

A SERVER BASED MULTIPLE PARAMETERS CONTROLLING USING PLC AND LABVIEW IN INDUSTRIAL AUTOMATION

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ABSTRACT- In an industrial concern there's a demand to observe at the efficiency intake patterns plants. This paper aims to offer a system to control the efficiency consuming of multiple parameters in industries are monitored and there data's are registered, from a distant space by employing a single PLC(Programmable Logic Control). The Allen Bradley 1400 PLC is connected with the manufacturing plants where the consumption of energy is to be monitored from one terminal. The readings from all the observatory area units connected to the PLC and so the readings from the plants are transferred to the LabVIEW using OPC (OLE for method Control) server that spontaneously displays the data on a pc. Apart from the first purpose of power monitoring this project has extended capability in terms of dominant the energy consumption. With this feature once a selected unit is overwhelming terribly high power or producing an eccentric power consumption, the PLC unit automatically controls and provides a notification on the pc screen for the users.

Keywords- PLC, LDR, Gas Sensor, Temperature sensor, OPC Server, LabVIEW.

INTRODUCTION

A PLC could be a microprocessor-based system, designed for automation processes in industrial environments. It uses a programmable memory for the interior storage of user-orientated directions for implementing specific functions like arithmetic, counting, logic,

sequencing, and timing. A PLC may be programmed to sense, activate, and management industrial instrumentation and, therefore, incorporates variety of I/O points, which permit electrical signals to be interfaced.

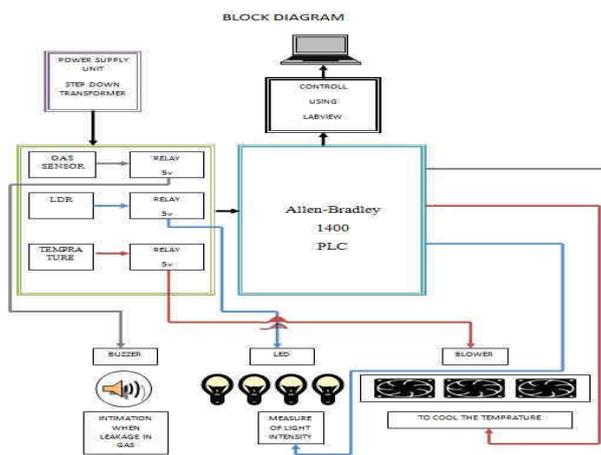
In our application, it managements through analog and digital inputs the PLC incessantly monitors the inputs and activates the outputs in line with the control pro-gram. This PLC system is of standard kind composed of specific hardware building blocks (modules) that plug directly into a proprietary bus: a hardware unit (CPU), an influence offer unit, input-output modules I/O, and a program terminal. Such a standard approach has the advantage that the initial configuration may be enlarged for alternative future applications like multi machine systems or laptop linking

The temperature, gas and light is often utilized in the economic production method parameters, whereas closely associated with people's lives. In several fields of research project and production observe, these management occupies an awfully vital position, particularly in science, industry, building materials, food, machinery, oil and alternative industries, contains a polar

role. Programmable Logic Controller (PLC) is an industrial management laptop; inherit computer, automatic management technology and communication technology jointly of the new automatic device. Its robust anti-interference ability and low-cost value, reliableness, programming is straightforward, straightforward to find out and use, by the project operator, like within the industrial field, the PLC has been wide utilized in numerous areas of business management.

The configuration software system is an automatic system observation layer a software system platform and development surroundings. Its versatile configuration can offer users with software system tools to quickly build industrial automatic system observation and general level. Before the looks of the configuration software system, the industrial areas of the user by hand or entrust a 3rd party to jot down HMI (Human Machine Interface software), it's developed a protracted time, low potency and poor reliableness shortcomings or obtain a fanatical industrial management systems and observation in computer through science laboratory read.

BLOCK DIAGRAM:



BLOCK DIAGRAM DESCRIPTION:

OVERVIEW OF PLC (AB1400):

Combining the options you demand from the MicroLogix 1100 controller, like EtherNet/IP, on-line written material and an intrinsic LCD, and adding increased options, like inflated I/O, quicker High Speed Counter/PTO and communication capabilities, the MicroLogix 1400 controller permits you to fulfill even larger application wants.

