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IoT Based Data Acquisition System Using PLC & SCADA

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ABSTRACT: First time automation in industries was done through the use of steam and water power. As the advancement took place, electricity was introduced and was used in industries for mass production. When computers were invented, it was designed to perform multiple functions. As time went on, computers became cheaper and then almost all industries started using it for automation because it reduced a major work load experienced by the humans and still it is considered as the best option to control and monitor a application. Automation is done through the technologies such as Bluetooth and radio frequency which can be employed for short distance communication. Automation through IoT can help to get rid of the short distance communication.The Internet of Things (IoT) is a system of interrelated computing devices, machines which transfers real time data over a network to server. Nowadays Industry needs everything computerized. Earlier systems can only monitor the situations with the help of cameras. In industries to reduce manual overhead implemented Internet of Things (IoT) to monitor as well as to inform the responsible person to take appropriate measures. In this we have Implemented an industrial web based Planton application using HTML and ASP.NET language. Our aim is to provide an application for monitoring of supply parameters such as voltage, current and pressure, flow meter values and controlling those parameters through concern authority using Planton web application and also storing real time data of configured parameters on IFTTT cloud to serve as an efficient backbone for achieving a network of sensors and actuators which can help for analysing and improving the performances of the day to day activities for industry use.

KEYWORDS: IOT, PLC, SCADA, ACK: Acknowledge, ONS: On State

I. INTRODUCTION

In existing systems there is no ways to detect un-even condition in industry. Manual intervention required for monitoring. Where need to use CCTV which only monitor but no Alert generation. Alert and their appropriate actions not present. The process of monitoring and control is time consuming to detect and generate Alert Manually. Industry alert are based on manual intervention. Notification for any circumstances in Industry not provided. The Internet of Things (IoT) is a term, referring to the trend of enabling connectivity for all devices, to allow more information provided for optimization of device operation, whereas Industry 4.0 specifically applies the IoT trend to industrial scenarios and use cases. Such advances are possible thanks to the development of the data communication in general, specifically the Internet and wireless technologies, as well as increase in computational and storage capability of computers. describes components of an IoT platform. Industry 4.0 vision that outlines the next generation Smart Connected Factory. The second is Internet of Things (IoT) which is a big shift towards smart, connected 'things'. Everyday objects are getting connected and exchanging information with each other and with users. Manufacturing is a mature industry with machines and assembly lines that run with a high degree of automation. Supervisory Control & Data Acquisition Systems (SCADA) and Distributed Control Systems (DCS) are prevalent industry standards. So how is IoT relevant to manufacturing and how is it critical part of your Industry 4.0 initiative? IoT is complementary to SCADA and DCS. Information generated from SCADA systems acts as one of the data sources for IoT. SCADA's focus is on monitoring and control. IoT's focus is firmly on analyzing machine data to improve your productivity and impact your top line. So to overcome the drawback of fixed filter bank we have to go for adjustable filter bank which is capable to produce multiband signals after processing audio input. Also it is more suitable for analysis of non-

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stationary signals such as speech. This adjustable filter bank is being designed with an aim to achieve better matching than fixed filter bank due to its ability to distribute sub bands flexibly.

