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LABVIEW BASED REAL-TIME DATA AQUISITION SYSTEM FOR INDUSTRIAL PROCESS MANAGEMENT

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ABSTRACT: The purpose of this paper is to demonstrate an innovative approach for low- cost industry processes management based on LABVIEW real-time platform. LABVIEW is a graphical programming tool-based on the data flow language G. This approach advantages us because the environment leads itself to a very uniform evolution from design to implementation allowing for strong co-simulation strategies. This paper examines the approach of real time system advancement using the data acquisition technique of LabVIEW. The system can monitor the temperature, pressure and water level indicator of the industry. Data Acquisition (DAQ) device is used for interfacing with the hardware. National Instrument's LABVIEW data acquisition hardware and software module have become one of the most widely used tools to capture, view, and process control systems. The proposed system increases the productivity by abstracting low-level complexity and integrating all of the technology. This paper adds the value towards the less manufacturing time, data logging demands of industry and low cost.

Keywords: DAQ, Pressure sensor, Temperature sensor, Water level sensor.

INTRODUCTION

In the present time of Industrial Automation easiness of work is one of the major concerns. Data collection in the industry is a difficult task in real time execution of events with industrial process control and automation. Now a day the vast majority of the commercial enterprises utilized DAQ systems broadly as a part of controlling and checking of system conduct and physiological parameters. Sometimes utilized Arduino to gather information as it is intended to associate with the physical world. Arduino is the ease with a great deal less amazing resolution.

LABVIEW software is used to accomplish and simulate the process. The fundamental point of preference of utilizing LABVIEW is the capability of reprogramming and virtual programming. Therefore, the whole setup will be constructed to control industrial process using LABVIEW software (Venkatasreehari and Chakravarthi, 2014).

In this paper, the design and implementation of an industry which aims to define a system for monitoring and control of industry via NI myDAQ device. The programming is done using LABVIEW. By utilizing Lab VIEW one can collaborate with the signs of this present reality so as to examine the information for more data which is important, and the outcome or yield can be seen by utilizing web, report and show (Johnsingh *et al.*, 2014). Independent of involvement in programming the client can work effectively and quickly with LabVIEW. Hall Effect wateI.r flow sensor, wire strip and temperature sensor are used for the pressure, liquid level and temperature detection respectively.

System configuration: In this system, three different sensors have been interfaced for monitoring three parameters i.e. Temperature, water level and pressure etc.

DAQ is utilizing to achieve real time data of various parameters. The system is based into three modules explained below:

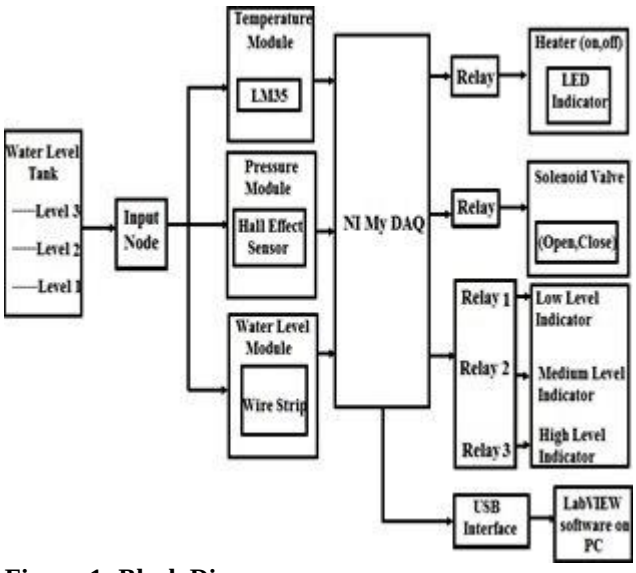


Figure-1: Block Diagram

Temperature Module: Temperature Sensors evaluate the measure of heat formation or even coldness that is created by an item or identify each and every physical change temperature creating either a digital or analogue

output. In this module, temperature sensor LM35 is utilized. LM35 changes temperature into electrical signals. It is utilized because it does not disturb, with any external calibration (Kos *et al.*, 2012). As the temperature crosses the limit LED turns on and gives us the indication of over heat. Relay driving circuit used to check the system process using LED and control the working of heater.

