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SCADA For Remote Industrial Plant Operation

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Abstract: **Now a days, most of the systems are operate on automation because of automotive system are most efficient and easy to use. SCADA based monitoring and control means use of temperature control system for monitoring the passive parameters such as voltage, current, temperature, power, etc. If any faults occur in industry then they can be display with the help of personal computer. Main purpose of this paper is controlling and data acquisition by using SCADA software. SCADA system is most important for solution, improving, reliability, increasing efficiency and saving the cost. SCADA systems are used private companies and public sector service provider. SCADA works well in many different types of enterprises because they can ranges from simple configuration to large complex project.**

Keywords: **Supervisory Control And Data Acquisition(SCADA)**

1. INTRODUCTION

SCADA was first introduced in the 1960s at Bonneville power administration and was first published in the PICA (Power Industry Computer Applications)

SCADA system is basically used for automation in industries. Its main advantage is to reduce the human effort and increase the efficiency. For example, SCADA is basically used in industries such as food/ beverage power machine manufacturing etc. But now a day it is also used in home and apartments such as lighting, heating and ventilation, water pumping, gardening, overhead water flow control remotely [2].

In plant SCADA systems generally installed in control room. SCADA system having three types of working stations in control room, first working stations are operating station; in operator station the users can only do real time process parameter monitoring functions. The second type is called Engineering station in such type of work station users can able to do process parameter monitoring function and modification. Then third type of work station is known as server station. In this station users do not monitor. Any process parameters but all the SCADA system software have stored in server as backup data when in any main station [1].

A supervisory control and data acquisition (SCADA) system consists of one or more computers with appropriate software (Master Stations) connected by a communication system to a number of remote terminal unit placed at various locations to collect data and for remote control and to perform intelligent autonomous control of a system and report results back to the remote masters. SCADA system includes hardware and software component [3].

2. EASE OF USE

In SCADA systems, data acquisition and control are performed by remote terminal unit (RTU) and field devices that include functions for communications and signaling. The communications between the control center and remote sites could be classified into following categories.

1. Data acquisition: the control center sends request messages to remote terminal unit (RTU) and the RTUs dump data to the control center. In this includes status scan and measured value scan. The control center regularly send a status scan request to remote sites to get field devices status and a measured value scan request to get measured values of field devices.
2. Control functions: the control center sends control commands to a RTU at remote sites. Control functions are group into four subclasses: individual device control (e.g., to turn on/off a remote device), control messages to regulating equipment, sequential control schemes, and automatic control schemes.
3. Broadcast: the control centers may broadcast messages to multiple remote terminal units (RTU). For example, the control center broadcasts an emergent shutdown message.

3. BENEFITS OF SCADA

1. Continuous monitoring of process
2. Real time control
3. Automation and protection

4. SCADA SIMULATION LABVIEW

The idea of this project is to retrieve the real time from the high temperature furnace on computer. Four heat sensor i.e., LM 35 are used to sense the heat and an analog to digital converter IC ADC0808 is used to convert the data into digital form required for the microcontroller. LM35 digital sensor has got three pins i.e., VCC, GND and output pins when LM35 is heated the voltage at output pin increases, it is connected to the analog to digital converter IC (ADC). ADC converts this analog value to binary in digital form. This digital form of data is fed to microcontroller. Now microcontroller processes this data and communicates with computer via RS232 communication and simultaneously switches ON and OFF the relays depending on requirement for maintaining the temperature as set by the supervisor. MAX232 IC is used for RS232 communication and ULN2003 IC is used for relay control.

