# A CONCEPTUAL STUDY OF SENSOR FOR SMART FARMING: HUMIDITY, TEMPERATURE AND MOISTURE MEASUREMENT

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***Abstract:*** **Agriculture is the primary occupation in our country for ages. But now due to migration of people from rural to urban there is hindrance in agriculture. So to overcome this problem we go for smart agriculture techniques using IoT. This project includes various features like moisture & temperature sensing. It makes use of wireless sensor networks for noting the soil properties and environmental factors continuously. Various sensor nodes are deployed at different locations in the farm. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, with microcontroller. This concept is created as a product and given to the farmer's welfare.**

***Keywords*: soil moisture, temperature, wireless sensor, microcontroller, environment, agriculture techniques.**

## I. Introduction

Improving farm productivity requires crop performance to be understood and forecasted under a wide variety of environmental, soil, fertilization, and irrigation conditions. Productivity of a farm can be enhanced by determining which crop variety has produced the greatest yield under similar soil, climate, fertilisation, and irrigation conditions. The same data-driven approach to crop selection can also address climate change, resource constraints and societal concerns around issues such as animal welfare, fertilizers, and environment that often impact agricultural production . According to the United Nations' Food and Agriculture Organizationfood production must increase by 60% by 2050 .

Smart farming involves the use of Information Communication Technologies (ICT) and in particular, the Internet of Things (IoT) and related big data analytics to address these challenges via the electronic monitoring of crops, as well as related environmental, soil, fertilisation, and irrigation conditions. Such monitoring data can be then be analysed to identify which crops and specific crop varieties can best meet the productivity targets of any particular farm around the world. Crop variety identification involves the use of plantsphenomics.Therefore, smart farming permits the assoication of crop data and related data analysis results with specific crop varieties .

PROBLEM STATEMENT

During the information stage main problem statements for current systems are as below:

1.Relay motor was firstly not working as we were using it as dual channel.

2. Soil moisture sensor was not working because firstly we were using Dht11 sensor.

SOLUTION TO PROBLEM FACED

1.Firstly relay module was not working so we changed it to single channel and after this changes, it started working.

2.As soil moisture sensor was not working because we were using Dht11 sensor, so we changed Dht11 sensor to Dht22 sensor and the soil moisture sensor started working.

OBJECTIVES :- This project is made for helping our agriculture sector which is important for every developing country.

SCOPE :- One of the limitations of this system is that continuous internet connectivity is required at user end which might prove to be costly for farmer. This can be overcome by extending the system to send suggestion via SMS to the farmer directly on his mobile using GSM module instead of mobile app. Weather data from the meteorological department can be used along with the sensed data to predict more information about the future which can help farmer plan accordingly and improve his livelihood.

## II. Working Architecture

- The soil moisture sensor continuously takes the reading from the soil and display on the LCD.
- The temperature and humidity sensor takes the reading from the atmosphere and display on the LCD.

- When the moisture is in negative, the dc motor starts supplying the water to the soil.
- Relaymodule helps in the functioning of DC motor .

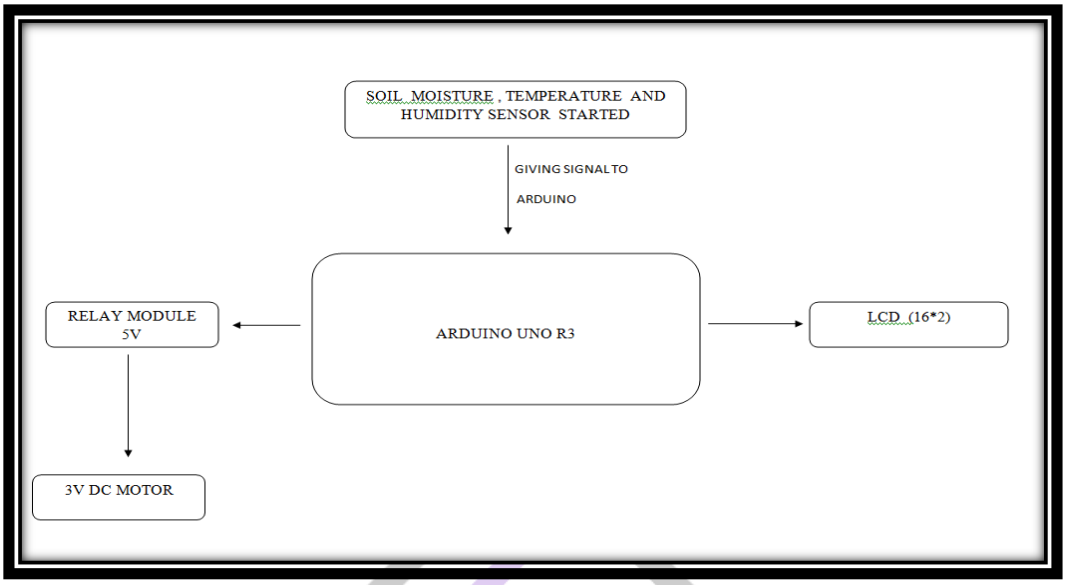


**Fig1.0** Block diagram of working of sensors

## III. Working component

ARDUINO UNO:-

The **Arduino Uno R3** 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 16 MHz 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.