Water Level System: Water level system is design to detect the level of the water in the boiler. Wire strip sensor used within the system. Set three levels of water in this system, which are high, medium and low. When water crosses these levels then the corresponding LEDs will be ON.

Pressure Detection System: Pressure sensor normally measures the pressure of gases or fluids. Pressure sensor normally acts as transducer it produces a signal as an element of pressure forced. Pressure detection system is designed to detect rate of flow of fluid in the boiler. Flow sensor utilized which is useful for distinguishing fluid flow rate and the solenoid valve is used within the system to control the rate of fluid.

MATERIALS AND METHODS

Hardware Description: Real-time signals are observed utilizing the communication between software and hardware through NI myDAQ that interfaces the sensor output to the computer utilizing a RS-232 serial port.

Data Acquisition: Data acquisition is the process of measuring and observing the real time signals e.g. voltage. Then carrying that data into the PC for analysis, processing and storage. Physical marvel speaks to this real-world signal that we want to measure, such as pH, speed, flow, humidity, temperature, pressure and so on. For instance, thermocouple, a sort of sensor which changes temperature into a voltage. That voltage can be measured by an analog to digital converter. Other type of sensors is flow meters, strain gauges, and pressure transducers, which measure rate of flow, displacement in a material due to stress, and pressure respectively. Other type of sensors are flow meters, strain gauges, and pressure transducers, which measure rate of flow, displacement in a material due to stress, and pressure respectively (Kos *et al.*,2012).

For each situation, the electrical signal generated by the sensor is directly relevant to the phenomena monitored by the sensors. In this paper, sensor LM35 & Hall Effect water flow sensor used for temperature measurement and recording the rate of fluid flow respectively (Kos *et al.*, 2012; Khn *et al.*, 2016) A suitable configuration of the data acquisition device may be required to produce accurate measurements. There is a need of a system that allows fast acquiring of data and control which increases the productivity of the network. NI myDAQ may be a sensible portable data acquiring (DAQ) device. It is a perfect match for taking sensor estimations. LM35 is associated with A0 channel to NI myDAQ and Hall effect water Flow sensor is associated with 4 advanced data pins (D0-D3) of NI myDAQ as shown in fig.2.

Figure-2: Hardware module

Three relay driver circuits are used to monitor and control the tank level module. For water level measurement we used wire strip and ULN2003 with 3 relay driver circuits as shown in fig.3.

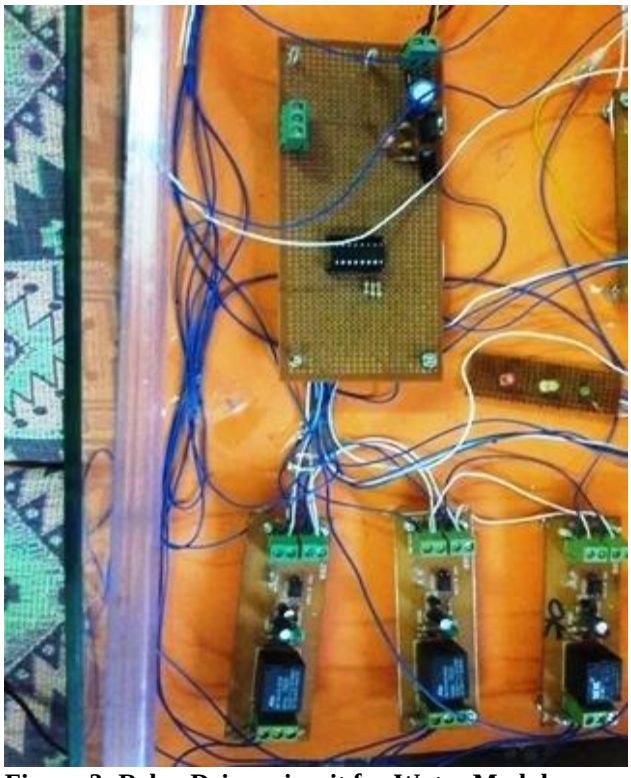
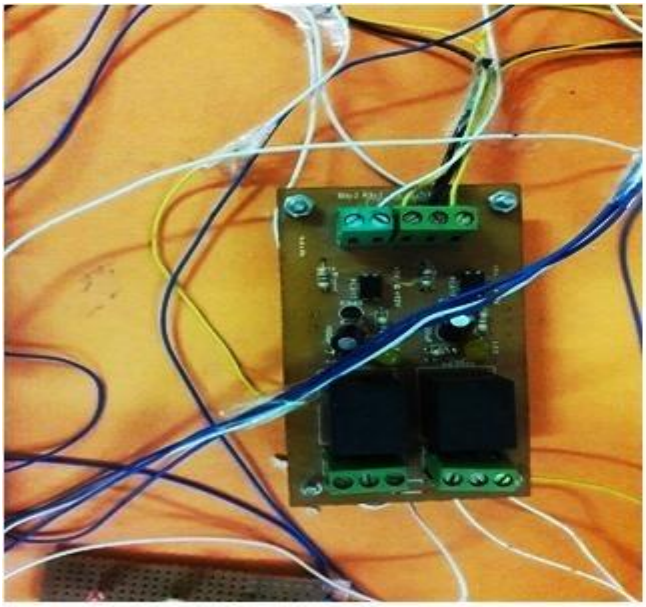


