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Monitoring and Controlling Of Different Process Parameters by Using Labview and Arduino

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Abstract: ***The design and implementation of process under consideration is done by using LABVIEW software and Arduino Uno. Temperature and level sensors are used to measure temperature as well as level. LabVIEW is used to control temperature and level within set values. The system contains Arduino unit interface in between the PC, the sensors circuit and hardware. Monitoring and controlling of parameter is done using LabVIEW. In general boiler has temperature greater than 200 Degree Celsius, so this is not possible practically to create such environment in laboratory, so a miniature boiler tank model is used where temperature rises up to 150 Degree Celsius. In laboratory model is prepared for measurement of temperature and level measurement with temperature ranges from -55 to 155 deg. C. The LabVIEW monitors and controls temperature, level with set points.***

Keywords: LabVIEW, Arduino, LM 35, Ultrasonic Distance Sensors.

1. INTRODUCTION

The remote monitoring and control system in recent years is closely related to the outstanding advance in electronics and instrumentation techniques. Remote monitoring and control systems are gaining market-share in diversified areas such as industry, security, education and even in health-care applications. In this project, control or monitor simple tasks, which can be performed by less complex systems. In various systems, temperature measurements are the main purpose for various systems and maintain it to avoid abnormal conditions. Now, in order to control the temperature, the temperature has to be first measured by using a temperature sensor. An analog temperature sensor, LM35 is used for this purpose. LM35 is a three terminal device, the three terminals being Vin, Vout and GND. For a given voltage at which the sensor gets biased, the temperature around it is sensed and is converted into a proportional voltage and is given through the Vout terminal. Arduino converts analog signal to digital signal. This digital signal is given to laptop system for LabVIEW software. Arduino is also used for transmitting and receiving the signal. In level control system we measure the level of the different process by using Ultrasonic Distance Sensor and we control the level of the process by using inlet and outlet water pumps.

2. SYSTEM DESCRIPTION

In this process, we control two important parameters of the process.

1. Temperature
2. Level

Block Diagram of actual process shows follows.

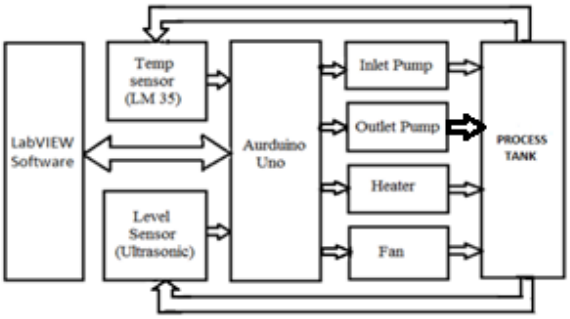

Fig.1 System Block Diagram

In this block diagram following contents are involved to perform a different task.
Temperature Sensor- LM 35 temperature sensor used to measure process temperature within ranges of -55 to 155 deg. C.
Level Sensor- Ultrasonic distance sensor used to measure the level of process tank. This sensor used to measure level within the range of 2cm to 4m.
Water Pump- Water Pumps used to control the level of process tank automatically.

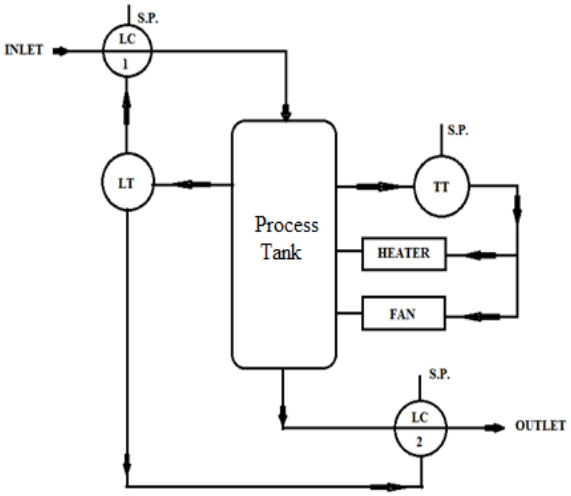

Fig.2 Process Diagram

Heater and Fan- Heater and Fans used to control the process temperature.
Arduino Uno- Arduino module used interfaces between software and hardware circuit.
LabVIEW Software- LabVIEW software used to develop system programs with block diagram and front panel.
In this process when the output of the system is within a certain limit of set values then there is every actuator in the system is turned off. Otherwise its turn on for different conditions.