BLOCK DIAGRAM

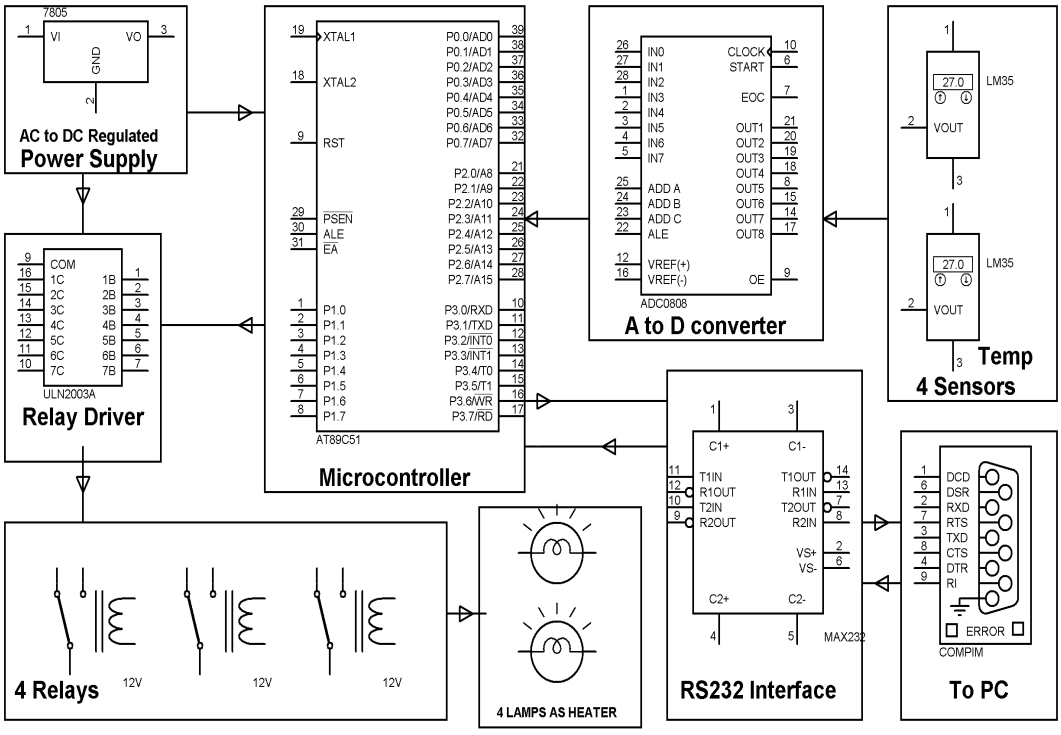


Fig.1:Block Diagram

Here temperature sensors are befittingly interfaced to the 8051 micro-controller which is in turn connected to a PC. On the front end, "DAQ System" (software) loaded in the computer which takes these values and displays them on its front panel, and also logs then in the database. One can set parameters like set point, low limit and high limits on the computer screen. When temperature of a sensor goes above the set point the micro-controller sends a command to the corresponding relay. The heaters are connected through relay contacts (corresponding to their sensors) are turned OFF are available for generating an AV alarm on the PC in the event of system failure.

Hence, processes at hazardous area can be controlled accurately and better safety using Supervisory Control And Data Acquisition. Adapting such a technology will save both money and time.

