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Temperature Control and Data Acquisition Method for Factory using Labview

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***Abstract*—The Aim of this paper is to present both automatic and manual temperature control system for modern data acquisition processes. In developing the work, consideration of steps' sequence was done; stating at the beginning point which is reading of temperature input using LM35 temperature sensor. Then convert that input analog into digital using Arduino microcontroller. After conversion, we do the appropriate task, for example, if the temperature reading is greater than factory temperature, the cooling unit will ON automatically and give us a mean to regulate the cooling unit speed. The software (LabView) that was used in this design has capability of manual regulation controls and responding in real time to takes the next step further to run, store and show the result schemes based on graphical temperature chart using the PC. The PC also stored the readings for the data acquisition result that is being exported into Microsoft Excel.**

***Index Terms*— LabView, Storage, Automatic / Manual control temperature, Data Acquisition, Speed Control etc.**

I. INTRODUCTION

The principle of division of labour is visible in using technology to assist man in the disposition of tasks with little effort using control systems. Ordinary control system measures the controlled variable, compares that measurement with the set point or reference, and if there is a difference between the two, changes its output signal to the manipulated variable in order to eliminate the error [1]. This however gives enormous advantages as great amount of stress and difficulties which can be monotonous are overcome using a relevant applied system. Therefore, from the principle of the control systems, this focused on the domain of Temperature Control system.

Ideal factory temperature suitable for both production and storage of goods, is usually adversely affected by too high or too low temperature which are cumbersome to regulate and control using conventional methods, hence the need for computerize and efficient system development to achieve the task is will be needed. Getting the precision temperature measurement daily and taking note of the environmental and location rise or fluctuation in temperature is also a challenge for many factories (e.g. pharmaceutical). However, the accuracy of these measurements will be meaningless unless the equipment and sensors are used correctly. Acquired data to be processed and stored for maintenance purpose and analysis in the future is also a crucial issue. The manual methods used for data acquired records are most likely to be prompt to errors due to human miscalculation and inability to write down the correct figures of the records obtain. Lab view „G"

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program allows users to create a graphical program which process the data obtained from the sensor (e.g., temperature sensor, pressure sensor.

II. Temprature Control And Data Acquisition

A. Temperature control

Accurate control of temperature is essential nearly in all chemical processes [4], but also varies in some applications. An accuracy of around 5-10ºC may be acceptable. There are some industrial applications which require better than ±1ºC accuracy. Temperature control is important for separation and reaction processes, and temperature must be maintained within limits to ensure safe and reliable operation of process equipment [3]. Various temperature scales have been proposed since time; in the centigrade, or Celsius, scale, devised by the Swedish astronomer Anders Celsius and used in most of the world, the freezing point is 0°, the boiling point is 100°. Celsius and Fahrenheit temperatures can be interconvert as follows:
C = (F - 32) × 100/180; F = (C × 180/100) + 32.
Celsius and Kelvin can be interconverted as follows:
C = (K - 273.15); K = (C + 273.15).

B. Data Acquisition

Data Acquisition (DAQ) is the principle of conversion using I/O signal interface from one device into another (e.g. Analog to Digital) using the appropriate channel of conversion. Data acquisition systems have evolved over time from electromechanical recorders containing typically from one to four channels to all-electronic systems capable of measuring hundreds of variables simultaneously [8]. Most DAQ can be categorize as either external or plug – in board configuration. As the name imply, Ethernet and USB are external system, while PCI and PCI Express are considered internal “DAQ Glossary”. LabView VI uses USB cable to connect the port for data acquisition board (Ardouino), while another side of the cable connects to the port of PC which tested to be COM65.

III. Results And Discussion

After successful implementation and test run, the following figures and tables show the temperature variable range and controller output plotted with respect to each time chart. Figure 4.1: The output result shows when the factories environment temperature is fluctuating at 29.780C, while the temperature range requirement is between10~350C, therefore the cooling system unit does not trigger ON.

