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Research Paper on Low Cost Scada System for Micro Industry

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Abstract - The main objective of the project is to use the SCADA system to control data in real time. It is necessary to monitor all the processes and control the elements related to them because many processes are running simultaneously in large enterprises. We can achieve this goal by using technology such as Wireless SCADA (Supervisory Control and Data Analysis). The AT89S52 microcontroller is interfaced with temperature sensors. The microcontroller wirelessly transmits data continuously from the sensors, which are then received via a USB type trans-receiver connected to a PC or laptop. The computer software that records the data into a file and displays it on the front panel of the PC or laptop is loaded. On the SCADA screen, we can change the parameters such as the setting, the low limit, and the high limit. The microprocessor sends instructions to the appropriate relay as soon as the temperature sensor drops below a predetermined level. In response to their sensors, the field devices connected by the communicator are switched from ON to OFF. For the purpose of making the alarm sound on the PC when there is a malfunction, there are more restrictions and lower options. Thus SCADA can be used to control processes accurately and safely at hazardous locations. On the SCADA screen, we can change the parameters such as the setting, the low limit, and the high limit

Keywords: Low Cost SCADA, Remote Monitoring, Industrial Automation

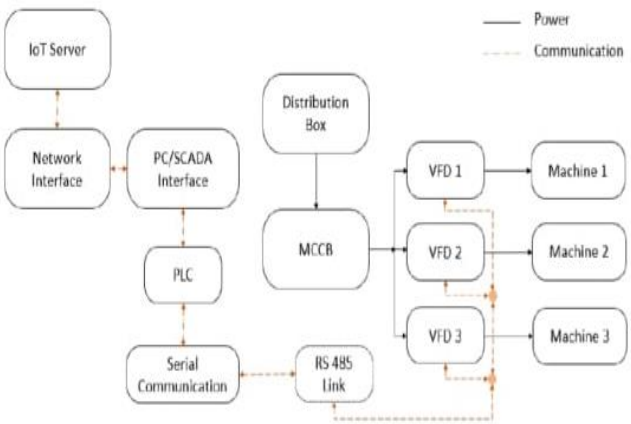
1.INTRODUCTION

This SCADA (Supervisory Control and Data Acquisition) is an integration of software and hardware components that enable remote or local control and supervision of industrial or other activities. The SCADA unit makes it easy and simple to observe and manage every aspect of the production process. The SCADA system is currently used frequently, and its use is expanding every day, but small and medium-sized businesses cannot afford to use it to monitor their plant processes due to the higher cost. If making wired connections to a remote location is too expensive or takes too long, a wireless SCADA is required. Its Wireless technology, which has become more popular in the IT industry recently, may also be appropriate for industrial control networks, offering solutions with high return on investment for safety, control, and diagnostics. Power-efficiency, timeliness, and scalability also present some potentially attractive properties for supporting large-scale ubiquitous computing applications. It is evident from managing the transition to wireless that common wireless protocols such as Wi-Fi and Bluetooth can be used in manufacturing settings.

2. Description of Designed System

The main user interface of the SCADA system is developed in C# environment with the feature of controlling and monitoring the system through internet/cloud server. The communication of SCADA system to the IoT cloud is through the internet protocol and the connection has been secured through end to end encryption. The IoT server data can be accessed through the internet from any mobile devices after the successful login with pre-shared API key and password. The operation and control actions can be performed from multiple devices and also be monitored in multiple screens. The real-time operation data is managed to logged into the cloud server and the detailed report can be generated as per requirement of the user. The remote terminal unit is set-up with PLC through Modbus communication through RS-485 communication channel. The PLC and the SCADA computer is installed in the same local network through ethernet cable to the router and router is connected to WAN for operation of the system through IoT devices. Fig. 1 shows the overall architecture of the proposed system. The power is supplied to the machines through Variable Frequency Drive (VFD) and the control signal is also sent through the VFD to run the machines in the desired manner. The RS-485 link establishes the communication between PLC and the VFD for the information and instructions exchange and the overall machining activities are accessed to be monitored through the main supervisory computer equipped with Supervisory Control and Data Acquisition (SCADA) software. In addition to the locally supervision and control of the industrial process, there is access of controlling and monitoring of the system through IoT server via internet communication through the network interface provided to the main computer.

