Scada for Substation

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***Abstract*— SCADA (Supervisory Control and Data Acquisition) distribution is an integrated system which accepts for the digital automation of distribution substation, feeder and user functions. It includes control, monitoring and protection of the distribution system, load management and remote metering of consumer load. The main function of distribution system is to receive electric power from large, bulk power sources and to distribute electric power to consumer at various levels with acceptable degrees of reliability. This distribution system is analyzed to develop a secure, reliable and convenient management tool which can use remote terminal units (RTUs). This research work aims to apply SCADA-based control technique for distribution substation. In order to accomplish that purpose, necessary graphic designs are created and input/output devices of PLC are assigned to communicate Citect HML and PLCs.**

Key Highlights-- Provides a whole solution for distribution automation of city and country power grids - automation control - Monitoring of power distribution.

Afterwards, PLCs ladder diagram is developed for network of distribution substation. In addition, Ethernet System is established using SCADA design in which four clients and one supervisory computer are involved for control purpose. Each of four process control station connects with PLC by means of RS 232 system However, this thesis mainly focuses on distribution substation process control system using SCADA. In that case, graphic design for distribution substation is created using graphic builder and dynamic pictures are controlled by each tag using the Citect (HML) programming including tags function. Various performance tests have been carried out in order to demonstrate the desirable features of SCADA application.

The significant advantages of SCADA design implemented in this thesis are to provide safe energy efficiency and minimize damage possibilities. This tag development system is able to fulfil all tasks of power load management, and can be upgraded easily, and satisfy the continuously developing requirements. By using this system, the continuously developing requirements would be satisfied.

The electric power system is one of the tools for converting and transporting energy which is playing an important role in meeting this challenge. Development of sources of energy to accomplish useful work is the key to the industrial progress which is essential to the continuous improvement in the standard of people everywhere. An electric power system consists of three principal components: the generating stations, the transmission lines, and the distribution systems. The transmission is the connecting links between the generating stations and the distribution systems and led to other systems over interconnections.

A distribution system connects all the individual loads in a given locality to the transmission lines. Electricity power utilities worldwide are increasingly adopting the computer aided monitoring, control and management of electric power distribution system to provide better services to customers. SCADA control distribution systems benefit customers: reducing unnecessary power outages, getting maximum demands. By using control unit in power distribution network, it reduces the labor costs, system maintenance, maximum on-peak and off-peak time, etc. The architecture of a SCADA system changed with the philosophy of computing in organization, from mainframe dominated, centralized computing system to network-based distributed computing in the early 1990s. Great progress in computer and communication technologies has lead to the innovation in SCADA system.

In particular, the widespread availability of internet technology provides a fundamental support for developers in their approach to a new generation of SCADA system. Electrical distribution on is required in order to manage the power utility in such shortage period.

Working principle

At power on the system will start and will display the message on LCD. the µ-controller by default will set all its output to high logic level. Then the RTC time will be show on LCD .as per the time schedule programmed, if the first set time is reached the particular output relay corers pending to that time is on. this relay is supply thus, the time for which the relay is on, the electrical supply is provided to that area. If the time is over first relay is switched off and the next relay is on the sequel once continues and the cycle repeats. They as per the time set, the distribution system works. the voltage & current taken by the load commented is detested with potential transform and current transform respectively. The transformers output is signal conditioned & calibrated in analog signal conditioning this signal goes to ADC then µc. the p89v51 RD 2 µ-controller is used & programmed to display the voltage & current. with voltage & current we can calculate the powerline., no power is done with supervisory control & being the data acquisition is done on pc the entire system is combine known as "scads based electrical distribution system"

Hardware description:

Circuit diagram explanation the project scads based electrical distribution system is the combination of hardware implementation and software implementation. The hardware part consists of the µ-controller based system with its devices, electrical transducers, their signal conditioning, the output relay board & at the o/p part, the pc interface is there. The detailed hardware description is given below.

