

# Design of SCADA Based Wireless Monitoring and Control

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**Abstract** – Controlling and Monitoring have paramount importance in the process industry. As laying cables for the field sensors and final control element increases the cost and gives the option to be monitored by operator person only. To make it available for the process engineer, the SCADA screen of the complete process has to be presented at his/her desk too without the use of more cables which adds up to the final cost. This paper provides a low-cost solution for the above problem by using the Indusoft Web Studio for the wireless access of the SCADA screen to more than operator. It utilizes the IIS Manger of the Computer and is uploaded on the server and made available to process engineer with security. By using the methodology, we intend to avoid occurring of hazardous situation caused by the ignorance of operator.

**Keywords:** Wireless Monitoring & Control, Scada, HMI, Indusoft Web Studio, Industrial automation.

## 1. INTRODUCTION

The aim is to make a control system which can be operated by the operator at the control station as well as on site engineers or the operator away from the control station in order to minimize risks involved in the plant due to absence of personnel at the control unit. This provision is given to avoid carelessness and hazardous conditions. The allowance given to the user is lowered from control panel operator towards the field engineer. To achieve the remote control, we researched about SCADA software by Wonderware Intouch and Indusoft Web Studio. Intouch, although easy to learn and versatile in multiple formats, did not have any provisions for wireless connectivity. We had to thus look forward into Indusoft Web Studio for our project progressions. With Indusoft we encountered certain problems as well, following which we had to contact the company and gain their assistance once.

## 2. LITERATURE SURVEY

Several Articles for our project were studied. Since the programming part of DCS have been discussed[6] in ‘Design of SCADA Based Wireless Monitoring and Control’. The development of interactive Scada screen[5] will always play an important role in similar kind of projects. The important and main software of this project ‘The Indusoft Web Studio’ [5] is a very powerful software with lot of features of wireless interfacing with the “Engineering Mainframe”.

## 3. SYSTEM ARCHITECTURE

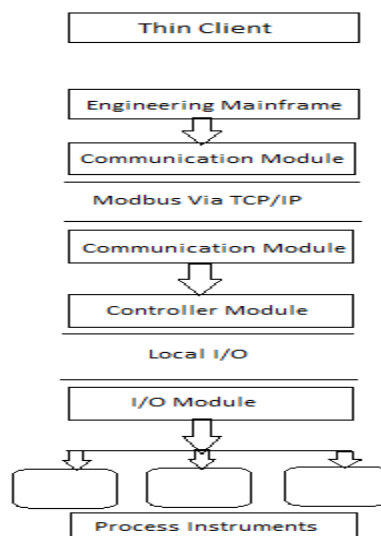


Fig -1.:System Architecture

Fig. 1 highlights the system architecture, which consist of sensors, final control element, DCS, SCADA. The sensors and final control elements are the field devices which are used for the purpose of input and output to the process or from the process (i.e. sensing field parameters and providing input to the control program or generating an equivalent output based on the input from field devices and controlling the process). In our project work, we are using level loop which consist of level sensor and control valve as the field devices and DCS as the main controller. The controller (DCS) consist of digital and analog I/O modules, communication channel. For the purpose of wireless control and monitoring to more than operator station we have used indusoft web studio. It is a powerful scada software giving us the advantage of easy access to HMI through thin client network. The DCS communicates with the Indusoft Web Studio through Modbus RTU via TCP/IP. The medium of communication is RS-232 wire connected to the ethernet port of the laptop. In Modbus communication, every process variable like PV (Process Variable), RSP (Resting Setpoint) have an I/O address which has to be called from the SCADA communication driver sheet to get the actual values in the SCADA screen. After Completing the Modbus communication driver sheet, designing SCADA screen, tagging every symbol, all the screens must be saved. Then publish all the screens as HTML from the menu tab. Completing all the process, we now need the iis Manager to access all the published html file of scada screen on the internet. We do have to add a site file in the iis manager to get this done.