Figure-3: Relay Driver circuit for Water Module

The relay driver circuit National Instruments of the temperature module which is used to on the heater in the project to maintain the temperature demands in the industry as shown in fig.4. Estimations and control the outputs. LabVIEW comprises of an effective compiler that review your GUI and direct deliver capable machine code. LabVIEW consists of a powerful compiler that inspect your GUI and straightforwardly produce proficient machine code. LabVIEW provides the flexibility of integration of data acquisition software/hardware with the process control application software for automated test and measurement applications. LabVIEW is an efficient graphical platform that enables engineers to scale from configuration to test and from little to vast systems. LabVIEW contains the proficient tools to tackle the present issues and the limit with regards to future development quicker and more effectively The programming in LabVIEW is graphical programming and operates in block diagram as shown in Fig. 6.

Automation Industry System Implementation. The front Panel is designed using LabVIEW permits monitoring to all parts of the industrial system via NI myDAQ. For the GUI consider the all kind of controlling elements like dials, Boolean, switches, push buttons etc. and monitoring elements like meter, tank, graph for this proposal system in front panel as shown in Fig. 7.



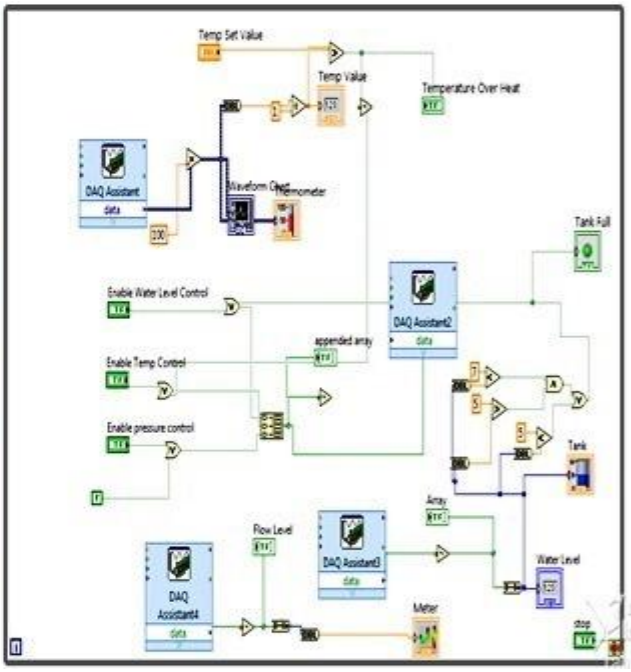


Figure-4: Relay Driver circuit for temperature Module.

Pressure relay driver circuit which is used to on the solenoid valve to maintain the pressure and all module circuits connection is connected to NI myDAQ pins as shown in fig. 5.

