience

3.3: APPLICATIONS:

1. used for irrigation of agriculture field
2. used in the agriculture research stations, greenhouses, gardens and loans etc.
3. Nurseries
4. In Garden

IV. COMPONENTS DESCRIPTION:

4.1: HARDWARE COMPONENTS REQUIRED:

4.1.1: ARDUINO MEGA 2560:

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 Analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro controller; 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 Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.



Fig 4.1.1: ARDUINO MEGA 2560 BOARD

4.1.2: DHT11 SENSOR:

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc.... to measure humidity and temperature instantaneously. DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.

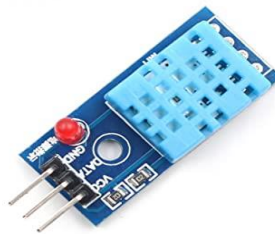


Fig 4.1.3: DHT11 SENSOR

4.1.3: LDR SENSOR:

A Light Dependent Resistor (also known as a photoresistor or LDR) is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light-sensitive devices. They are also called as photoconductors, photoconductive cells or simply photocells. They are made up of semiconductor materials that have high resistance. There are many different symbols used to indicate a photoresistor or LDR, one of the most commonly used symbols is shown in the figure below. The arrow indicates light falling on it.

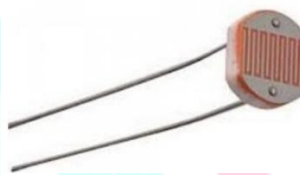


Fig 4.1.3: LDR SENSOR

4.1.4: SOIL MOISTURE SENSOR:

This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity). The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent. This sensor makes it perfect to execute experiments within science courses like environmental science, agricultural science, biology, soil science, botany, and horticulture.

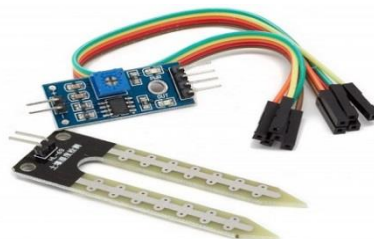


Fig 4.1.4: SOIL MOISTURE SENSOR

4.1.5: RAINDROP SENSOR:

Raindrop Sensor is a tool used for sensing rain. It consists of two modules, a rain board that detects the rain and a control module, which compares the analog value, and converts it to a digital value. The raindrop sensors can be used in the automobile sector to control the windshield wipers automatically, in the agriculture sector to sense rain and it is also used in home automation systems.

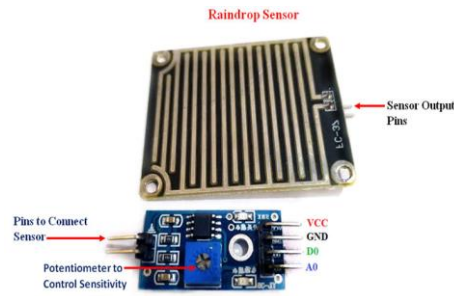


Fig 4.1.5: RAINDROP SENSOR

4.1.6: GSM:

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.



Fig 4.1.6: GSM

4.1.7: LCD:

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light emitting diode and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.



Fig 4.1.7: LCD

4.1.8: DC PUMP:

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use AC power otherwise DC power for energizing the motor of the water pump whereas others can be energized other kinds of drivers like gasoline engines otherwise diesel.



Fig 4.1.8: DC PUMP

4.2: SOFTWARE REQUIRED:

4.2.1: ARDUINO IDE SOFTWARE:

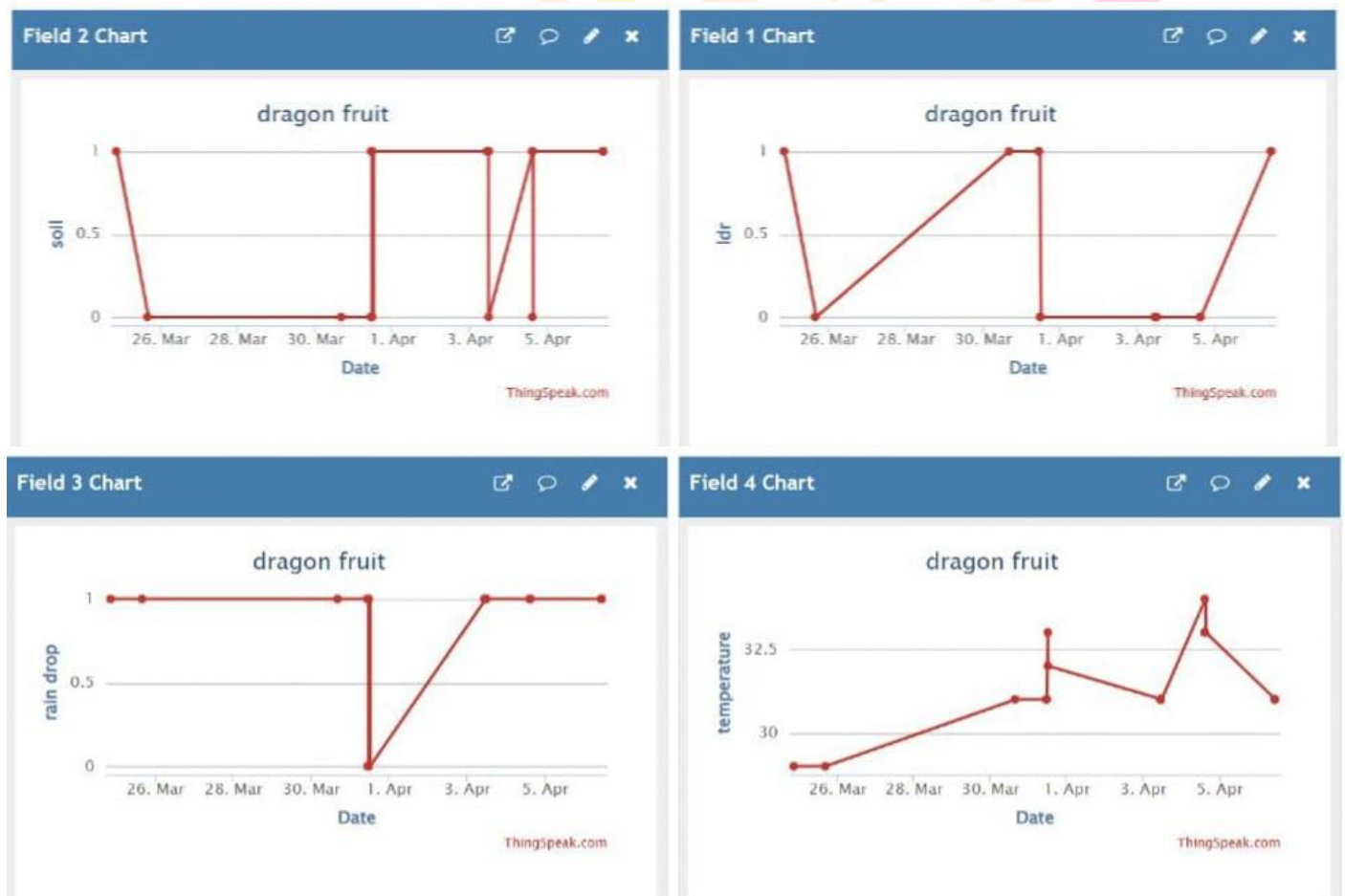
The Arduino integrated development environment (IDE) is a cross platform application (for Windows, macOS, Linux) that is written in the programming language Java. It originated from the IDE for the languages *Processing* and *Wiring*. It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple *one-click* mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus. The source code for the IDE is released under the GNU General Public License, version.

4.2.2: EMBEDDED C:

EMBEDDED C Programming is the soul of the processor functioning inside each and every embedded system we come across in our daily life, such as mobile phone, washing machine and digital camera. Each processor is associated with embedded software. The first and foremost thing is the embedded software that decides functioning of the embedded system. Embedded C language is most frequently used to program the micro controller.

V.RESULTS AND DISCUSSION:

In this project model considering alternate source of electric power, automatic control, reliability and low cost. As the system is totally automatic, it will help the operator to properly irrigate their fields. Also in this model the water level indicator is used to avoid the dry running of motor which is helpful for safety of motor and saving of water. The proposed methodology can be suitable alternative to overcome the necessity of electricity and the irrigation system for our farmers. To promote the formation of dragon fruit, it is important to provide the cactus with optimal growing conditions, such as proper water and nutrient levels, adequate sunlight, and suitable temperature. Pest and disease management are also important for ensuring healthy growth and fruit formation.





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