Use the embedded LCD to line the local area network network configuration, show floating purpose values on user-configurable show, set OEM logos, modification file addresses, and increase the LCD knowledge wiring capability to support an entire file.

Benefits

- Ethernet port provides internet server and e-mail capability.
- Built-in LCD with backlight permits you to look at controller and I/O standing, and provides a straightforward interface for messages, bit/integer observance and manipulation.

The MicroLogix 1400 conjointly came with An RJ45 10/100 LAN port as did the 1100. This port at the start supported Ethernet/IP Peer to see electronic messaging (not implicit I/O connections,) in addition as Boot-P, DHCP, internet Server and Email functions.

In 2010, illustrator discharged the series B model that increased the LAN port adding Modbus protocol and DNP3 over science.

Being discharged 3 years when the 1100 allowed the 1400 to return with all the options of the 1100, in addition as several enhancements. On the far side the enlarged I/O, high speed DC I/O, and different options

mentioned higher than, the MicroLogix 1400 conjointly had the subsequent enhancements over the 1100:

- More than double the memory (20K versus 8K)
- Double the program swiftness (.7ms versus 1.5ms per 1K)
- Trigonometry instruction support
- Advanced science directions
- Advanced temporal arrangement directions (Read High-speed Clock, cipher Time Diff)
- Backlit alphanumeric display
- IP Address settable from alphanumeric display
- Data Table accessible type alphanumeric display

Just like the 1100, the 1400's embedded show LCD digital display alphanumeric display replaced several of the quality diode indicators found on different MicroLogix models. It absolutely was wont to show the standing of I/O points, in addition as modification the controllers "mode." it absolutely was additionally used modify the DCOMM setting for channel zero, and to show controller set the LAN address. It even supported displaying of user outlined messages victimization associate "LCD" instruction.

The MicroLogix 1400 was additionally just like the 1100 within the proven fact that it enclosed a further 128K chip that may well be used with the DLG instruction for data logging. 64K of

that very same memory may even be used with associate degree RCP formula instruction.

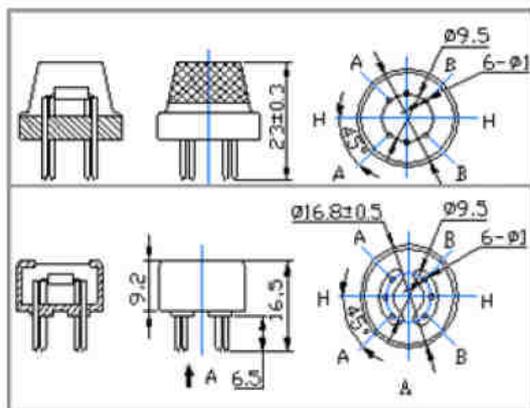
The MicroLogix 1400 was additionally programmed with a similar Windows based mostly RSLogix five hundred software package (version eight.1 or greater) that programmed the SLC-500 and different MicroLogix processors, further because the MicroLogix solely programming software package, RSLogix small Starter (\$129.)

Today, with its advanced options and plenty of enhancements over the MicroLogix 1100, the MicroLogix 1400 is that the pinnacle of Rockwell's common MicroLogix programmable controller family.

MQ-6 GAS SENSOR:

Sensitive material of MQ-6 gas detector is SnO₂ that with lower physical phenomenon in clean air. Once the target flammable gas exist, the sensor's physical phenomenon is additional higher alongside the gas concentration rising. Please use straightforward electro circuit, Convert amendment of physical phenomenon to correspond signaling of gas concentration. MQ-6 gas detector has high sensitive to gas, methane series and LPG, additionally response to gas. The detector may well be wont to observe totally different flammable gas, particularly methane series, it's with low value and appropriate for various application.