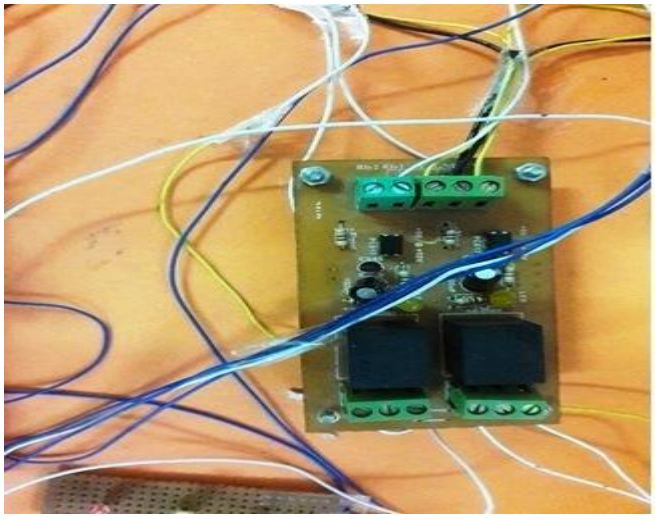
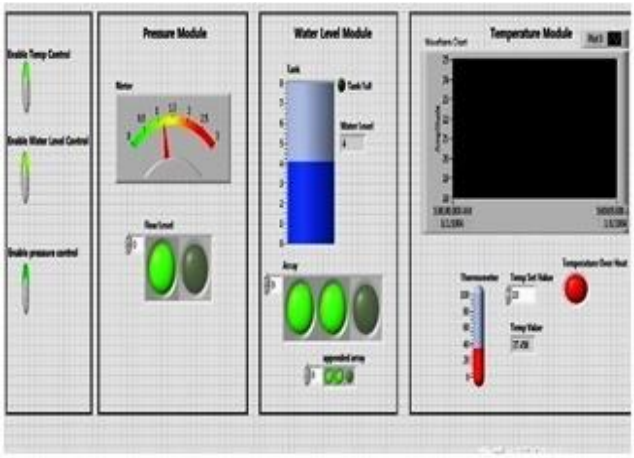


Figure-5: Relay Driver circuit for Pressure Module



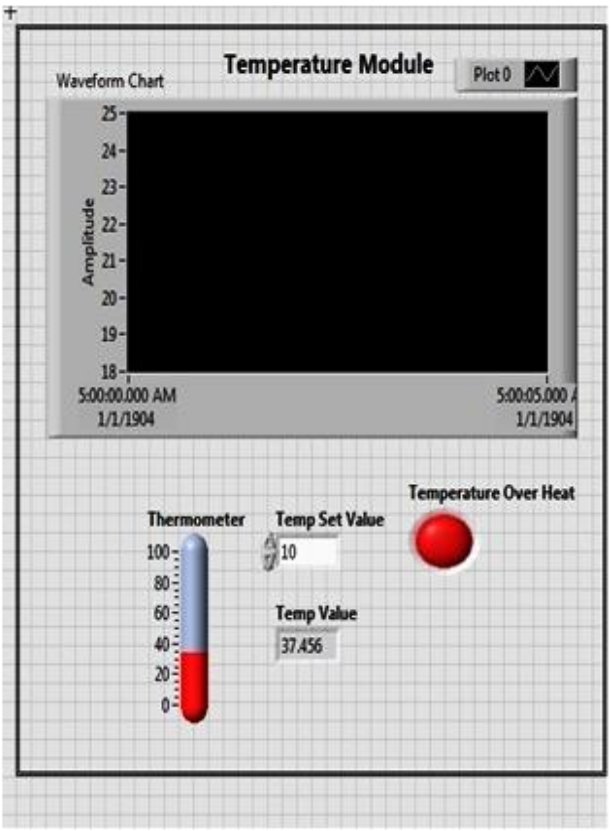


Figure-6: LabVIEW Block Diagram

Software Description: Laboratory Virtual Instrument Engineering Workbench is graphical programming language that is produced by National Instruments. LabVIEW contains the adaptability to incorporate it with an expansive number of equipment gadgets, paying little mind to producer. In this paper LabVIEW program works through a NI myDAQ to control the instruments take

RESULTS AND DISCUSSION

Project has been controlled effectively and accomplished dependable transmission of information to the remote site. Representation of indications and controls in FP using LabVIEW is very effective. The measurement of different parameters can be arising through a PC having a LabVIEW tool. The real measurement of the parameter will be requested in the individual parameter position. So, the controlled characteristics can be seen from the control room.