II. BLOCK DIAGRAM

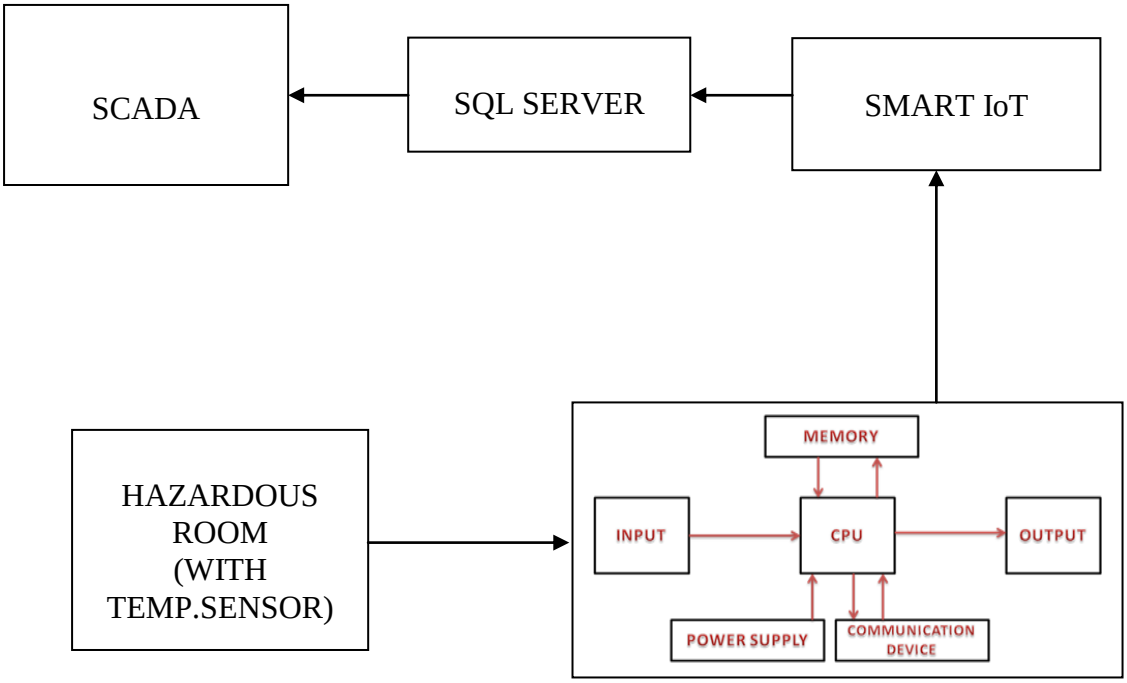

Fig (2.1). Block Diagram Representation

III. OBJECTIVES

- To monitor and control data over a long distance.
- Internet Of Things Cloud service helps to create adance communication of system.
- To access data trough wireless connectivity.
- To allow Industrial Organizations to control industrial processes remotely or at remote locations.

IV. HARDWARE SPECIFICATION

1) PLC - ALLEN-BRADLEY MICROLOGIX 1400

MICROLOGIX 1400 COMBINES THE FEATURES YOU DEMAND FROM MICROLOGIX 1100, SUCH AS ETHERNET/IP, ONLINE EDITING, AND A BUILT-IN LCD, PLUS PROVIDES YOU WITH ENHANCED FEATURES, SUCH AS: HIGHER I/O COUNT, FASTER HIGH SPEED COUNTER/PTO AND ENHANCED NETWORK CAPABILITIES.

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2) SMPS:-

INPUT: 100-240V~1.5A 50-60Hz ,OUTPUT: 24V— 2.5A
Universal AC input voltage.

➢Hazardous Locations approval to ATEX and Class I, Div 2.

3) RS485 Interfacing standard.
RS-485 does not define a communication protocol; merely an electrical interface. Although many applications use RS-485 signal levels, the speed, format, and protocol of the data transmission are not specified by RS-485.

4) MODBUS protocol.
The Modbus Security protocol provides protection through the blending of Transport Layer Security (TLS) with the traditional Modbus protocol. TLS encapsulates Modbus packets to provide authentication and message-integrity protection. The new Modbus Security protocol uses port 802.

V.SOFTWARE SPECIFICATION

1. SCADA- NET based SCADA for web hosting (IoT software) MicroLogix 1400, such as EtherNet/IP, online editing, and a built-in. LCD, plus provides you with enhanced fea-tures, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities.

2.We have used Zenon software, SQL Server 2008, RS Logix 500, RS Classics, SQL Server Booster.

VI.SOFTWARE IMPLEMENTATION

Following fig. (a) represents the main supply providing to each ladder.
Each ladder represents a specific process running in the plc. The following image contains 2 main supply providing one for the I/O mapping and the other for the alarm logic in the ladder diagram.