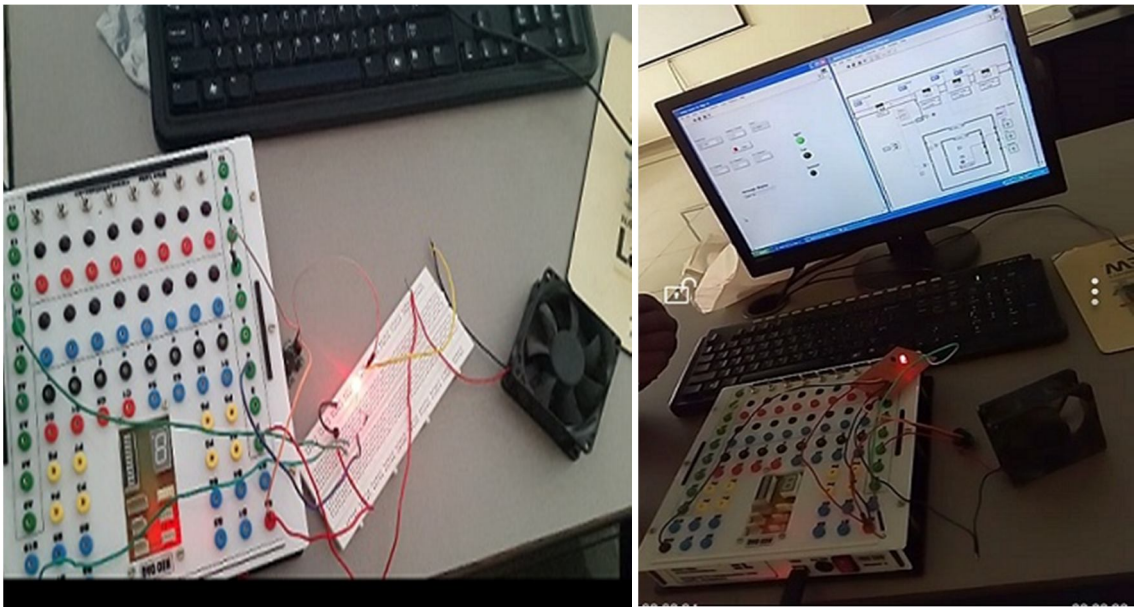
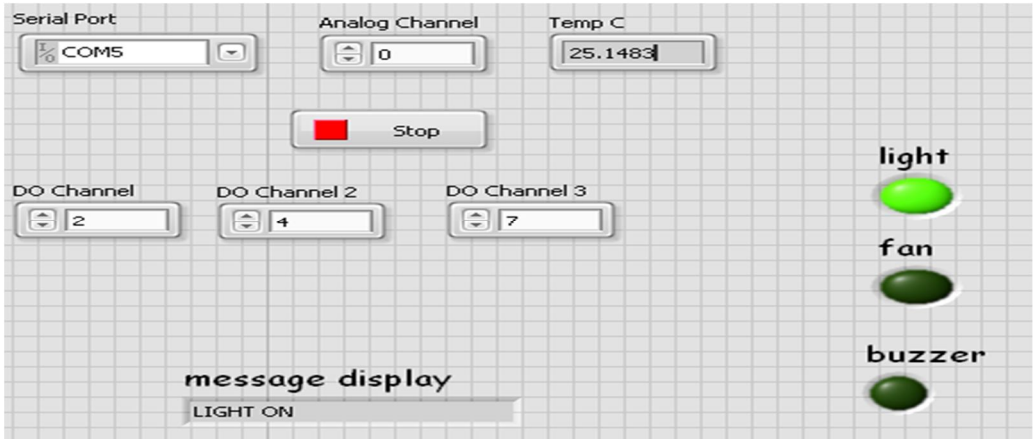