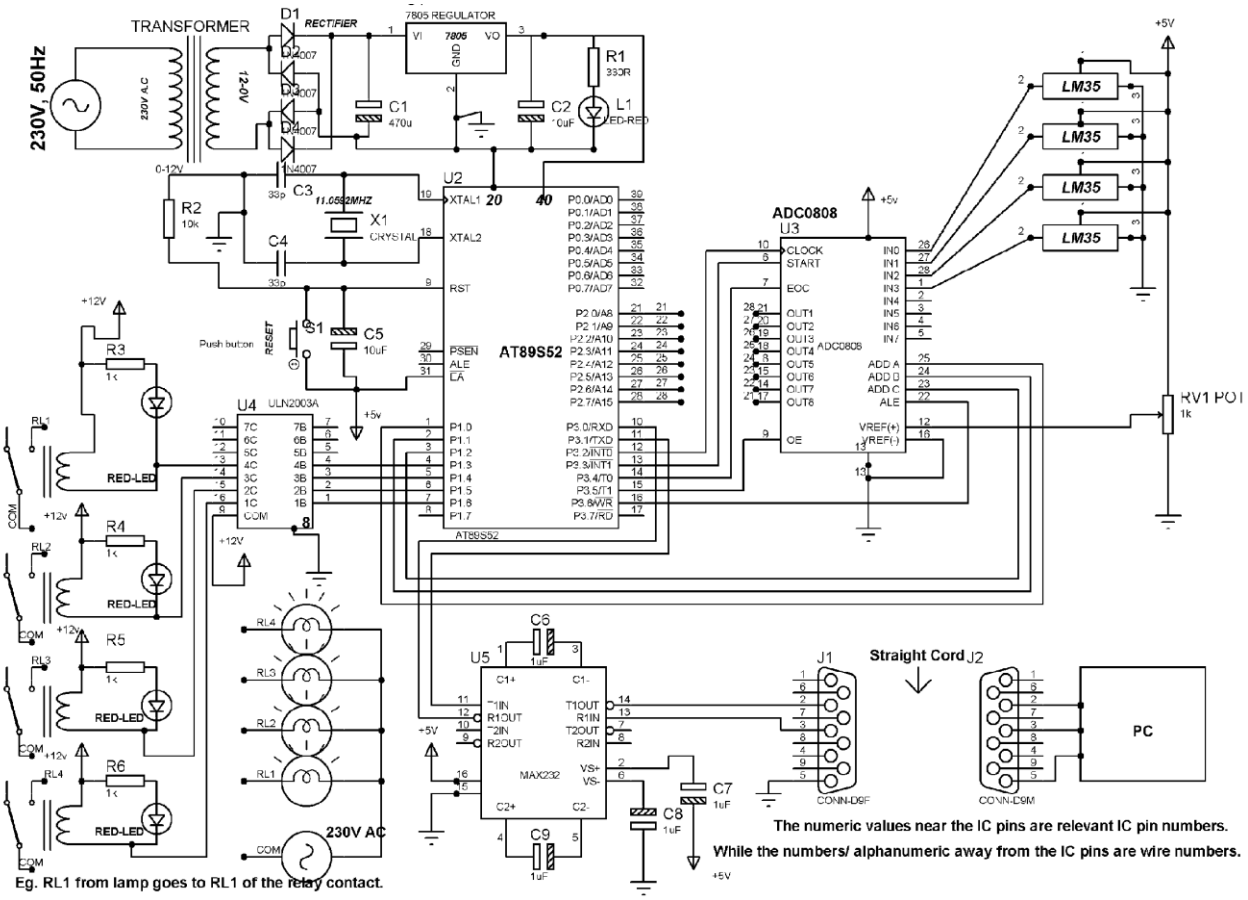


Fig.2: Circuit Diagram

The above circuit diagram works on four main ICs

1. Microcontroller AT89S51/52:

It consist of 8K bytes of In- System Programmable (ISP) Flash Memory. Endurance: 10,000 Write/Erase Cycles.4.0 V to 5.5V operating range. Fully Static Operation: 0Hz to 33MHz. 256 * 8 bit Internal RAM 32 programmable I/O lines. Three 16 bit timer or counters. Eight Interrupt Sources. Full Duplex UART Serial Channel. Interrupt Recovery from Power-down Mode. Watchdog Timer. Dual Data Pointer

2. ADC 0808:

The ADC0808, Data acquisition component is a monolithic CMOS device with an 8-bit analog to digital converter, 8-chnnel multiplexer and microprocessor/ microcontroller compatible control logic. The 8- bit A/D converter uses successive approximation as the conversion technique.

Key Specification:

Resolution 8 bits, Total unadjusted error +/- ½ LSB and +/- 1 LSB, Single power supply 5 VDC, Low power 15 mW., Conversion time 100µs.

3. MAX 232:

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signal suitable for use in TTL compatible digital logic circuit. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. When a MAX232 IC receives a TTL level to convert, it changes a TTL logic 0 to between +3 and +15V, and changes TTL logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL.

4. RELAY DRIVER (ULN 2003):

ULN 2003 is a high voltage and high current Darlington transistor array. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode Clamp diode for switching inductive loads. The ULN 2003 has a 2.7kW series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices.

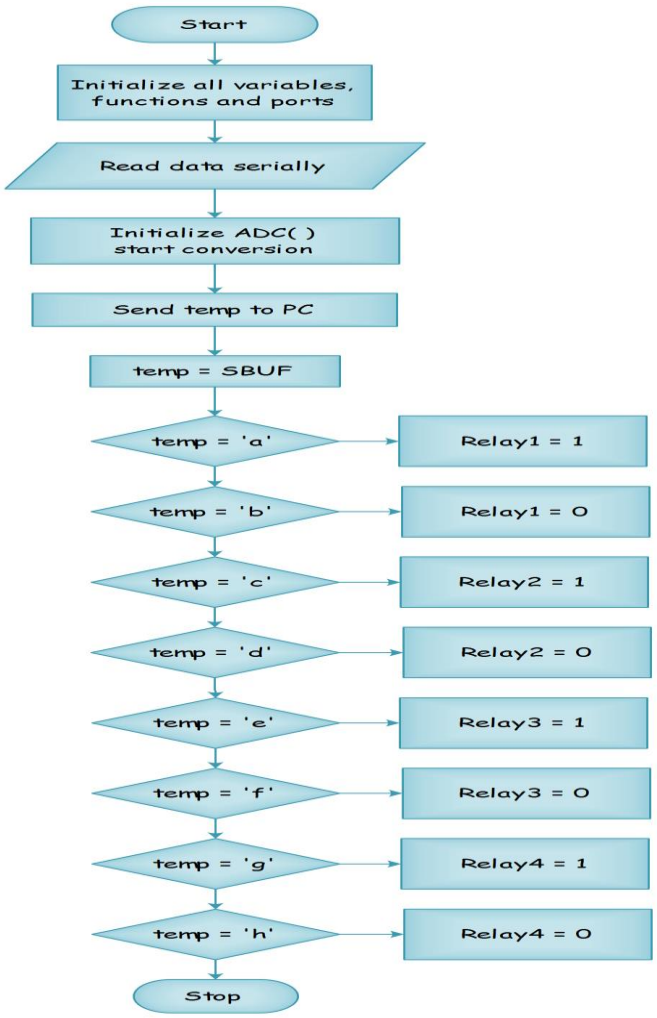
Current, Output Max: 500mAmp, Voltage, Input Max: 5V.

