Temperature Based Speed Control of Home Appliances (Fan)

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Abstract: - The temperature-based fan speed control system can be done by using an electronic circuit using an Arduino board. The proposed system is designed to detect the temperature of the room using temperature sensor in Android mobile and send that information to the Arduino board. Then the Arduino board executes the contrast value given by the Android application through Bluetooth and controls the voltage of current. The Android application gets the value using temperature sensor and using the algorithm gives the voltage value. The voltage value is sent to Arduino board using Bluetooth and can be displayed using LCD screen. The generated pulses from the board are fed to the driver circuit to get the preferred output from the fan.

1. INTRODUCTION

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which may produce sparks and also results in fire accidents in few situations.

With the advancement of technology, intelligent system is introduced every day. Everything is getting sophisticated day by day. There is an increase demand of technology and smart electronic system. Electric fan is one of the most popular electronic device due to its cost effectiveness and low power consumption advantages. It is one of the most sensible to offer a comfortable and energy efficient. The fan has been long used and still available in the market.

Demand for the accurate temperature control has conquered many of industrial domains. Automatic temperature control is important in order to maintain a comfortable environment. Automation System aims to further the cause of automation so as to achieve the goal of simplicity. Primitive sense of using a fan by button the switch and by controlling the speed controller. In this method there is no chance that the temperature can change the speed of fan except changing the speed of fan by manually. So, it is needed to create a mobile application to automatic temperature control system for fan of which the speed will changed by measuring temperature by temperature sensor in mobile.

Automatic temperature-controlled fan leverages the power of Arduino to provide an automation control system of fan which speed is controlled by measuring temperature by temperature sensor in mobile which sends the value using Bluetooth. Using Arduino, motor, wires, sensors and other hardware the fan gets the surrounding temperature from Bluetooth and on depending that control the speed of fan automatically. It is one practical to use mobile application which is a used daily for a temperature control system that can be used for automatically controlling a room temperature by controlling the fan's speed automatically.

2. RELATED WORK

A: Dong Chunxia. The design of energy-saving intelligent fan speed IEEE Workshop on Electronics, Computer and Applications 2014

This introduces a C8051 F005 MCl) governor an energy-saving design clever use of pyroelectric infrared sensing technology, smart placeholder technology, wireless remote-control technology, SCM control technology, steeples speed technology, temperature and humidity sensing technology, the intelligent control of the technology used in the control of household appliances, sampling the ambient temperature around the body, for controlling the humidity and the presence and the number of people on the fan. And apply it in the ordinary fans, it has long-distance operation, automatically sense the temperature and humidity Diaodang timer switch function, so the fans more intelligent and humane, to gain a larger market space. [1]

B: Damar Wicaksono Eka Firmansyah Hanung Adhi Nugroho. A Microclimate Closed House Control Design for Broiler Strain 7th International Annual Engineering Seminar (InAES), Yogyakarta, Indonesia 2017

Through all stages of growing, chickens need a certain climate quality. The old climate quality is only the actual temperature-based controlling. On modern climate, an organization called Cobb-Vandross detached three climate parameters need to be satisfied: 1) temperature, 2) humidity, and 3) wind speed. It is known that those three parameters are not independent, the area to be controlled are fast area while commonly, this available tool to control those three parameters is only the speed of the exhaust fans inside the broiler house. Therefore, controlling three parameters which were intertwined each other inside a fast area with only single actuator was the main problem of this paper. The main goal was to achieve ideal microclimate control to grow chicken inside a broiler house. Results shows that the climate control that can be implemented effectively to maintain

the effective temperature of the broiler house at 32 to 22 degrees Celsius from the day-old chick to be matured in brooding stage. Temperature controller testing shows prototype device has linear set point response between two with maximum heating rate and maximum cooling rate. [2]

C: Vaibhav Bhatia, Gavish Bhatia. Room Temperature based Fan Speed Control System using Pulse Width Modulation Technique International Journal of Computer Applications (0975 – 8887)

The design and simulation of a novel fan speed control system based on room temperature using Pulse Width Modulation Technique. The duty cycle is made to vary according to the room temperature and the fan speed is controlled accordingly. This paper elucidates how the autonomous speed control of fan is done based on data from the temperature sensor. The design proposed here is appropriate according to the modern lifestyle. The simulation of the system has been done on Proteus Professional Software v 8.0 and the various graphs showing relationship between temperature and different parameters have been plotted in MATLAB R2013a v8.1 to validate the accuracy of the system. [3]

D: Surabhi, Upendra Prasad, Vivek Kumar Jain Design and Fabrication of Temperature based DC Fan Speed Control System using Microcontroller and Pulse Width Modulation Technique International Journal of Innovative Research in Science, Engineering and Technology