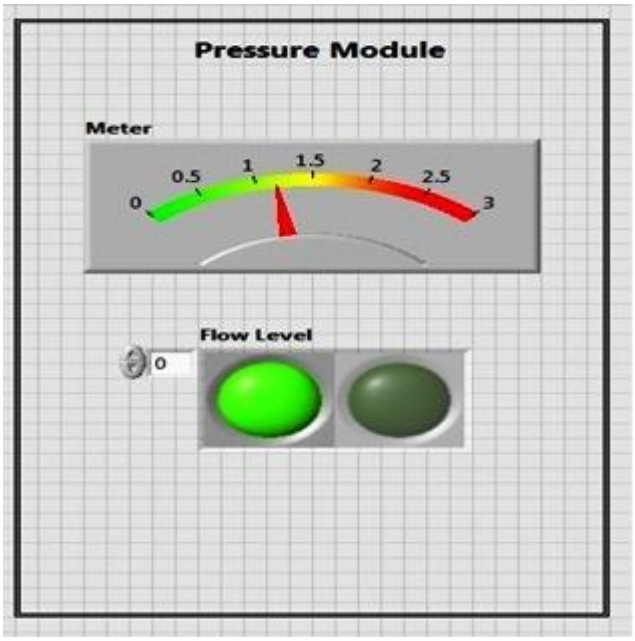


Figure-8: Output of Temperature module

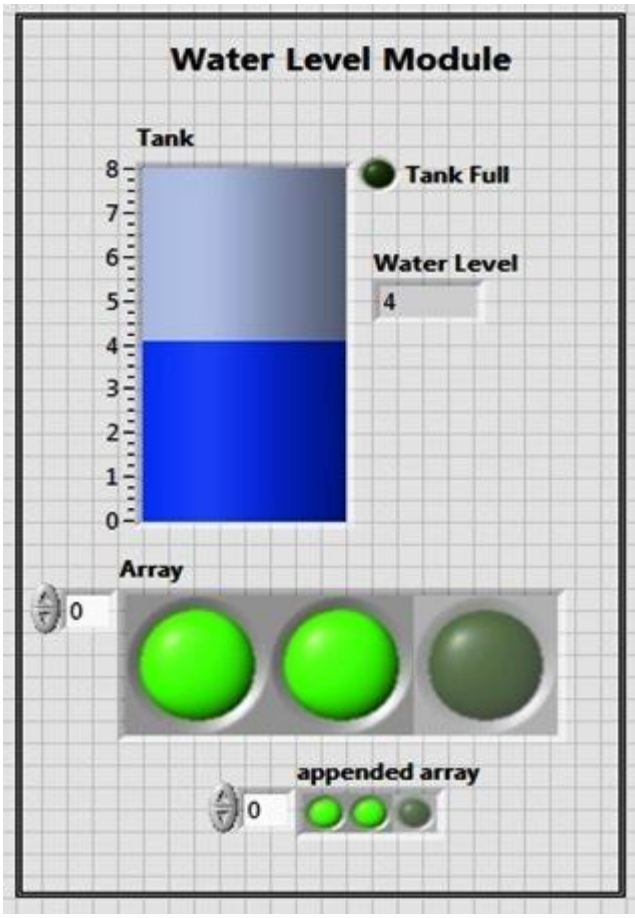


Figure-9: Output of Water Level Module
Figure-10: Output of Pressure Module

Conclusion: The fundamental goal of this paper is to design the worth straightforward methodology for monitoring and controlling the temperature, pressure and water level of any industry by utilizing the LABVIEW software and NI-myDAQ device. The proposed control technique used in process industries as feed forward control mechanism for maintaining a constant temperature and other parameters. In regard to the proposed methodology system enables to monitor the continuous process parameters in less assembling time and with simplicity of implementation for reliable measuring.

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