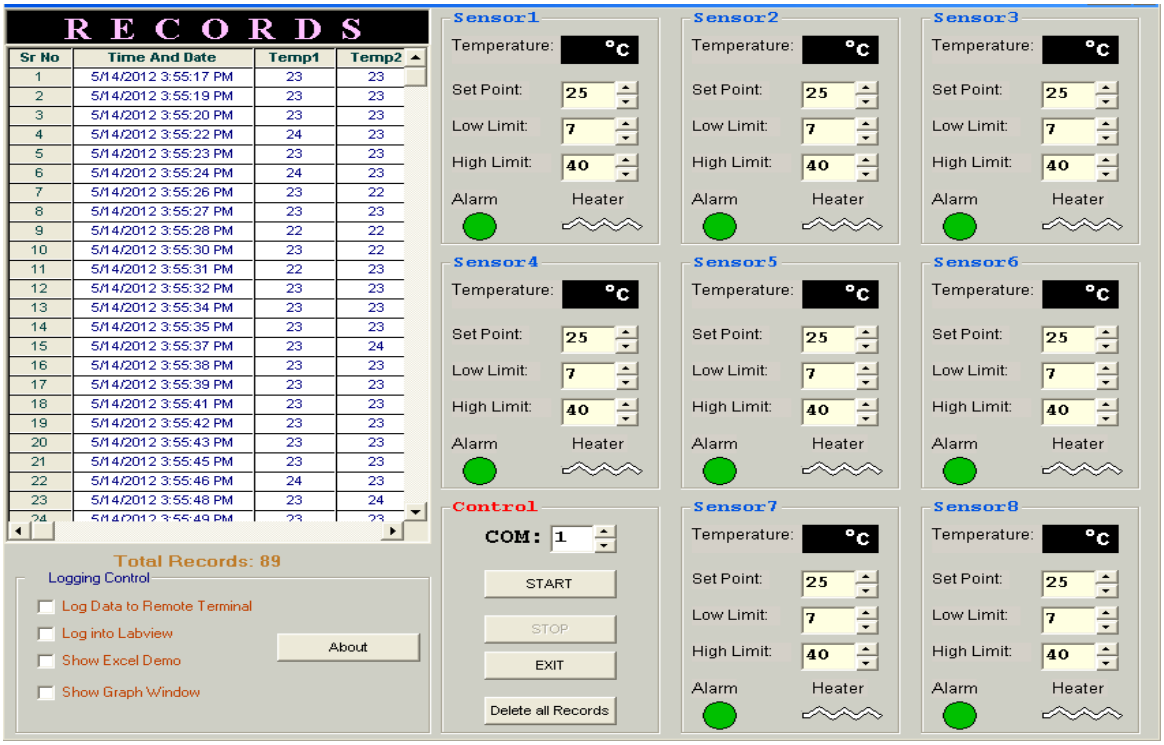
1Voltage, Output Max: 50V.

5. SOFTWARE

An Embedded system is a combination of computer hardware and software and perhaps additional mechanism or other parts designed to perform a specific function. An Embedded system is microcontroller based, software driven, reliable, real time control system, autonomous, or human or network interactive, operating on diverse environment and solved into competitive And cost conscious market.