To get rid of the problem of Obscurity to control temperature in industries, a microcontroller-based controller has been proposed. A temperature sensor has been used to measure the temperature of the room and the speed of the fan is varied according to the room temperature using pulse width modulation technique. Controller is used to control the speed of DC Fan and temperature is varied through the Temperature sensor and data is sent to AT89S52 microcontroller using analogue to digital converter. The duty cycle has been varied from 0 to 100% to control the fan speed depending upon the room temperature, which is displayed on liquid crystal display. Duty cycle values between 25% and 95% allow smooth control of the fan. It is easier, reliable and accurate. The simulation of the system has been done on Proteus Professional Software v 8.0. Hardware implementation has been also done. The results of the research and Output waveforms have been investigated. Various design criteria, performance characteristics, comparison with different parameters have been plotted in MATLAB software system and other simulation results have been discussed in detail in this paper. [4]

E: Jungsoo Kim, Mohamed M. Sabry, David Atienza, Kalyan Vaidyanathan, Kenny Gross Global Fan Speed Control Considering Non-Ideal Temperature Measurements in Enterprise Servers 978-3-9815370-2-4/DATE14/ c 2014 EDAA

Time lag and quantization in temperature sensors in enterprise servers lead to stability concerns on existing variable fan speed control schemes. Stability challenges become further aggravated when multiple local controllers are running together with the fan control scheme. In this paper, we present a global control scheme which tackles the concerns on the stability of enterprise servers while reducing the performance degradation caused by the variable fan speed control scheme. We first present a stable fan speed control scheme based on the Proportional- Integral-Derivative (PID) controller by adaptively adjusting the PID parameters according to the operating fan speed and eliminating the fan speed oscillation caused by temperature quantization. Then, we present a global control scheme which coordinates control actions among multiple local controllers. In addition, it guarantees the server stability while minimizing the overall performance degradation. We validated the proposed control scheme using a presently shipping commercial enterprise server. Our experimental results show that the proposed fan control scheme is stable under the non-ideal temperature measurement system (10 sec in time lag and 1C in quantization figures). Furthermore, the global control scheme enables to run multiple local controllers in a stable manner while reducing the performance degradation up to 19.2% compared to conventional coordination schemes with 19.1% savings in power consumption. [5]

F: P.Siva Nagendra Reddy, K.Tharun Kumar Reddy, P.Ajay Kumar Reddy, Dr.G.N.Kodanda Ramaiah, S.Nanda Kishor. An IoT based Home Automation Using Android Application International conference on Signal Processing, Communication, Power and Embedded System (SCOPES)-2016

Now a day's technology becomes ever more invasive, the design challenges in home automation are increasingly apparent. Seamless controlling home, monitoring and programming by the end user have yet to enter the mainstream. This could be legitimate to the challenge of developing a fully independent and extensible home system that can support devices and technologies of differing functionalities and protocols. This paper describes how to control and monitor home appliances using android application over internet. There are number of commercial home automation systems available in market. However, these are designed for limited use. Therefore, home appliances can individually be controlled both from within the home and remotely. This is very helpful to physically challenged people.

The practical goal of this paper has been to create a virtual, but practically usable, android home automation system. The android mobile is used to send the commands to the Arduino to control all the home appliances. The main feature of this system is to control the voltage levels of home appliance in home like speed of fan based on

temperature, intensity of light based on light intensity etc. and another feature is we may get the status of our home appliances from our android mobile phone. In this system we use different sensors like temperature, rain sensor and LDR for different applications. [6]

3. PROPOSED MODELLING

In the following architecture diagram, the temperature sensor sends the current temperature value to the mobile app through the Bluetooth module. The calculation is done in mobile app and sent to the Arduino board using Bluetooth module.

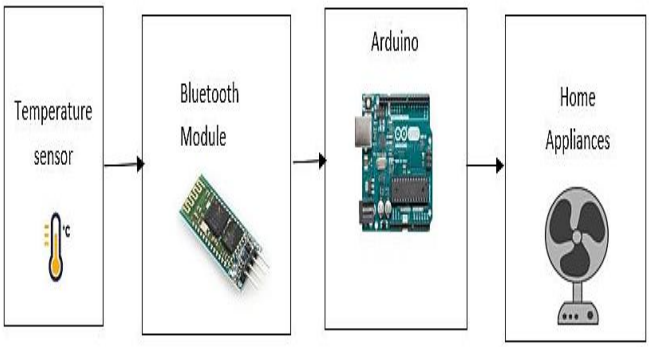

Fig: Architecture Diagram

4. RESULTS AND DISCUSSIONS

To calculate the fan speed the formula is given as

Fanspeed=(Temperature-20)*4

Based on the above formula the temperture obtained by the temperature sensor the fan speed is maintained as follows

S. No.	Temperature	Fan Speed
1	<20 ºC	OFF
2	21 ºC - 25 ºC	20%
3	26 ºC - 30 ºC	40%
4	31 ºC - 35 ºC	60%
5	36 ºC - 40 ºC	80%
6	>40 ºC	100%

Table: Temperature vs Fan Speed

The above table gives the idea of the valuse of fan speed based on the temperature If the temperature is below 20 oc the fan will be switched OFF and with the increase of temperature there will be increase in the fan speed.