Configuration



CHARACTER:

- * Sensible sensitivity to flammable gas in big selection
- * High sensitivity to gas, paraffin and LPG
- * Long life and low value
- * Straight forward drive circuit

APPLICATION:

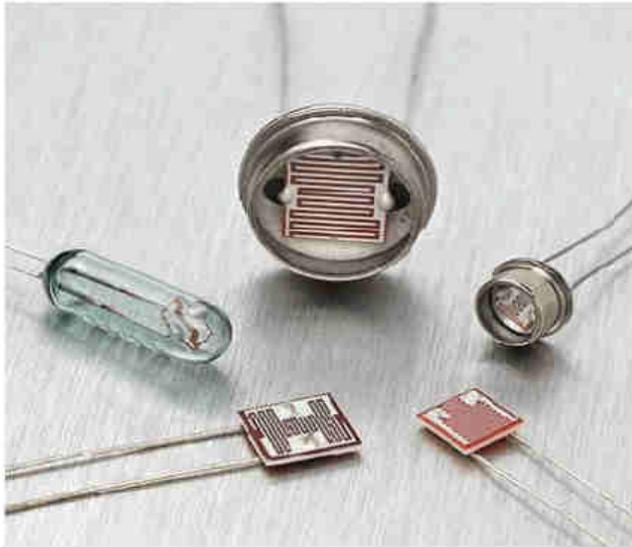
- * Domestic gas escape detector
- * Industrial flammable gas detector
- * Transportable gas detector

TECHNICAL DATA:

Model No.		MQ-6	
Sensor Type		Semiconductor	
Standard Encapsulation		Bakelite (Black Bakelite)	
Detection Gas		Isobutane, Butane, LPG	
Concentration		300-10000ppm (Butane, Propane, LPG)	
Circuit	Loop Voltage	V_L	$\leq 24V$ DC
	Heater Voltage	V_H	$5.0V \pm 0.2V$ AC or DC
	Load Resistance	R_L	Adjustable
Character	Heater Resistance	R_H	$31\Omega \pm 3\Omega$ (Room Tem.)
	Heater consumption	P_H	$\leq 900mW$
	Sensing Resistance	R_s	$2K\Omega - 20K\Omega$ (in 2000ppm C_2H_6)
	Sensitivity	S	$R_s(\text{in air})/R_s(1000ppm C_2H_6) \geq 5$
	Slope	α	≤ 0.6 ($R_{1000ppm}/R_{1000ppm LPG}$)
Condition	Tem. Humidity	$20^\circ C \pm 2^\circ C$; $65\% \pm 5\% RH$	
	Standard test circuit	$V_L: 5.0V \pm 0.1V$; $V_H: 5.0V \pm 0.1V$	
	Preheat time	Over 48 hours	

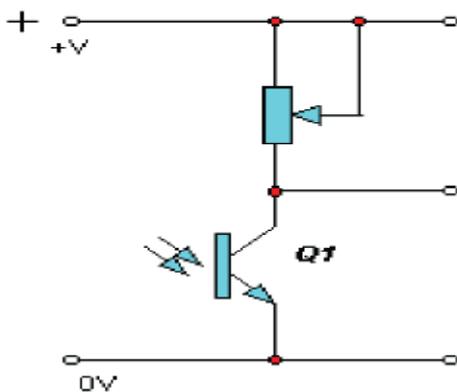
LDR (Light Dependent Resistor)

A light dependent resistor also known as a LDR, photo resistor, photoconductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity. LDRs (Light Dependent Resistors) are a very useful tool in a light/dark circuits. A LDRs can have a variety of resistance and functions. For example it can be used to turn on a light when the LDR is in darkness or to turn on a light when the LDR is in light. It can also work the other way around so when the LDR is in light it turns on the circuit and when it's in darkness the resistance increase and disrupts the circuit.



