

Study and Control of DHT11 Using Atmega328P Microcontroller

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Abstract --- Here digital portable Temperature and Humidity Sensor is designed by using the DHT11 (Temperature and Humidity) sensor and ATmega328P Microcontroller. The accuracy in temperature is $\pm 1^\circ$ similarly the accuracy in Humidity is found to be $\pm 1^\circ$. It can measure temperature of range 0°C to 60°C and humidity of range 0% to 95% The power supply of 5volt and 1 amper is used to drive the Arduino Uno ,DHT11 and the 16x2 LCD display to display the Temperature and Humidity.

Index Terms— Arduino Uno, DHT 11, Humidity , Temperature and 16 x2 LCD Display

1 INTRODUCTION

THIS DHT11 is the low cost temperature and Humidity sensor which is very slow and basic but very helpful for the researcher who want to do basic data logging device. It has two parts, a capacitive humidity sensor and a thermistor. It consists of chip which converts analog to digital data signal with temperature and humidity. This digital data is reading by microcontroller Atmega 32 i.e. Arduino Uno and displayed by the 16x2 LCD display. Distributed fiber Bragg grating technique is also used to measure the temperature and humidity sensor [1]. An intrinsic relative humidity (RH) sensor which has linear, reversible, and accurate response behavior at 10–90% RH and at 13–60 °C[2]. Cryogenic Frost point Hygrometer (CFH) is able to reproduce the R.H distribution as observed [3]. Capacitive humidity sensor has two detection electrode, the capacitance change with humidity it includes reference capacitor and feedback capacitor [4].Capacitive humidity sensor include the capacitor with metallic electrode with a moisture-sensitive polymer film between them [5].By using the integrated CMOS testing electronics the sensitivity of the sensor can be improved by removing the underlying substrate[6].

Anodic aluminum oxide (AAO) having nanosize pores is used as a sensing layer for observing water vapor [7]. Wireless sensor network (WSN) system can be design for temperature and humidity sensor by using an Xbee wireless communication module for environmental application [8], [10].Arduino Uno is microcontroller which is open source also. It works physical computing platform for researcher to interact with object. It has the free Integrated Development Environment (IDE). The Arduino IDE is based on the Processing language [9]. Before the discovery of the Arduino Uno ,the parallel port of computer is used to measure the temperature and humidity by interfacing the sensor with the parallel port of the computer[11].But now the days simple the Atmega 32 Microcontroller is used which is very easy to program . It gives the less error in measure then the later one.

2 METHODOLOGY

To design it following components are used

1. DHT11
2. Arduino Uno
3. 16x2 LCD display
4. Jumper
5. 5volt 1amp dc power supply

DHT11 is uses as capacitive humidity sensor and a thermistor to measure the surrounding air, and gives out a digital signal. It requires careful timing to grab data. It gives new data once every 2 seconds, so when using our library, sensor reading date is two second old. Simply connect the first pin on the left to 3-5V power, the second pin to data input pin and the rightmost pin to ground. It uses a single-wire to

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send data. The output of DHT11 is feed to the Arduino Uno board in pin no 6 .The Arduino Uno is connected to the 16x2 LCD display as shown in fig 1. This circuit is design in the Fritzing Beta Version 0.9.0 Software. The connection of DHT11 with Arduino Uno and 16x2 display is shown below.