From the values obtained in graph, the can be plot as follows,

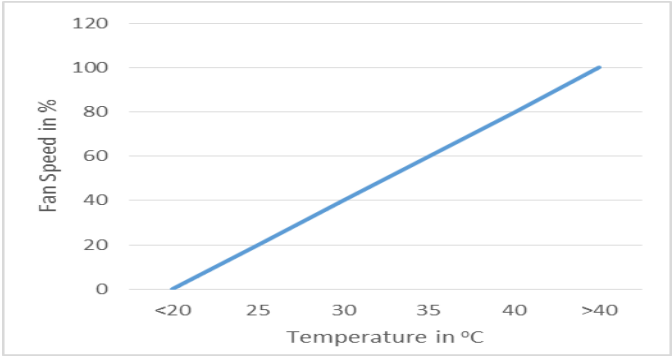

Fig: Graph of Temperature Vs Fan Speed

From the graph, X-axis is taken as temperature in oC in that is given as input and Y-axis is taken as Fan speed which is the required output. Here, the temperature iss directly proportional to the fan speed. If the temperature is more than 40 oC, the fan will be at its maximum speed.

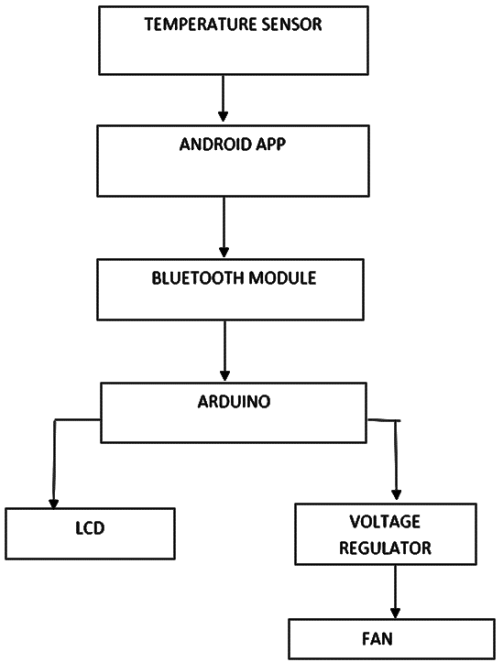

Fig: Data Flow Diagram

From the data flow diagram, the temperature sensor gets the current temperature and gives the value to the mobile app. The mobile app does the calculation and gives the voltage value to the circuit using the Bluetooth connected.

PROJECT OUTCOME

The project currently maintains the speed of fan automatically by sensing the temperature with the temperature sensor of the mobile and sends the calculated value to the Arduino board through Bluetooth which sends to the Arduino and then to the voltage regulator. The fan speed can also be controlled

manually for the absence of temperature sensor in the mobile. The Arduino board will automatically turn off if it doesn't get connected to the Bluetooth of mobile.

Test Case 1:

For temp = < 20 oC

Fanspeed=(Temperature-20)*4

So fanspeed=(20-20)*4

fanspeed=0

Test Case 2:

For temp = 32 oC

Fanspeed=(Temperature-20)*4

So fanspeed=(32-20)*4

fanspeed=48% ~ 60%

Test Case 3:

For temp = 44 oC

Fanspeed=(Temperature-20)*4

So fanspeed=(44-20)*4

fanspeed=96% ~ 100%

In this way the speed of the fan is varied according to the temperature that is given by the input from the phone through temperature sensor.

5. CONCLUSION

Thus, by using this model fan speed can be controlled automatically using the temperature sensor of android mobile. The value of the voltage calculated from the mobile app is send to the Arduino board which controls the fan speed using voltage regulator.

REFERENCES

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[6] P.Siva Nagendra Reddy, K.Tharun Kumar Reddy, P.Ajay Kumar Reddy, Dr.G.N.Kodanda Ramaiah, S.Nanda Kishor. "An IoT based Home Automation Using Android Application" International conference on Signal Processing, Communication, Power and Embedded System (SCOPES)-2016