

Humidity and Temperature Prototype for Education with Internet of Things

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Abstract— The condition of a room of both humidity and temperature is very important for specific activities, to know the condition of the room from the humidity and temperature can be designed a prototype of humidity and temperature by using few components such as DHT 11 sensor, Arduino UNO R3, 2x16 LCD, I2C LCD. The designed prototype applies the Internet of Things connectivity so that humidity and temperature information can be quickly sent to Android applications that user have. This prototype can be used well with accurate results every second and even every second data will be sent using internet connection, and also this prototype can be used as a learning media for students who want to know how microcontroller, Arduino, and IOT work.

Keywords—Sensor, Arduino, Humidity and Temperature, IOT

I. INTRODUCTION

The development of information technology is growing very rapidly, especially in the field of information and almost many aspect already impact with technology[1]–[4]. One of the technology is Internet, Internet makes it easier for us to search the information we need or we can do many things with internet such as banking, online shop, remote, monitoring chatting and there's a lot of thing can to do[5], [6]. Accessing the internet more faster because of the increasingly sophisticated technology and supported data management in a fast, precise and efficient and excellent data storage space, thus the information we need becomes easier to obtain and easy to use by every user[7].

Humidity and Temperature of a room are essential for a specific activity such as farming, baby room and many else[8]–[10]. Humidity and Temperature must be controlled as early as possible until it reaches the desired conditions, to find out the how humidity and temperature of a room can be known and control it could be designed a prototype microcontroller by using a DHT-11 sensor, Arduino and also Microcontroller board[11], [12]. The designed prototype will

also be connected online or IOT-based so that information can be obtained quickly and quickly because the connection is stable with a broader range making it easier to get information, received data must be checked and calculated so that possible data errors can be avoided[13]–[15].

IOT application on humidity condition and room temperature is used to get real room condition data so that decision can be executed whether to raise the room temperature or lower the room temperature, this control can be done online by using internet connection because all devices both prototype microcontroller and remote control which are made based on Android are all connected. Raising or lowering the temperature is only one activity that can be done based on the data obtained, but also the use of IOT and microcontroller can be used as an example for learning media[16] to recognize the electronic devices and also the use of internet positive than just for browsing or merely access facebook, youtube and so forth.

Prototype humidity detection and room temperature can be used as an excellent educational media for students to know Internet of Things and also microcontroller work and how communication can be connected to each other by using internet connection, learning will be more natural to do if there is a physical form of the material taught in this case is about microcontroller Arduino and IOT and how to connect the two, students are expected to know how to design a humidity and temperature detector using Arduino and IOT.

II. METHODOLOGY

Internet of Things is an auspicious scientific development to optimize life based on intelligent sensors and smart equipment that work together through the internet network, all the equipment we use in our daily lives can be controlled and monitored using IOT[17]. The majority of processes are achieved with the help of sensors in the IOT. The sensors are deployed wherever, and these sensors convert raw physical data into digital signals and transmit them to the control center[18]. In this way, we can monitor changes in the

environment remotely from any part of the world via the internet. The architecture of this system will be based on the context of operations and processes in real-time scenarios[1], [7], [17]. Security in the IOT is currently undergoing an excellent development with a lot of security research using IOT, some algorithms that can be applied on IOT like Tripple Transposition Key, Base64, Blowfish and many others and most dominant use were symmetric cryptography algorithm[19]–[24].

Humidity and temperature detection prototype is designed using several components such as DHT 11 sensor, Arduino UNO R3, 2x16 LCD, I2C LCD[11]. The primary element to detect the sensor using DHT 11 which can identify good enough humidity conditions and room temperature, this sensor has a thermistor type NTC (Negative Temperature Coefficient) to measure the temperature and an 8-bit microcontroller that process both sensors and send the results to the pin output in a single-wire bi-directional format[9], figure 1 is the detailed components assembled on the designed humidity and temperature detection prototype.