How it Works

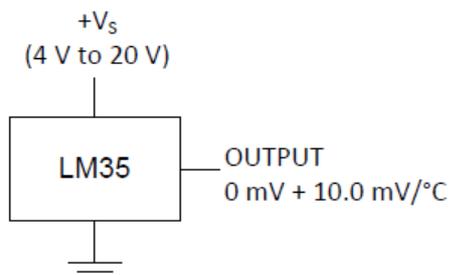
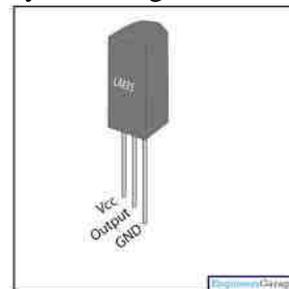
The way an LDR works is that they are made of many semi-conductive materials with high resistance. The reason they have a high resistance is that there are very few electrons that are free and able to move because they are held in a crystal lattice and are unable to move. When light falls on the semi-conductive material it absorbs the light photons and the energy is transferred to the electrons, which allow them to break free from the crystal lattice and conduct electricity and lower the resistance of the LDR.



TEMPERATURE SENSOR (LM35):

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage

linearly proportional to the Centigrade temperature. Thus the LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ cover a full -55°C to $+150^\circ\text{C}$ temperature range. Low cost is assured by trimming and calibration at the wafer level.



The low output impedance, linear output, and precise inherent calibration of the LM35 make interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 draws only $60\ \mu\text{A}$ from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 is rated to operate over a -55°C to $+150^\circ\text{C}$ temperature range, while the LM35C is rated for a -40°C to $+110^\circ\text{C}$ range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-

lead surface-mount small outline package and a plastic TO-220 package.

FEATURES

- Calibrated Directly in Celsius (Centigrade)
- Linear + 10-mV/°C Scale Factor
- 0.5°C Ensured Accuracy (at 25°C)
- Rated for Full -55°C to 150°C Range
- Suitable for Remote Applications
- Operates from 4 V to 30 V
- Less than 60-μA Current Drain
- Low Self-Heating, 0.08°C in Still Air
- Non-Linearity Only $\pm 1/4^\circ\text{C}$ Typical

APPLICATIONS

- Power Supplies
- Battery Management
- HVAC
- Appliances

LABVIEW:

NI LabVIEW software can communicate with any programmable logic controller (PLC) in a variety of ways. OLE for Process Control (OPC) defines the standard for communicating real-time plant data between control devices and human machine interfaces (HMIs). OPC Servers are available for virtually all PLCs and programmable automation controllers (PACs). In this tutorial, learn how to use LabVIEW to communicate with a networked PLC using OPC.

INTERFACING PLC & LABVIEW WITH OPC SERVER:

Following steps are implemented to achieve desired objective

1.CONFIGURING PLC DRIVER

Here we choose RS-232 DF1 devices and click on Add New. Next we name the PLC and then start the configuration in Configure RS-232 DF1 devices. To select the most appropriate settings Auto-Configure can be used to let RSLinx do the configuration.

2.CREATING NEW OPC TOPIC

Next we create a new OPC Topic and save it for further use. All the inputs and outputs that are available in the PLC will be available under topic which we have created.

3.CREATING NEW OPC SERVER

In the RSI-OPC Test Client we start a new OPC Server. Since we are using RSLinx, the proprietary software for Allen Bradley PLCs, we use RSLinx OPC Server to avoid any compatibility problems or limitations. However other OPC servers can be used wherever required

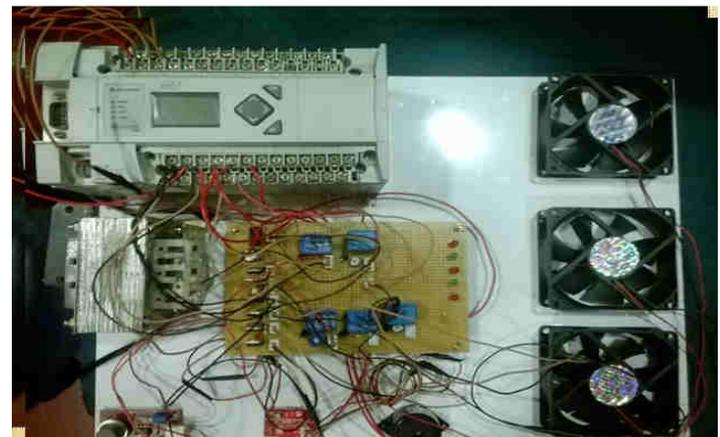
4.CREATING A NEW GROUP

After creating the new OPC server we create a new group. After assigning a name we leave the other setting to default.