#### 4. SYSTEM HARDWARE

##### 4.1. Cascade Loop

For the field process of the project we preferred a cascade loop with flow as the primary loop and level as the secondary loop. This loop consists of control valve, water

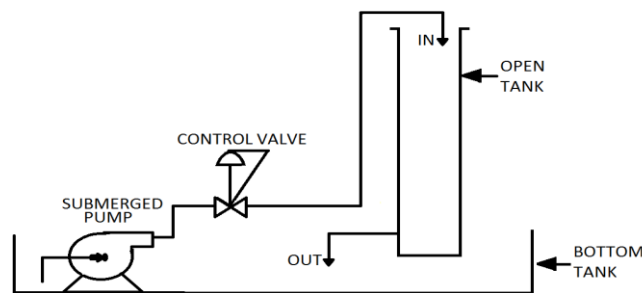


Fig- 2. Process Flow Diagram

pump, level transmitter, i/p converter as the field devices which are interfaced with the dcs to the analog input and output.

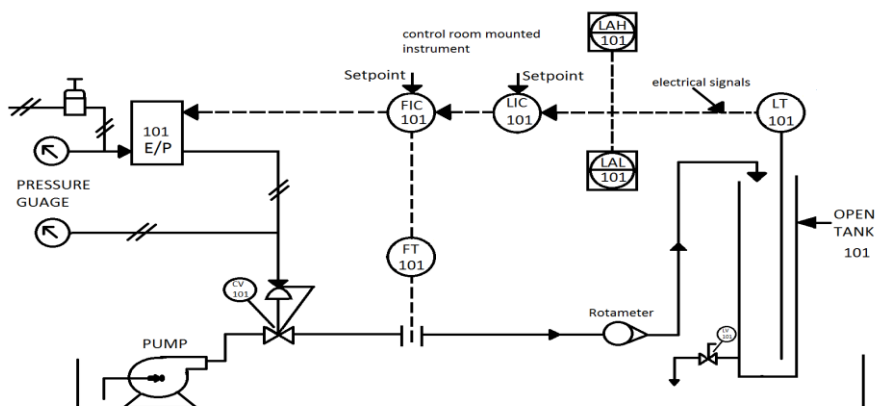


Fig- 3. Piping & Instrumentation Diagram

## 4.2. Honeywell 900: C-30

The Honeywell ControlEdge HC900 Controller is an advanced loop and logic controller offering a modular design sized to satisfy the control and data management needs of a wide range of process equipment. When combined with the optional 900 Control Station operator Interface that is highly integrated with the controller's database, configuration and setup time is minimized. This powerful combination together with Honeywell's performance proven control technology provides users an ideal solution for process control. Open Ethernet connectivity with ModbusTCP Protocol also allows network access using a variety of HMI/SCADA software. Program execution environment is protected using an independent watchdog timer. The DCS which we are using consist of One CPU (Controller Module), 1 Analog input module, 1 Analog output module, 1 Digital input module, 1 Digital output module and a power supply module



**Fig- 4.** Honeywell 900: C-30 Hybrid Control

(SMPS). It is a non-redundant controller. As we are using the DCS to control a process, we will be using the analog i/o modules only.

## 5. SYSTEM SOFTWARE

The main two software required for the monitoring and controlling purpose are 'INDUSOFT WEB STUDIO' and 'INTERNET INFORMATION SERVICES MANAGER'.

### 5.1. Indusoft web studio

Indusoft web studio[4] is a powerful scada software used for the purpose of monitoring and controlling the process / process variables. The indusoft web studio comes with the features like thin client network, mobile access. This software lets the user access the scada screen in his/her office which is available at the operator workstation in the field devices and thus to monitor the process or look at the parameter and keep a check on the particular process of a plant which in return reduces the possibility of any incident to occur as more than two or two people will be having the watch over the process. An Indusoft Web Studio is a powerful tool for the monitoring and scada purpose.

### 5.2. Internet Information Services (IIS) Manager

Internet Information Services (IIS), formerly Internet Information Server) is an extensible web server created by Microsoft for use with the WindowsNT family. IIS supports protocols like HTTP, HTTPS, SMTP and NNTP. It works as a web server for the device which helps the user to access the scada screen on any computer as it is in the main device or operator workstation. It uses the HTML format of every scada to access it on a web browser. For the project we used the HTTP protocol of the IIS manager.