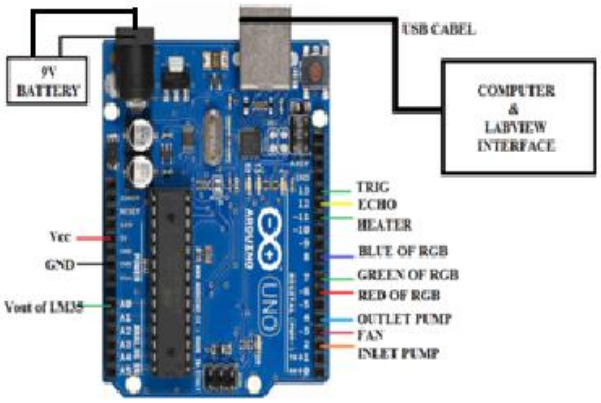

Fig.3 Pin Configuration

When output values of sensors go outsides the set values then turn on different actuators.
Working Conditions:
High Temperature- Fan turn on
Low Temperature- Heater turn on
High Level- Outlet pump turn on
Low Level- Inlet pump turn on
Process diagram of process shows above
Process Parameters:
Level Transmitter- Ultrasonic Distance Sensor
Temperature Transmitter- LM 35 Temperature Sensor
Level Controller-
LC1-Inlet Water Pump
LC2- Inlet Water Pump
Temperature Controller-
Heater and Cooling Fans

3. MODEL DEVELOPMENTS

In this process, we have used LabVIEW software to monitoring and controlling of different process parameters with the help of Arduino interface.
Flow diagram of system is shown following

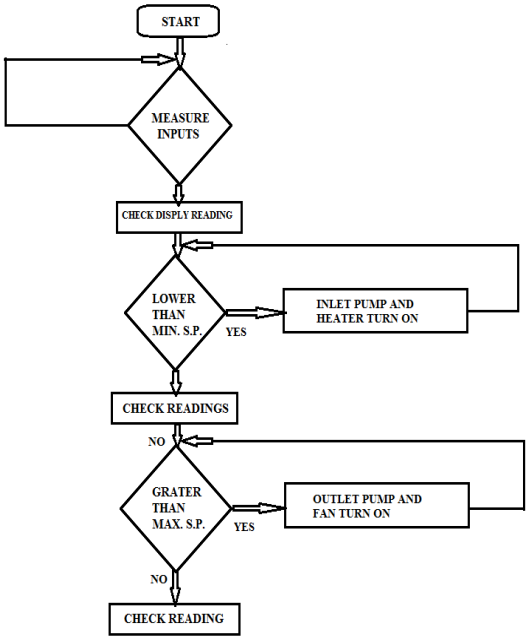

Fig.4 flow chart

LabVIEW:
In the LabVIEW software, there are two windows
1. Front panel 2. Block diagram