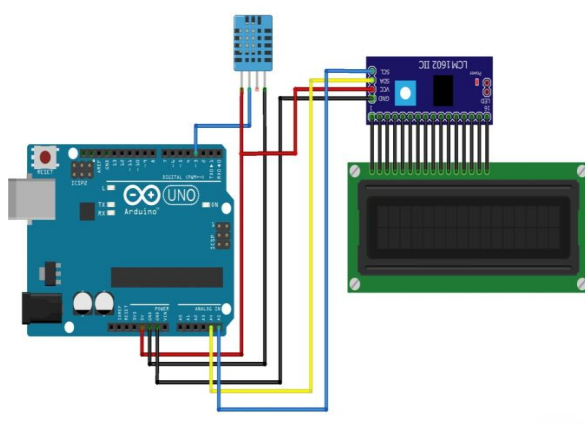


Fig.1: Prototype humidity and temperature device

The circuit in Figure 1 which is the prototype of the humidity and temperature detector are connected and input command to display the condition of the room into the led display, the command is used as follows:

```
#include <DHT.h>
#define DHTPIN 2
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
void setup()
{
    Serial.begin(9600);
    dht.begin();
}
void loop()
{
    float h = dht.readHumidity();
    float t = dht.readTemperature();
    Serial.print(h);
    Serial.print(",");
    Serial.print(t);
    Serial.println();
    delay(2000);
}
```

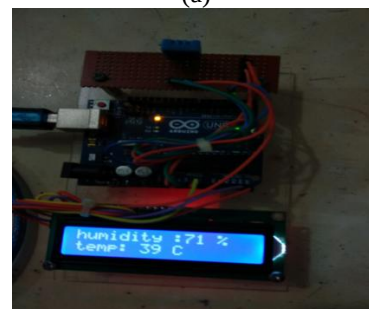
```
Serial.print(t);
Serial.print(",");
Serial.println();
delay(2000);
}
```

III. RESULT AND DISCUSSION

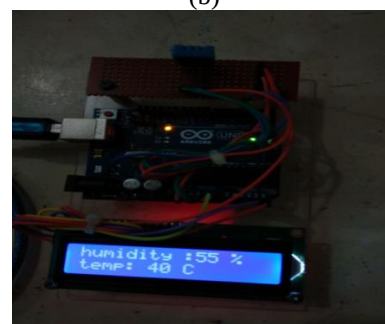
An experiment humidity and temperature detection is conducted in a closed room with one ventilation air, the and microcontroller will send data of detection result to the Android application in real-time if there is change condition either from humidity or temperature, here is some test result done with some different condition



(a)



(b)



(c)

Fig.2: a,b and c Experiment humidity and temperature
Figure 2 is a result of several room conditions in Fig. 2 (a) stable room conditions where air vents are turned on, then in

Fig. 2 (b) and (c) the air vents are turned off and fire are turned on in and drastically the room temperature increased significant but the humidity are more lower than the first one, to test real-time data of humidity and temperature can be connected by using Matlab with result as follows:

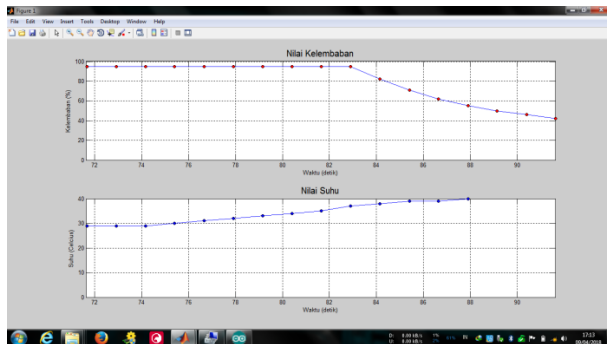


Fig.3: Real-time data output from the microcontroller

Figure 3 shows the condition of humidity and room temperature in real-time, shown in Figure 3 changes the condition of the room every second, from figure 3 shown the humidity section decreased while the temperature is getting high with exponentially rising charts, table 1 below show detailed table testing condition of humidity and temperature.