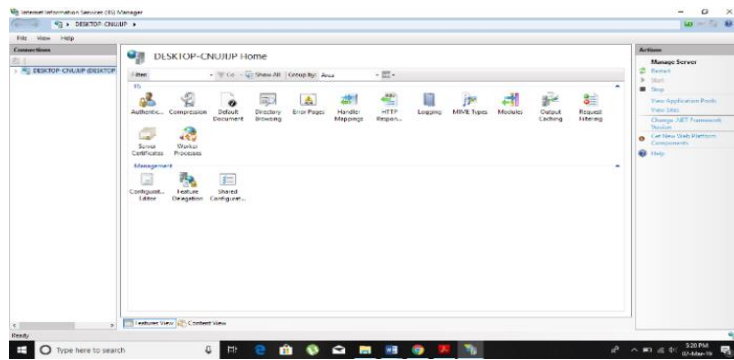


Fig -5. IIS Manager

### 6. RESULT

After the completion of interfacing of scada screen with the hardware, the final output screen we prepared let you have the control over the process by giving the setpoint from the screen itself and keep a watch on the trends window and alarm window which will inform the operator about any misbehavior of the process like low water level in the tank or high-water level in the tank. The final designed scada screen is as given below:

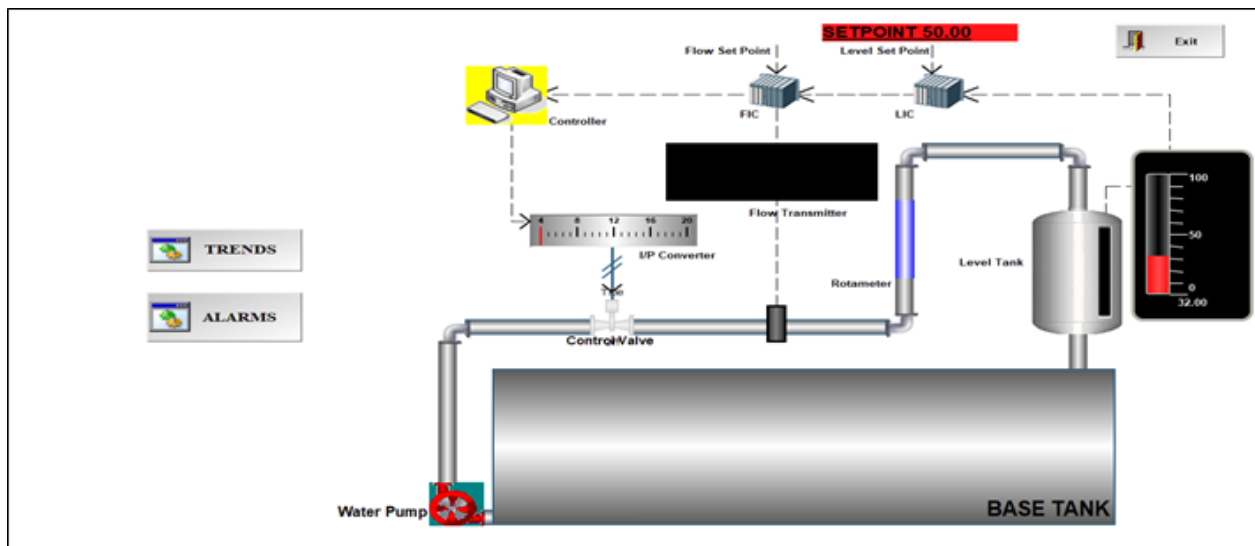


Fig -6. Main

Screen

Activation Ti...	Tag Name	Message
03/30/2019 17:27:17	LT	Almost Drained !!!!
03/30/2019 17:27:17	LT	Level Low!!

Fig -7. Alarm Screen

## 7. CONCLUSION

The proposed paper suggests design and implement a wireless monitoring and control system for a process. The system is based on **Indusoft Web Studio** wireless communication protocol and highlights the use of an innovative, yet simple and effective control algorithm. The implementation has been done for a point-to-point system that has only one field unit, but given the user friendliness of wireless technology the system can be upgraded for monitoring several field units. The developed system is low cost, reliable and accurate for processes where safety and monitoring have enormous importance. The implementation of this system not only reduces the cost of wireless but also gives access to more than one operator to the process.

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