3.1 Front Panel:

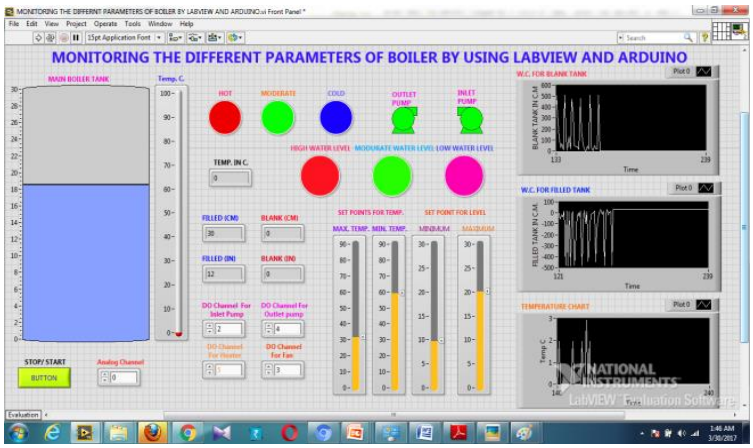

Fig.5 front panel of combine circuit

3.2 Block Diagram for Temperature Control:

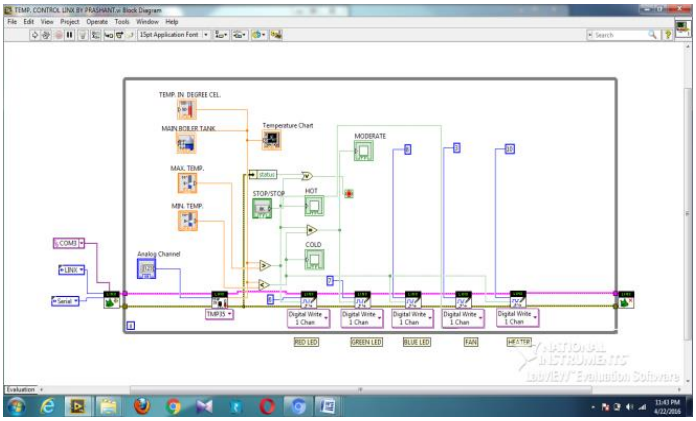

Fig.6 Block Diagram for Temperature Control

3.3 Block Diagram for Level Control

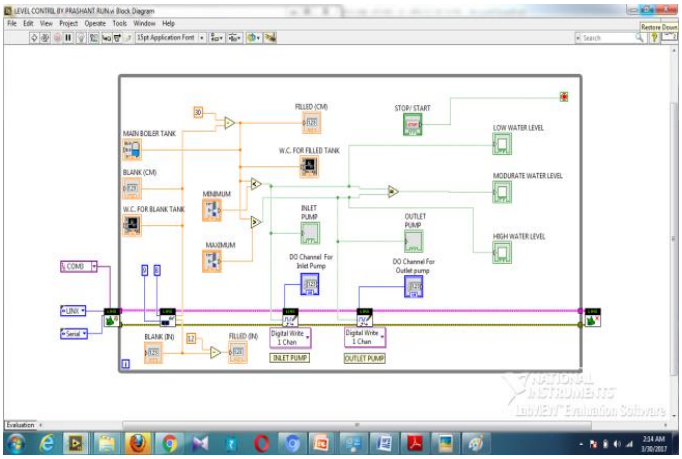

Fig.7 Block Diagram for Level Control

4. RESULT AND CONCLUSION

In this process, we monitor and controls temperature as well as level of different process
The actual reading of this process:
The output voltage of LM 35 sensor is directly proportional to actual temperature. When the output voltage of sensor increases then temperature also Increases.

Table No.1 Temperature Measurement

Output of LM 35 in Volt	Output Temperature in deg. C.
0.01	1
0.10	10
0.30	30
0.50	50
0.70	70
1.00	100
1.50	150

Table No.2 Operation Condition for Temperature

Sr. No.	Temp. C.	Heater	Fans
1	30	ON	OFF
2	40	OFF	OFF
3	50	OFF	ON

Table No.3 Operation Condition for Level

Sr. No.	Level Cm	Inlet Pump	Outlet Pump
1	5	ON	OFF
2	10	OFF	OFF
3	15	OFF	ON

In this condition, we set the level of the process between 7 to 13 deg. C. so when the temperature goes higher than max S.P. value then outlet water pump turn on and for the level of process tank lower than min S.P. value then inlet water pump turn on.

5. CONDITIONS AND DISCUSSION

In this process, there are different operational conditions.
Temperature Conditions:
For
Min. S.P. 35 deg. C.
Max S.P. 45 deg. C.
Comments:
30 - Low temperature
40 - Moderate temperature
50 – High temperature
Level Conditions:
For
Min. S.P. 7 Cm
Max S.P. 13 Cm
Comments:
5cm - Low level
10cm - Moderate level
15cm - High level

DISCUSSION

Considering the growth of monitoring and control systems and knowing that a large number of such applications can be achieved using monitoring and controlling of boiler parameter, this project has presented the feasibility of a flexible and low-cost monitoring and control solution using LabVIEW and Arduino, which can be easily applied and adapted to various applications.

The system is LabVIEW-based and uses standard interfaces for communication. So, it does not require expert programmers to perform adjustments in the program. It requires basically a computer with LabVIEW, and an Arduino, besides the instruments to be controlled and/or monitored. The access to the system can be carried out using computer and Arduino without the need to use high-cost devices.

This project we can only use for demo purpose. Because different process temperature like boiler process temperature must be greater than 200 deg. C. So we cannot generate such an environments in practical laboratories.

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