



Automation based Automatic Fan

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Abstract: Now-a-day's technology is running with time; it completely occupied the life style of human beings. Even though there is such an importance for technology in our routine life there are even people whose life styles are very far to this well-known term technology. So, it is our responsibility to design few reliable systems which can be even efficiently used by them. Automatic Room Temperature Controlled Fan Speed Controller is one of them. The developed system provides an environment in which no user needed to control the fan speed. Automatically control the fan speed by sensing the room temperature. These fascinating efforts to create intelligent system are to provide human being a more convenient life. The circuit was designed using electronic components available in local market to keep the cost at low level.

Index Terms: DHT 11, Room Temperature, Home Automation, Fan Speed, Low-cost

I. INTRODUCTION

Electric fan is one of the most popular electrical appliances widely used in tropical locations for convective heat transfer to achieve cooling due to its cost-effectiveness, low power consumption, and efficiency in attaining excellent ventilation. Presently, the regular electric fans used in the house consist of a speed regulator calibrated into five ascending order which is manually controlled to the desired speed. This sometimes poses a challenge for a user that is not fully conscious while the fan is in operation for example; when a person is sleeping; when a baby is in the room alone; or for the patients in the hospital unaided.

Consider a scenario when a person is in deep sleep and with the fan set to the highest speed because of a hot weather. If the weather suddenly changes and is very cold, the person will be extremely cold and might catch cold or even result to pneumonia. Similarly, a baby that is under the fan alone might develop cold or when in extremely hot weather, develop heat rashes if the fan speed is not properly controlled. The inconvenience and the risk of not regulating the speed of a fan timely to suit the ambient temperature has been a major challenge which is the focus of this research.

The objective of this research project is to design and construct an efficient automatic household electric ceiling fan that can auto-switch the fan regulator to control the fan speed to suit the ambient temperature. This is different from a remote sensing device which will require the manual operation of the fan regulator using a remote control.

II. SYSTEM DESIGN

The system is divided into six main parts, namely, Arduino Uno, Bread Board, DHT11 Humidity sensor, 5V fan, 2N2222 Transistor, Led screen. The sensor & driver circuit consists with DHT 11 temperature sensor with associative circuits. The output of the sensor is converted in volts and it use as input of subtraction circuit also the output of fixed voltage circuit is applied to the input of subtraction circuit. The output of subtraction circuit controls the fan dimmer via buffer.

2.1 Arduino Board

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, 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. You can tinker with your UNO without worrying too much about doing something wrong, worst-case scenario you can replace the chip for a few dollars and start over again.

2.2 Bread Board

A breadboard is a rectangular plastic board with a bunch of tiny holes in it. These holes let you easily insert electronic components to prototype (meaning to build and test an early version of) an electronic circuit, like this one with a battery, switch, resistor, and an LED (lightemitting diode). The connections are not permanent, so it is easy to remove a component if you make a mistake, or just start over and do a new project. This makes breadboards great for beginners



who are new to electronics. You can use breadboards to make all sorts of fun electronics projects, from different types of robots or an electronic drum set, to an electronic rain detector to help conserve water in a garden, just to name a few.

2.3 DHT 11 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.

2.4 5V FAN

As the fan speed of DC cooling fans is directly proportional to the supply voltage, the temperature of the device can be controlled by modulating the input voltage of the fan. The voltage is regulated by a system of heat sensors and software that can change the voltage and the fan speed with precise accuracy. DC fans consume less power than AC fans. While the exact difference between the power ratings of the two fans depends upon the precise device specification, on average DC fans consume 60 % less power than AC fans. The revolutions per second rate in a DC fan can be varied with the input voltage.

2.5 2N2222 Transistor

The 2N2222 is a common NPN bipolar junction transistor (BJT) used for general purpose low-power amplifying or switching applications. It is designed for low to medium current, low power, medium voltage, and can operate at moderately high speeds. The 2N2222 is considered a very common transistor, and is used as an exemplar of an NPN transistor. It is frequently used as a small-signal transistor, and it remains a small general-purpose transistor of enduring popularity.

2.6 LED Screen

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 diodes 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. The LCD 16×2 working principle is, it blocks the light rather than dissipate. These are commonly used in the screen industries to replace the utilization of CRTs. Cathode Ray Tubes use huge power when compared with LCDs, and CRTs heavier as well as bigger. These devices are thinner as well power consumption is extremely less.