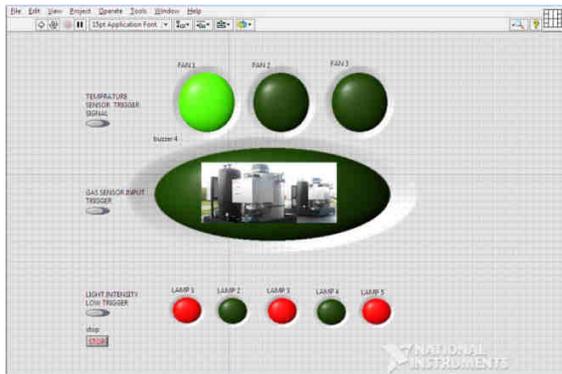
5.CREATING ITEM/TAG

Then we add new OPC tags which are essentially the input/output variables under this group. For the access path we need to specify the same name as the OPC Topic which was specified in RSLinx. We give the addressing of the input/output variables as per the syntax of the PLC and the data type of the variable can be selected from the drop down menu.

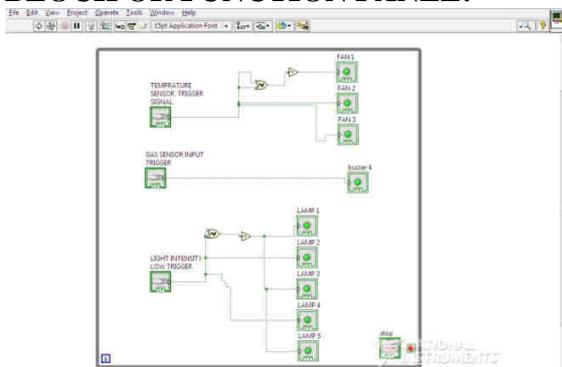
EXPERIMENTAL KIT:



LABVIEW FRONT PANEL:



BLOCK OR FUNCTION PANEL:



RESULT:

The block diagram and front panel for level control application which are successfully created to make communication between PLC and LabVIEW via OPC Server.

CONCLUSION:

The main idea was to interface LabVIEW and PLC for more effective and efficient process control. This project of interfacing two most powerful technologies ruling the industries lead to many new features like acquiring data at faster rate, controlling the process accurately, providing Multi-Tasking operations, Remote controlling and several other features. Used correctly, multithreading offers numerous benefits including more efficient CPU use, better system reliability, and improved performance on multiprocessor computers. Using LabVIEW, you can start today to

maximize performance on multithreaded operating

systems and/or multiprocessor computers without increasing either your development time or the complexity of your application. Because the multithreading technology of LabVIEW is implemented transparently, no extra programming is required to take full advantage of multithreading technologies

REFERENCES

- [1] P. Bennell and J. Segerstrom, "Vocational education and training in developing countries: Has the World Bank got it right?," *Int. J. Educ. Dev.*, vol. 18, no. 4, pp. 271–287, 1998.
- [2] S. Sahin, M. Olmez, and Y. Isler, "Microcontroller-based experimental setup and experiments on SCADA education," *IEEE Trans. Educ.*, vol. 53, no. 3, pp. 437–444, Aug. 2010.
- [3] P. Chou, G. Ortega, and R. Borriello, "Synthesis of the hardware/software interface in microcontroller-based systems," in *Proc. Comput.-Aided Design*, 1992, vol. ICCAD-92, pp. 488–495.
- [4] A. Mader and H. Wupper, "Timed automation models for simple programmable logic controllers," in *Proc. 11 Euro Micro Conf. Real-Time Syst.*, 1999, pp. 106–113.
- [5] S. Sahin, Y. Isler, and M.B. Selek, "An example experiment in control of liquid level and temperature using virtual instruments," *J. Tech. Sci., Celal Bayar Univ., Soma Vocational School*, vol. 8, no. 1, pp. 1–10, 2007.