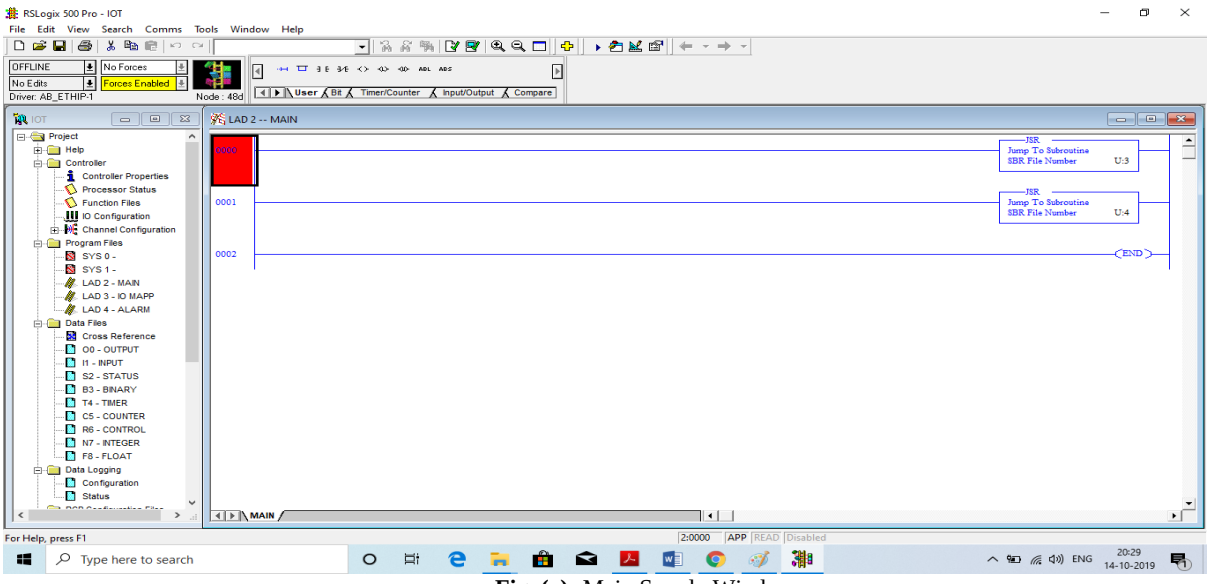

Fig. (a): Main Supply Window

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In fig. (b) the presenting blocks are added as the scaling parameters of our project i.e the temperature and humidity scaling parameters. In the respective blocks respective limits are set as the range in between which the value of temperature and humidity of the content should be there. As far we are going under the process we are giving the digital inputs which corresponds to the counts in the plc and the input is accordingly given to the plc.