FLOWCHART





Software having above GUI is used for keeping the real time records of heat sensors in computer MS ACCESS data base .The software has also the provision for setting the parameter such as set point, low limit, high limit and alarm indication with display of heater ON/OFF at the supervisor terminal. This project can handle eight sensors but only four have been used here. The project uses lamp in place of heaters.

6. CONCLUSION

Hence SCADA circuit has been designed and data from different analog loads has been acquisitively and digitally displayed on PC. Several loads have been monitored on PC in real time.

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SACDA stands for Supervisory Control and Data Acquisition. It generally refers to an industrial: a computer system monitoring and controlling a process. The process can be industrial, infrastructure or facility based, which includes those of manufacturing, production, power generation, fabrication, and refining and may run in continuous, batch, respective or discrete modes.

Infrastructure process may be public or private, include water treatment and distribution, waste water collection and treatment, oil and gas pipelines electrical power transmission as well as distribution, civil defense siren systems, and large communication system.

REFERENCES

[1] Deepak Kumar Agrawal, "Application Of SCADA System in Steel Industries",Department of Mechanical Engineering, Takshshila Institute of Engineering & Technology, Jabalpur (M.P.), RGPV University Jabalpur (M.P.), Volume 5, Issue 6, June 2015.

[2] G.Venkateswarlu1, Jayashree Sahu2, Y. Sriya3, Sruti Pappala4, "PLC and SCADA Based Secured and Sustainable Living", Assistant Professor, Dept. of EIE, CVR College Of Engineering, Hyderabad, Telangana, India1, UG Student, Dept. of EIE, CVR College of Engineering, Hyderabad, Telangana, India2,3,4, Vol. 4, Issue 4, April 2015.

[3] Anjaly Subhash[1], Bibi Mohanan[2], "Supervisory Control And Data Acquisition for A DHDS Substation",M. Tech, Dept. of ECE, Rajagiri School of Engineering and Technology, Kakkanad, Ernakulam, Kerala, India[1] , Assistant Professor, Dept. of EEE, Mar Basellios Institute of Technology and Science, Kothamanaglam, Kerala, India[2], Vol. 4, Special Issue 1, March 2015.

[4] Radoje CVEJIC[1],Aca MARKOVIC[2],Rosica CVEJIC[3], "SUPERVISORY CONTROL (SCADA) SYSTEM AND THEIR IMPLIMANTATION IN THE HIGH VOLTAGE PLANTS ",[1]University ,,Union,Nikola Tesla", FSOM, Beograd, [2]University,, Union, Nikola Tesla", FSOM, Beograde, [3]PD TE-KO TE,, Kostolac", Kostolac, Srbija, ISSUE#3, DECEMBER 2014.

[5] Parth Desai[A], Sharyu Mahale[A], Pooja Desai[A],and Sunil Karamchnadani[A],"Smart SCADA And Automation System in Power Plants", Department of Electronics and Telecommunication, DJSCE, Mumbai University India, Accepted 05 Oct2014, Available online 10 Oct 2014,Vol.4,No.5(Oct 2014).

[6] Action Nechibvute, Courage Mudgingwa,"Wireless Sensor Networks for SCADA and Industrial Control Systems",Department of Applied Physics and Telecommunication, Midlands State University, Private Bag 9055 Gweru,Zimbabwe, Volume 3 No. 12, December, 2013.

[7] Kaushik Bhuiya, Kintali Anish, Dhwani Parekh, and Kilaru Lakshmi Sahiti,"Low Cost Wireless Control And Monitoring using PLC and SCADA",Depqartement of Electronics and Instrumentation, SRM University, Kattankulathur, Chennai,Volume 3, Issue 9, September 2013,ISSN 2250-3153.

[8] Yongge Wang, "sSCADA :Securing SCADA Infrastructure Communications", Dept. of SIS, UNC Charlotte, 9201 University City Blvd, Charlotte, NC 28223 yongwang@uncc.edu ,July 24,2012.

[9] Bindu Pillai[1], Vishal Mehta[2], Nilam Patel[3],"Development of Supervisory Control And Data Acquisition System for Laboratory Based Mini Thermal Power Plant Using LabVIEW ", Department of Mechanical Engineering, Faculty of Technology And Engineering, Carotar University of science and Technology, Changa. (Gujrat), India,(ISSN 2250-2459, Volume 2, Issue 5, May 2012).

[10] Mariana Hentea, "Improving Security for SCADA Control Systems", Excelsior College, Albany, NY, USA, Volume 3, 2008.