3. PROPOSED SYSTEM:



4. EXPEREMENTAL SETUP:

The experimental setup was carried out in the plant site of Himalayan Snacks and Noodles Pvt. Ltd. in Banepa, Nepal and the outcomes are recorded. The setup consisted of development of optimized control system by using the PLC for the logical decisions to be made to the system and was controlled from the supervisory control by the SCADA software developed in C# environment in visual studio 2013. The end machining process were equipped with the infrared sensors to detect the objects in the rollers and to detect the machines status. The signals from the IR sensors were communicated with PLC for making necessary control commands based on the sensor status. The machine control is accessible from the push buttons located locally or from the SCADA interface from the main control computer. The control logic is made in XOR combination between SCADA system and the pushbuttons so that from any controller section the machine operations can be accessed easily

4 .WORKING

SCADA (Supervisory Control and Data Acquisition) is a type of business management software that allows businesses to monitor and control various business processes. Copy to a remote machine. It is widely used in industries such as oil and gas, water and waste, power generation and manufacturing. A SCADA system collects data from sensors and control devices in remote locations and transmits the data to a central control room for monitoring and analysis. It allows operators to monitor and control processes and systems, and can be used to perform various tasks. SCADA systems usually consist of several components, including human-machine interfaces (HMIs), logic controllers (PLCs), remote control units (RTUs), and communication networks. These units work together to collect data, provide control and transmit information between the control unit and remote locations. In recent years, SCADA systems have become increasingly complex, integrating advanced technologies such as cloud computing, artificial intelligence, and the Internet of Things (IoT).

The working of a SCADA system involves the following steps:

1. Data Acquisition: The SCADA system gathers data from various field devices, such as sensors, actuators, and PLCs (Programmable Logic Controllers), using protocols like Modbus, DNP3, or OPC.
2. Data Processing: The collected data is processed, analyzed, and stored in a central database for further use.
3. Monitoring: The SCADA system provides a graphical interface for monitoring the status of the processes and the field devices. The interface displays real-time information about the process parameters, alarms, and trends.
4. Control: The SCADA system allows operators to control the processes remotely by sending commands to the field devices. The commands are executed by the field devices and the process parameters are adjusted accordingly.
5. Reporting: The SCADA system generates various reports and provides historical data analysis, which helps in decision making and process optimization.
6. Alarm Management: The SCADA system provides an alarm management system that alerts the operators about any abnormal conditions or deviations in the processes. The operators can then take corrective actions to minimize downtime and prevent losses.

5,FUTURE SCOPE:

The future scope of SCADA (Supervisory Control and Data Acquisition) systems is very promising due to the increasing demand for smart and efficient industrial control systems. The future of SCADA systems is expected to be impacted by the integration of new technologies such as Internet of Things (IoT), cloud computing, machine learning, and artificial intelligence.

6.RESULT:

The system works appropriately to avoid any inconvenience. The system works smart with the help of Arduino Nano, LCD, Relay, Power Supply, and Temperature Sensor. The Arduino Based languages is used to create a website for SCADA system based on the Internet of Things. The results are properly checked and are accessible by everyone.

7.CONCLUSION:

To monitor the load status and temperature in a remote plant, we created an example of a wireless SCADA system. This system uses remote plant data collection technology, which is connected to a PC to monitor parameters of remote plant and transformer load conditions. Using a (programming language) environment platform, we have successfully tested a low-cost SCADA implementation that can be installed and implemented in small-scale running units and SCADA interfaces to monitor and control the entire plant process. Monitor the entire plant process. The findings of this study can be used to build SCADA to monitor and control the entire industry for both commercial and educational purposes. The user interface can be made more user-friendly so that it can be operated from the webpage directly by using the selector switches and input data, and SMS alerts can be delivered to system administrators of any essential notifications for a more facilitated and enlarged service.

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