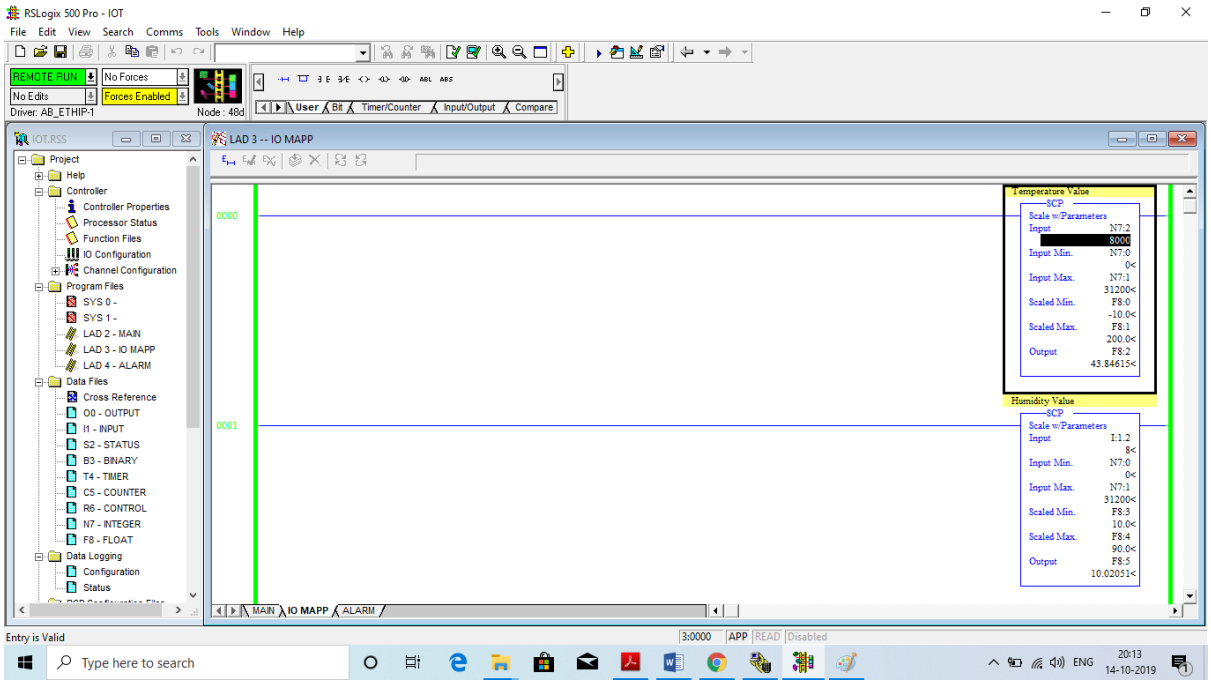

Fig. (b): Window of Scaling Parameters

Scaling parameters like the maximum value and the minimum value of temperature and humidity are set accordingly by the user. And the plc generates the output temp in the degree format as per the values which are given by the user as in the form of counts. Accordingly we can enter the count to get the respective temperature in the plc.

In the fig. (c) comparators like the greater than, less than are added to the temperature counting and the humidity counting in the plc. Output of the each comparator is shown at the right side of the ladder diagram. If the given count which represents as the temperature, exceeds the set value given by the user is greater then comparator will give the output. If the value is below the set level or less than the comparator gives the signal and output is received at the less than comparator of the temperature.

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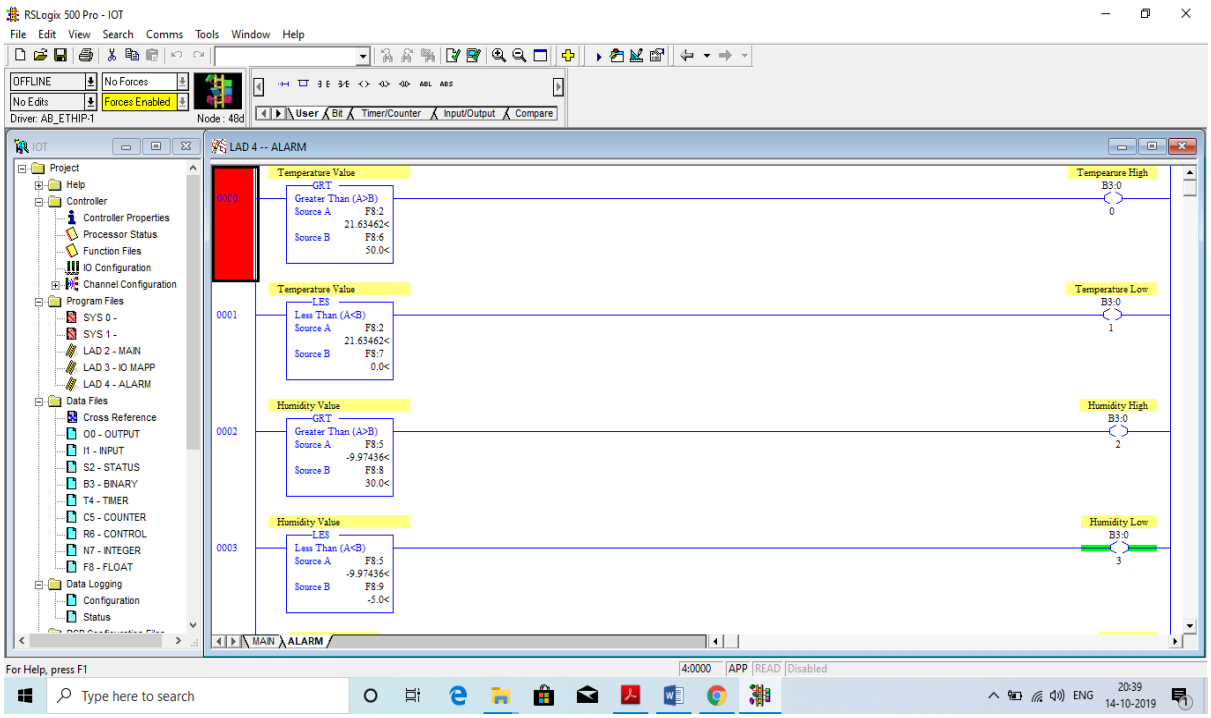

Fig. (c): Window of Comparator Logic

Similarly, the same process is carry forwarded for the Humidity sensor as well. If the count exceeds the value set by the user the output will be given at the end of the greater than comparator block and same for the less than comparator block the output will be at the less than comparator block of the of the ladder diagram.