- Transducers &their signal conditionings port is given in single phase power black box -pl copy-

The signal conditioning part is followed by analog to digital converter. The ADC 0808 is used. It is 8bit ADC with 8 I/p channels and inbuilt multiple is provided to select the specific channel independently. the select lines are provided on 28 pin ic. The is provided with a fixed reference the ref is generated from 5v supply with potential divider network. specifically, we set the ref = 2.5v in order to display 1 unit for 10mv input to ADC. the separate clock is provided IC 555 with astute multivibrator. The clock frequency near to 200kh2. the selection lines are controlled by the µ-controller, with so tare programming At the output of ADC, 8bit data do – D7is available- this data is given to input port of the µcontroller ADC

CPU:

The main decision-making block of the system is micro-controller p89v51RD2. It does multitask simultaneal it provides the key board data to RTC & time is shown on LCD display. It reads the memory time schedule and acceding µ-controls the on/off actions of the output relays provided the data is transferred to LCD display.

The µ-controller hardware CKT .is provide with µ-controller basic circuitry i.e., VCD, GND, reset, CLK, etc. at port 1dey board is provided. It may be a simple key board or matrix key-board. The real time & distribution schedule is programmed with this key-board RTC is interface with port-3 i2c protocol is used here. The SCL –serial clock & SDA serial data signals are use. The RTC ic 1307 is used. The RTC also requires the crystal of 32kh2. with this ic & crystal, the real time & data stored is available all the times. The on chip & PCB mounted 3.6v battery is provided with RTC

The LCD display is interfaced with port3 only. 4lines. Data communication is used. the R/s, RD/WR & enable control lines are provided. the intensity control of the LCD is done with a variable voltage potential divider. The back light LED is also provided with VCC .it 16x2 type of LCD. the SMD techno try is used for LCD & it is trough outside sourcing.

The port4 is provided with external pull-up resistors, being not pulled high internally .it can be used as address bus as well as data bus in case of external in emery interface. The relays, to switch the electricity. it consists of 7 Darlington pairs inside a single chip the open collector o/p are available to which relay will can be connected. Another end of relay coil is connected to VCC thus, if particular input of ULN goes high its corresponding collector goes low & the relay will is energized- contact change over takes place and the supply continues. The serial communication is provided to transfer the data from µc to the compute on computer the data is available with time.

Software Scheme:

As already stated, the system requires the software base, the programmable µ-controllers are used. These are the integrated circuits within built memory & they

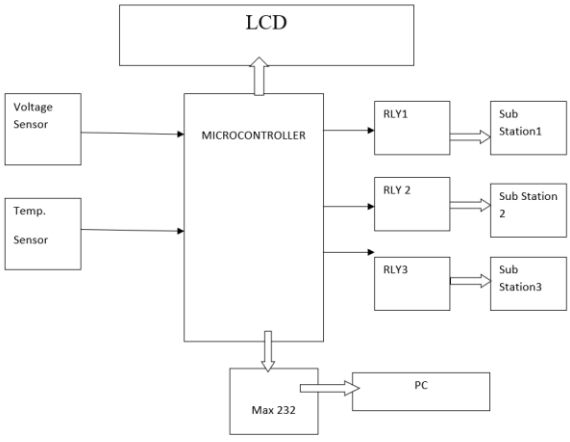
behave as per the instructions provide inside the prig here two software are required.

1. Assembly langue software for µ-controller bad
2. VB/C#. net for PC front end
   The µ-controller used is p89v5rd2 hence in CKT. System programming is done. The flash magic software is used
3. The compiler used is keel.
4. Software
5. Initially, at power the µ-controller is initialized & all its ports are high.
6. The LCD initialized and message is displayed.
7. Read Voltage
8. Display the data on LCD.
9. Initialize SBUF –serial communication buffer. Transfer the vtg/current processed data to buffer & then to max 232
10. Repeat the above steps in cyclic fashion
11. End the program.

Purpose:

The purpose of this standard is to provide guidance to the engineer responsible for the design and specification of SCADA and automation systems.

Block Diagram:



Technical specifications:

Supply =230v ac.
Logic=PIC 16F877a
Language= c language.
Pc communication=serial type
Communication protocol=232
Lcd display =16x2 alphanumeric type.
Relay =12v electromagnetic type
Protocols: serial & i2c.
Voltage sensor =pt 0-9v, current sensor

The features of project:

Provides a whole solution for distribution automation of city and country power grids.

Improves service reliability, power quality and reduces grid power loss.

Monitoring of power distribution from power plant to power substations. Automation control of switch yard.

Automatic selection of bus bar in case of maintenance or supply line failure.

Continuous monitoring and detection of power failure on various transmission lines, power substation, power poles and at transformer drum.

Automatic sequential power cutoff provision for various areas so as to implement load shedding in most effective way.

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