III. PROPOSED SYSTEM

The proposed system of the given project using DHT 11 humidity sensor and 2N2222 Transistor is shown in Fig.1.

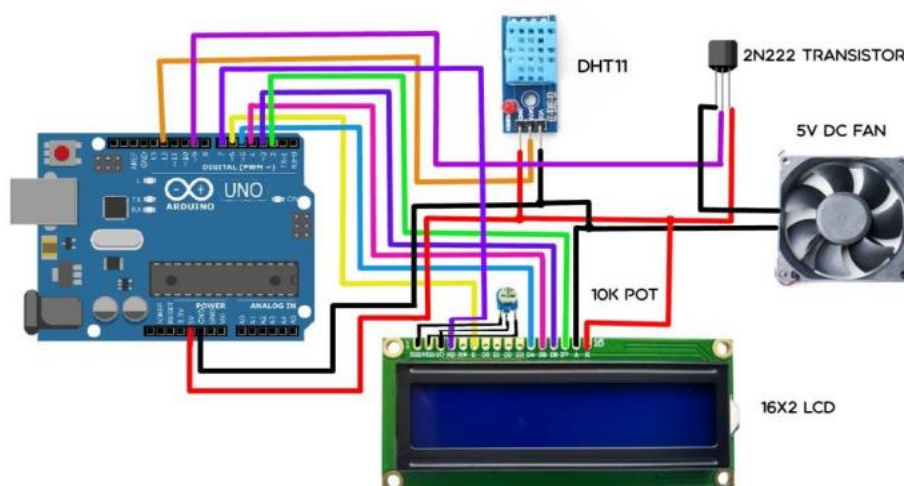


Fig 1 Proposed System



IV. FLOW SYSTEM

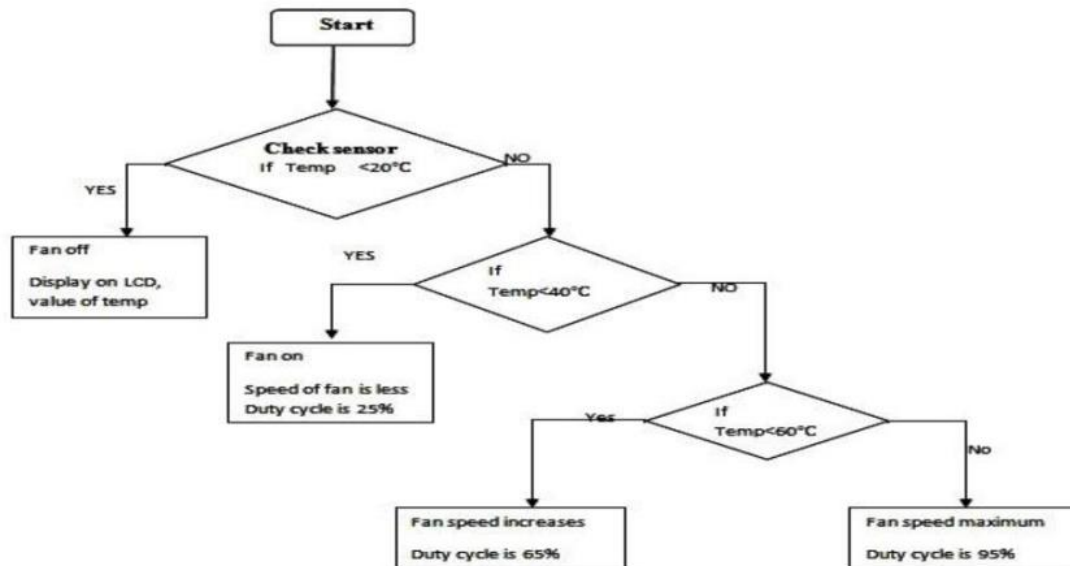


Fig 2 Flow Chart

V. RESULT & DISCUSSION

The device was successfully designed and developed, as its performance was strong. The device employed a mother board and a DHT 11 humidity sensor. The speed of the fan depends on the temperature of the surrounding. If the temperature is high the fan will rotate faster as the mother board the pass more voltage to fan and hence the fan moves faster. We have ascertained the developed device in a series of test and we observed sound performance. We have recorded the calculated and measured value of temperature and plot a graph as depicted in Fig. 3. From the graph we see that the practically measured value and calculated value of temperature of this device is exactly same. So, the device will perform better.

