SCADA BASED POWER FEEDING SYSTEM FOR SUBSTATION USING ARDUINO

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ABSTRACT- This paper explains how to implement a low cost RTU (Remote Terminal unit) by implementing MODBUS communication protocol on ARDUINO and interfacing with SCADA (Supervisory Control And Data Acquisition). We have put forward our idea to The Ingenious Power and Control System Pvt. Ltd for minimizing hardware cost on substation automation

Keywords—RTU (Remote Terminal Unit), SCADA (Supervisory Control And Data Acquisition), ARDUINO, MODBUS protocol

I.INTRODUCTION

Automation is a growing technology and now it is reaching a new level. Today we can see small scale industries to giant industries are implementing automation technology to improve their product quality and quantity.

But major problem facing on automation based industries is automation hardware cost. RTU (Remote Terminal Unit) is a widely used costly electronic hardware for collecting field data from sensors and controlling actuators. This hardware have the capability to communicate with other intelligent electronic devices with certain communication protocol MODBUS is a open communication Protocol developed by MODICON Corp. It is widely used in RTU’s for communication.

SCADA (Supervisory Control and Data Acquisition) is software used for making animated graphics of industrial process.

The SCADA system collects information from plant intelligent devices such as PLC (Programmable Logic Controller), RTU etc and mimic plant process.

ARDUINO is a Italian made low cost AVR (Advanced Virtual Risk).It’s a Microcontroller based Development board. We are implementing MODBUS communication Protocol on this board like RTU and interfacing with SCADA system on substation for low cost solution on automation industry.

II.EXISTING SYSTEM

The Ingenious Power and Control System Pvt. Ltd is an industrial and Marine automation company. They are widely using RTU modules along with PLC and SCADA systems for automating industries and substations. This RTU’s are costly around 500 USD for single piece. On certain industries they have to use ten to hundreds of RTU.

They are facing another problem is that limitation on component level service. They are following use and throw.

Figure 2.1 RTU (Remote Terminal Unit)
III. PROPOSED SYSTEM

The proposed system is applying in a automatic power feeding system on substation. In this system we are replacing ordinary RTU modules with low cost ARDUINO based system.

Figure 3.1 Proposed Block Diagram

This system has four section 1) Sub-Feeder control and Sub-Feeder sensors 2) ARDUINO MODBUS RTU 3) Communication networks 4) Substation Automation SCADA System

1. SUB-FEEDER CONTROL AND SENSORS

This section controls ON / OFF process of individual sub feeders and collecting status from sensors like over load detector, high voltage detector, earth leakage detection and status of sub feeders.[5]

2. ARDUINO BASED RTU

It is a low cost AVR microcontroller based development board. This is configured of MODBUS communication protocol with the help of ARDUINO programming Software.[2]

This program will assign an MODBUS memory map for each digital input output, analog input output and internal memory .Through this memory address we can access ARDUINO internal registers and data can be manipulated.

3. MODBUS COMMUNICATION

In this section ARDUINO RTU is networked via RS485 standard of communication .RS485 is a multi-drop communication standard and 2 wire communication. Two wires are D+ and D-.

Communication configuration

Standard : RS485
Parity : EVEN
Stop Bit : 1
Baud Rate : 9600
Number of Bit: 7
Mode: ASCII

4. SUB-STATION SCADA

This is the animated graphics of substation feeding system installed in a Personal Computer[1].This application shows Real Time status of feeding system and it facilitate an alarm system and report generation.[4],[3].
IV. WORKING OF SINGLE FEEDER SYSTEM

The transformer itself step down the voltage to 5v. Two voltage regulators are used in the to avoid heat losses. The capacitor used here is used to filter the ripples. Two pins from the PCB board is connected to the +5 v and ground respectively to the arduino.

Potentiometer are used to determine the analog signal, IN Max 232 IC there are tx & rx pins, which is connected to the respective tx and rx pins in arduino. Digital input from the board is given to the 8, 9, 12 & 13th pin of arduino board. There’s a dip switch in the circuit which is used when necessary.

Serial port is connected to the laptop or pc. In case of pc the serial port is not necessary. If the connection is correct the kepserver will show the quality as good, if not it shows the quality as bad. The analog output is viewed in the PCB board by glowing of LED’S.[2]

V. RESULT & CONCLUSION

The SCADA BASED POWER FEEDING SYSTEM FOR SUBSTATION USING ARUDINO reduces the cost of effective system for controlling sub-feeders in the substation. The proposed system is superior to other existing systems which are used in substations, with the help of this interfacing results obtained the sub-feeders are monitored and also controlled in case of faults in the substation.

Arduino is versatile and also user friendly.

VI. REFERENCES