Table.1: Real-time interval for humidity and temperature

Time	Humidity	Temp	Time	Humidity	Temp
4.348228	75	28	91.62333	42	42
5.186247	73	28	92.87639	39	42
6.440109	74	28	94.13988	36	42
7.684001	74	28	95.39436	36	42
11.4725	75	28	96.62316	36	43
16.74082	77	28	97.88362	34	43
17.98814	76	28	99.1232	33	43
19.24554	76	28	100.3805	32	43
20.48846	79	35	101.626	32	43
21.73041	76	28	102.872	31	43
22.99297	75	28	104.1591	31	43
24.22902	75	28	105.373	30	43
25.4899	75	28	106.6101	29	42
26.72996	75	28	107.8688	29	42
27.98361	75	28	109.1035	29	42
29.21715	75	28	110.3476	29	42
30.4667	75	28	111.6003	30	42
31.71362	75	28	112.8511	30	42
32.97254	74	28	114.1015	30	42
34.22994	74	28	115.3534	30	41
35.47742	74	28	116.6001	31	41
36.71483	74	28	117.849	31	41
37.9707	74	28	119.0896	32	41
39.20709	73	28	120.3461	32	41
40.46906	73	28	121.5877	32	40
41.70908	73	28	122.8678	32	40
42.95978	73	28	124.0846	33	40
44.20365	73	28	125.3299	34	40
45.46131	73	28	126.578	34	39
46.7014	73	28	127.8289	35	39
47.94051	73	28	129.0889	35	39
49.21105	73	28	130.3214	36	39
50.44831	73	28	131.5669	36	39
51.68692	73	28	132.8222	37	39

52.94845	73	28	134.0673	36	38
54.19859	73	28	135.335	34	38
55.44652	73	28	136.5789	35	38
56.68669	74	28	137.8328	35	38
57.93506	75	28	139.0678	36	38
59.18325	75	28	140.3125	36	38
60.42631	75	28	141.5604	37	38
61.68646	74	28	142.8109	36	37
62.91789	74	28	144.0622	37	37
64.1848	74	28	145.309	37	37
65.42288	75	29	146.5542	38	37
66.68683	75	29	147.7932	38	37
67.92149	75	29	149.0409	39	37
69.16574	75	29	150.2962	39	36
70.42042	76	29	151.5477	39	36
71.66966	95	29	152.7987	40	36
72.926	95	29	154.0411	40	36
74.17205	95	29	155.2877	41	36
75.40221	95	30	156.5328	41	36
76.65939	95	31	157.7908	42	36
77.91483	95	32	159.039	41	35
79.16551	95	33	160.285	42	35
80.41055	95	34	161.529	42	35
81.65382	95	35	162.7792	43	35
82.90748	95	37	164.0293	43	35
84.15132	82	38	165.2802	44	35
85.40669	71	39	166.5258	45	35
86.64194	62	39	167.766	45	35
87.90184	55	40	169.0105	45	34
89.14062	50	41	170.277	46	34
90.39504	46	41			

Table 1 is the real-time value obtained from the microcontroller using Matlab, and the value will be sent to the Android application so that the user knows the condition of the room installed by the prototype of humidity and temperature.

IV. CONCLUSION

The designed humidity and temperature prototype can display the real-time room temperature conditions and by implement IOT concept the data can be quickly received by the owner with the help of android applications that connected to the Internet. Matlab used as live test data show the graph result changing of humidity and temperature, this prototype can be used as educational media of learning for the student who wants to learn basic of electronics, programming, network and IOT. The development of this prototype is possible to be carried out such as being connected to the air conditioner and triggering the automatic temperature setting and other developments that will be the object of another research.

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