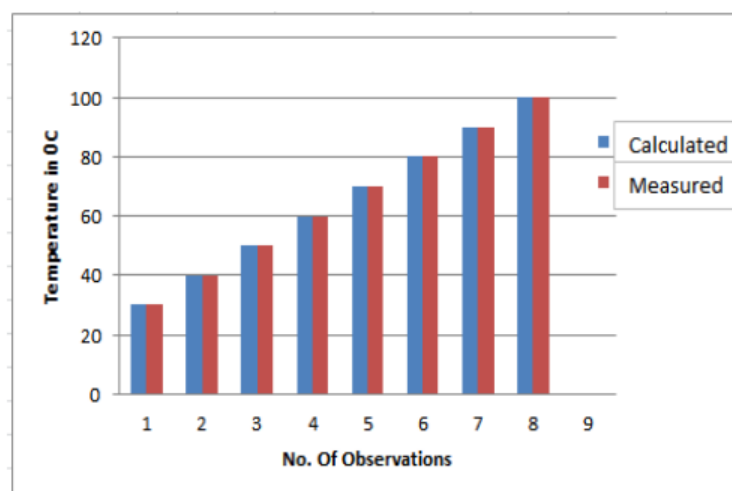


Fig. 3 Graph for comparison of temperature

The developed device has a facility to set the starting value of the fan. We have seen that the fan speed is directly proportional to the room temperature. The graph is depicted in Fig. 4. It is seen that when the room temperature is high the fan speed is high and vice-versa.

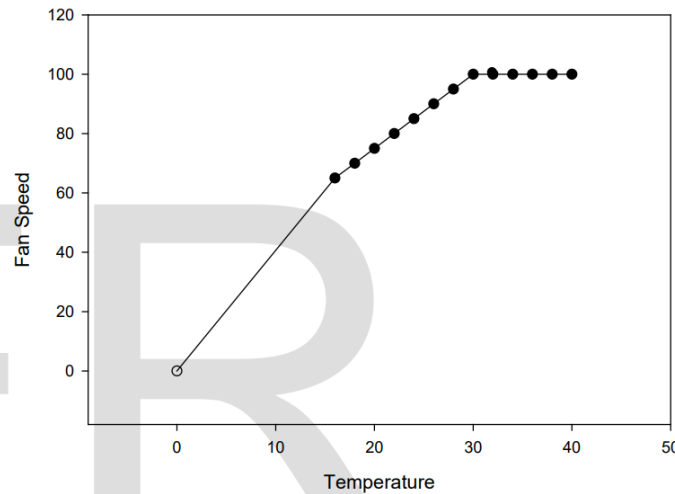


Fig. 4 Temperature VS Fanspeed

In recent times, the cost of electronic equipment has fallen significantly, though automated equipment remains expensive. However due to the rapid development of electronics, all designed components and instruments are inexpensive. Moreover, when the features of the presently used device are compared with the developed device, the latter emerges as a better choice in terms of cost, portability and design. Particularly in developing countries, the use of the designed instruments will be accessible for many users.

The standard room temperature is 25°C while the human normal temperature is 37°C according to the World Health Organization (WHO). The temperature range of the developed device was set with the applied input voltage as shown in Table 1 below (in ascending fan speed level; 1, 2, 3, 4 and 5).

SPEED LEVEL	TEMPERATURE RANGE(°C)	PIN+(VOLT)	PIN-(VOLT)
1	16	0.16	0.05
2	32	0.32	0.2
3	35	0.35	0.3
4	38	0.38	0.35
5	41	0.41	0.38

Fig. 5 Temperature Range

VI. CONCLUSION

This paper elaborates the design and construction of fan speed control system to control the room temperature and turned on/off control automatically with the human detection. The temperature sensor was carefully chosen to gauge the room temperature, and motion sensor was chosen for detect the human. Besides, the microcontroller had been used to control the fan speed using the fan speed in rpm and the Arduino was successfully programmed using C/C++ Language to compare temperature with standard temperature and set fan speed and their values displayed on LCD. Moreover, the fan speed will increase automatically if the temperature room is increased. As conclusion, the system which designed in this work was perform very well, for any temperature change and can be classified as an automatic control.

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