Fig. (d) contains the main part where the Hooter (buzzer) is connected to the OR gate configuration of each respective block of temperature and humidity. If one of the gate receives the signal the OR gate generates the pulse and the output is obtained at the end by the hooter.

In the next step the Acknowledge key is added to the ladder format to avoid the irritation caused by the continuous hooter sound. This key works as the main switch for the hooter, if the Hooter rings up the user will be able to turn of the ringing of the hooter by the help of the acknowledge key.

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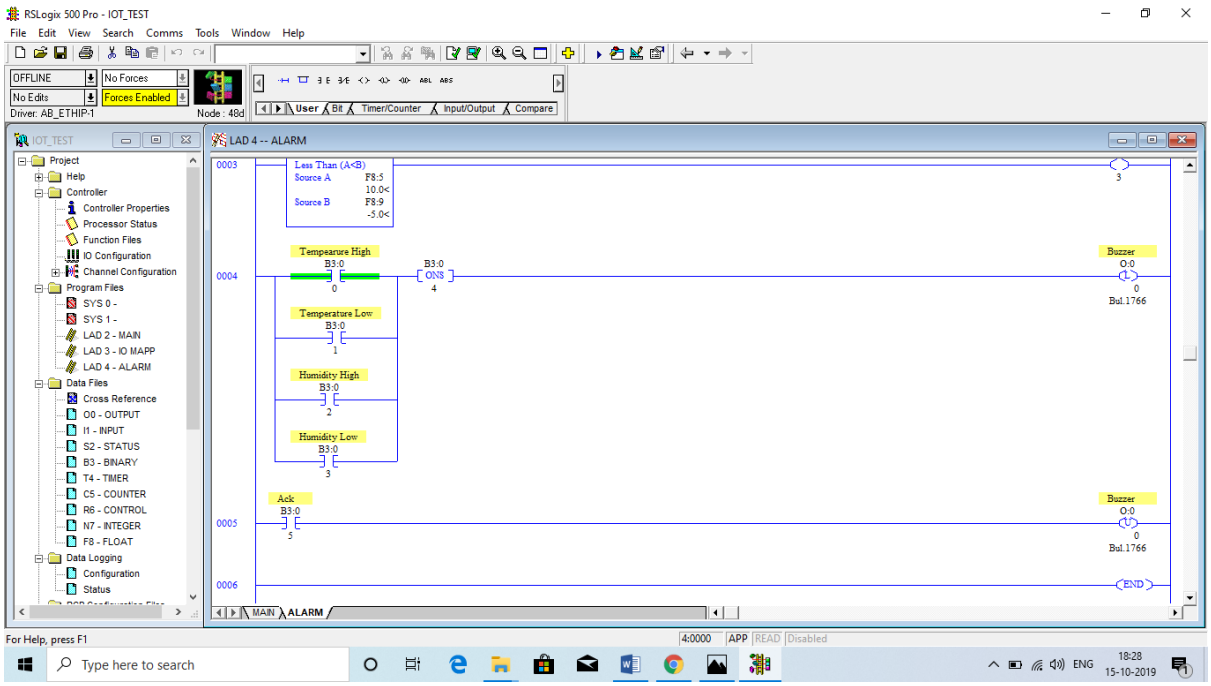

Fig. (d): OR gate Logic window(output)

VII. RESULT

We designed the logic of PLC named as the ladder logic for the project in RS Logix 500 software. Taking in consideration the temperature and humidity parameters the user will be able to get to know whether the temperature and humidity is exceeding the respective set value or not. We connected Hooter at digital output pin of PLC to verify whether the parameters are exceeding the respective limits. We have provided one Acknowledge(Ack) key to avoid the continuous beeping of the Hooter.

VIII. CONCLUSION

Nowadays Industry needs everything computerized. Earlier Pharmaceutical industries can monitor and supervise the critical and Hazardous Parameter like Temperature, Humidity, O2 Level in environment etc. In industries to reduce the manual overhead implemented Internet of Things (IoT) is used to monitor as well as to inform the responsible person to take appropriate action respectively. Implemented an industrial project using Arduino& Node MCU though IFTTP CLOUD, Temperature & Humidity values and controlling those parameters through concern authority using IFTTP Cloud application and also storing real time data of configured parameters to serve as an efficient backbone for achieving a network of sensors and actuators which can help for analysing and improving the performances of the day to day activities for industry use.

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