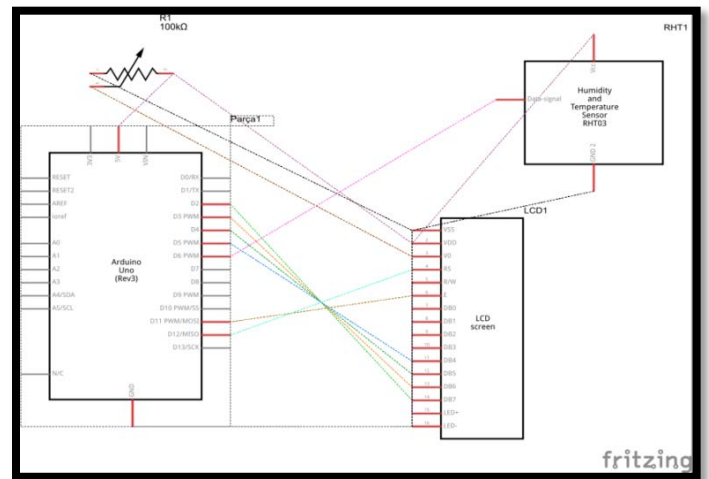


Fig2 Schematic

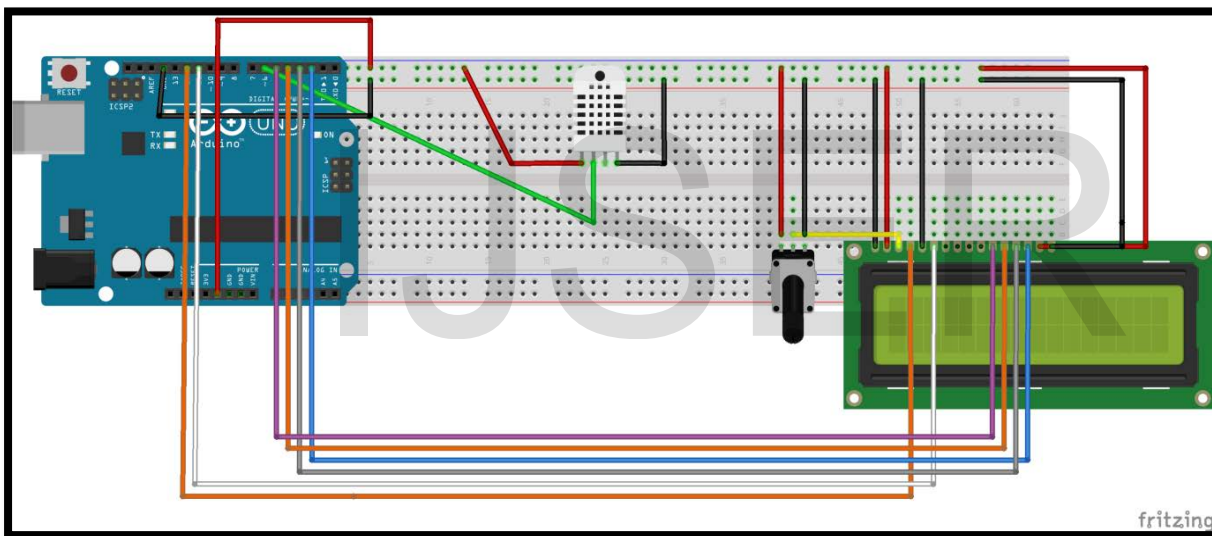


Fig 1 The connection of DHT11 with Arduino Uno and 16x2 LCD display

3 RESULTS AND DISCUSSION

The result of the experiment shows that the maximum temperature capacity of the sensor is 60°C and the minimum is 0°C .It also shows that the humidity is inversely to the temperature .It has a accuracy of temperature of $\pm 1^{\circ}\text{C}$. Similarly it shows that the maximum Humidity measure is 95% and minimum is 0% with the accuracy of $\pm 1^{\circ}\text{C}$.

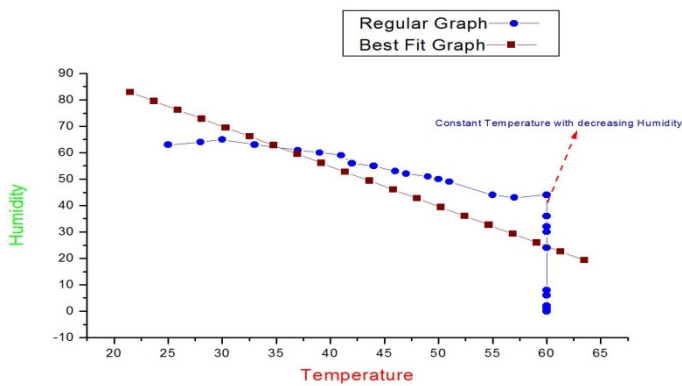


Fig 3: Graph of Temperature Vs Humidity



Fig5: Front View

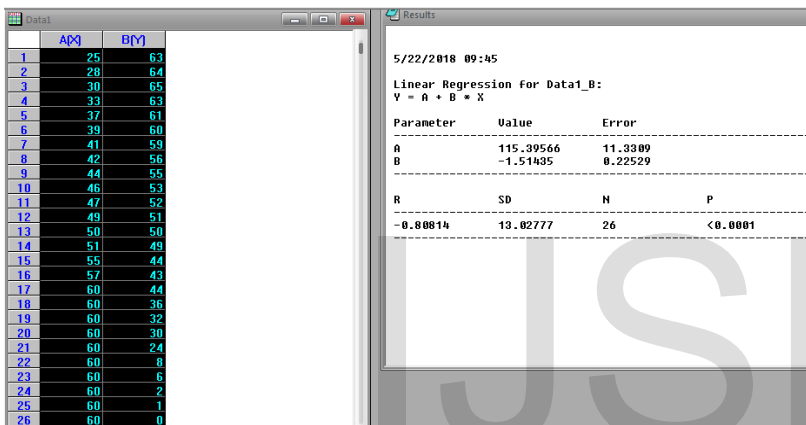


Fig 4: Data of Temperature and Humidity with linear regression equation

Here from the graph as shown in fig 3 we conclude that the Temperature is inversely proportional to the Humidity and the temperature is become keep constant at 60°C and Humidity decrease rapidly to zero i.e . the maximum temperature capacity of the given DHT11 is 60°C and similarly the minimum Humidity that is measured by the sensor is zero . This is the main finding of this research.

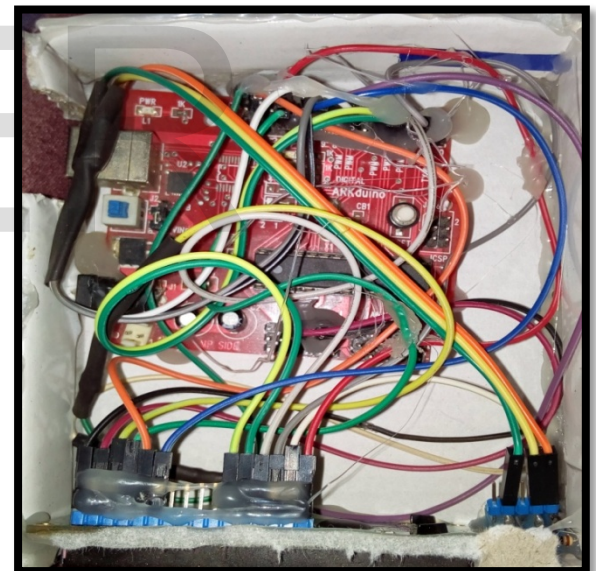


Fig6: Arial View

4 APPLICATIONS

- It can measure temperature and humidity
- It is used in Local Weather station
- It is used for Automatic climate control
- It is also used for Environment monitoring System wirelessly.

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