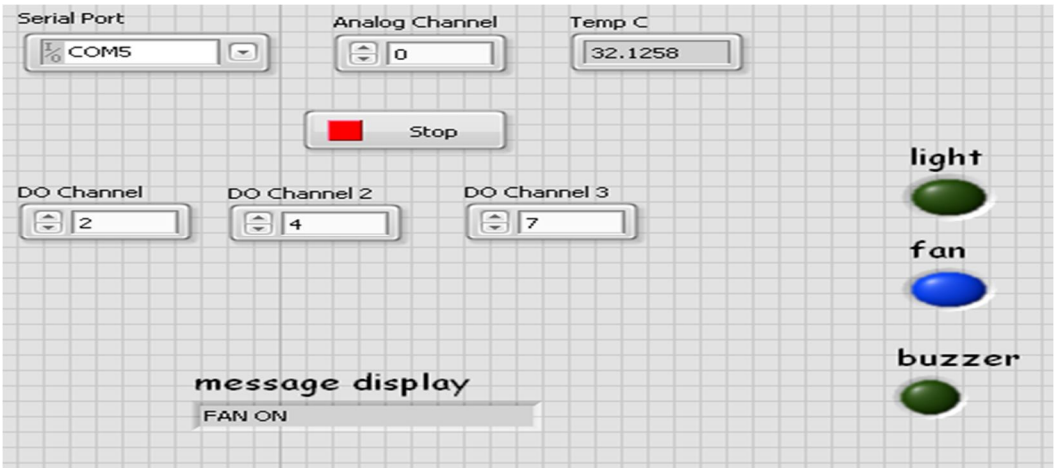
Figure 1. Hardware implementation

Results

Case 1: T=0 to 30, LED is ON, FAN is OFF, ALARM is OFF



Case 2: T=30 to 40, LED is OFF, FAN is ON, ALARM is OFF



Case 3: T=40 and Above, LED is OFF, FAN is OFF, ALARM is ON

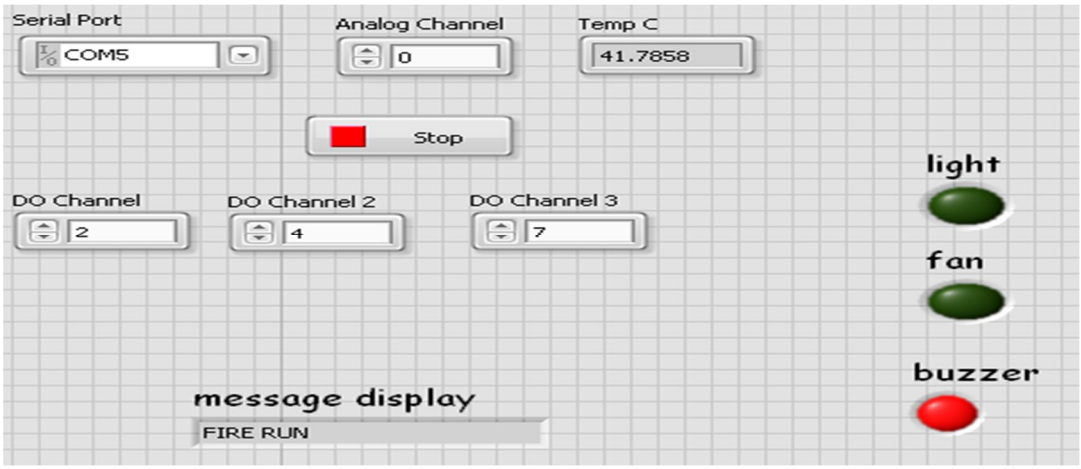


TABLE I. DATA OBTAIN DURING FIRST TEST

Date	Time	**Temp (Degree Celsius)**
11/09/2016	15:15:24.000	29.04297
11/09/2016	15:15:24.437	30.01953
11/09/2016	15:15:24.643	29.53125
11/09/2016	15:15:24.942	29.53125
11/09/2016	15:15:25.220	30.01955
11/09/2016	15:15:25.516	31.87134
11/09/2016	15:15:26.073	32.00135

TABLE II. DATA OBTAIN DURING SECOND TEST

Date	Time	**Temp (Degree Celsius)**
16/09/2016	22:07:56.989	31.73828
16/09/2016	22:07:59.456	32.64828
16/09/2016	22:07:59.456	33.11125
16/09/2016	22:08:49.438	32.53125
16/09/2016	22:08:56.237	33.01953
16/09/2016	22:09:23.789	33.87134
16/09/2016	22:09:43.403	34.00135

IV. CONCLUSION

Thus the design of both automatic and manually read and regulate the temperature of factory environment setup to store and display using LabVIEW has been achieved. Also all types of controllers are designed in the LabVIEW. There may be other softwares used for designing control system but LabVIEW is the simplest of them all. Is because it uses the drag and drop principle, it doesn't need any code to run the software since it follows graphical coding E.g. for a while loop we simply make a box inside which the contents of the statement are taken from. I also recommend future design to incorporate other features such as air-condition and weather station controller and advance sensing unit, to be tried and tested using this work in other to substitute the manual and analog form of data acquisition. this work serves as a powerful learning experience.

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