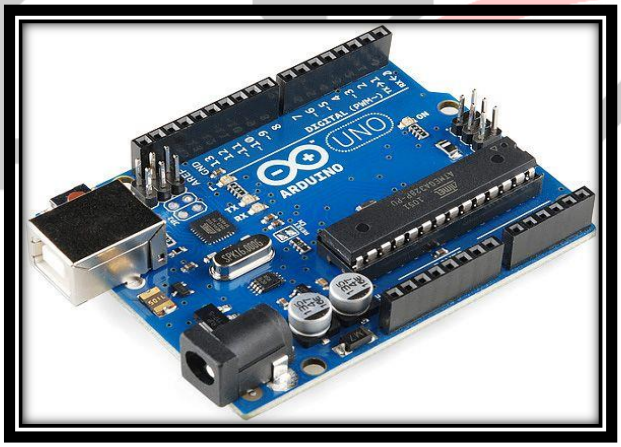

**Fig2.0**Arduino UNO

SOIL MOISTURE SENSOR

Soil moisture sensor is a sensor which senses the moisture content of the soil. The sensor has both the analog and the digital output. The digital output is fixed and the analog output threshold can be varied. It works on the principle of open and short circuit. The output is high or low indicated by the LED. When the soil is dry, the current will not pass through it and so it will act as open circuit. Hence the output is said to be maximum. When the soil is wet, the current will pass from one terminal to the other and the circuit is said to be short and the output will be zero. The sensor is platinum coated to make the efficiency high. The range of sensing is also high. It is anti-rust and so the long has sensor life which will be afford the farmer at a minimum cost.

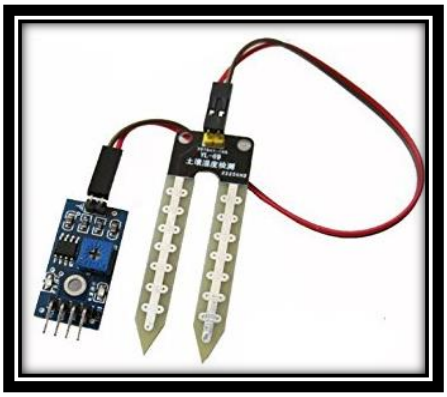

**Fig3.0** Soil Moisture sensor

TEMPERATURE / HUMIDITY SENSOR

The DHT11 sensor is highly used because its output voltage is linear with the Celsius scaling of temperature. It does not provide any external trimming. It has a wide operating range. The maximum output is 5V. The output will increase 10mV for every one degree rise in temperature. The range is from -55 degrees to +150 degrees. There are three terminals as Vcc, Ground and the analog sensor. It consumes minimum amount of electricity. Thus, it is energy efficient. It is very efficient in horticulture. It is user friendly to use.

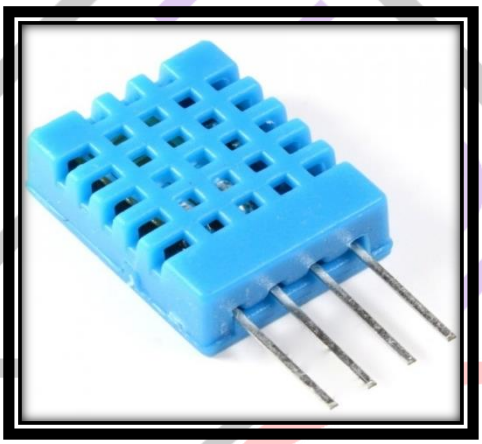

**Fig4.0** Temperture and Humidity sensor

5V RELAY MODULE

The module is triggered, high trigger current less than 5mA, part of the 51 single-chip IO port output capability is weak, pull or increase the drive capability of the circuit.


**Fig5.0 Relay module**

DC PUMP MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

**Fig6.0** DC pump motor

LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels , while other display have larger elements .


**Fig7.0** LCD (16*2)

**IV. Implemantation**

Future expansion

By using this circuit we can connect GSM module to control the farming from our mobile.

By using motor driver L293D we can also control the speed of the water and the amount of the water supply supplied to the field .

APPLICATION

I. For checking the moisture in the soil
II. For Detecting temperature in the surrounding
III. For supplying water when the moisture level is low

APPLICATION AREA :-

- Robotics barrier
- Smart farming
- Public awareness
- Irrigation system

Advantages

The movement proves great advantages for the future; for example, the use of Smart Farming techniques can optimize the yield of land, creating more output from the same amount of input. Not only does smart farming optimize, it also utilizes the knowledge of farming professionals by not replacing the traditional farmer but using their knowledge to support decisions. This optimization allows for less waste and maximum efficiency. And the use of sensor technology and real time data allows for unparalleled insight into the commodities market.

Potential limitations

However advantageous the movement is, it comes with disadvantages as well. Smart farming requires skills in robotics, and computer based intelligence, skills the average farmer would not necessarily have. Not only are farmers not proficient in robotics and computer intelligence the language of the Internet of Things would need to dramatically change in order for both farmers and information technology professionals to communicate to each other. Finally farming is a low margin industry so the willingness to invest in innovation is low as well.

## V. Conclusion

IoT based smart farming system can prove to be very helpful for farmers since over as well as less irrigation is not good for farming. Threshold values for climatic conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region. This system generates irrigation schedule based on the sensed real time data from field and data from the weather repository. This system can recommend farmer whether or not, is there a need for irrigation. Because of this the human efforts are less .

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