

IOT Based Industrial SCADA System

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Abstract— Number of accidents happens in the industry are increased in great extent. These accidents are mainly caused due to system or machinery failure or due to irregular irresponsible monitoring and controlling of the system. Such accidents becomes Hazardous for human life working with that environment. To avoid such accidents happened due to system error we have to control the system parameter automatically. The system proposed in this paper gives advance solution for the monitoring and controlling of the industrial machine parameter from anywhere, anytime by using internet.

Keywords— IOT (Internet of Things), Arduino UNO, Arduino Software, ESP8266, SCADA(Supervisory Control& Data Acquisition).

1. INTRODUCTION

Automation has much more importance in industry because due to automation overall productivity is increases. Quality of the product is also increases due to automation. It also reduces manufacturing cost. There are another several reasons such as lack of availability of skilled person, lack of industrial training centers so that automation got importance. Most of the developed countries suffer from lack of human resources. Those persons who work for their industry from many years they are leaving the industry. If they want to hire new candidate to replace old candidate then first problem is that new candidate is non-experienced. So we have to arrange training session. Candidate may leave the industry if workload is more. In case of developing country skill become important factor. They have more manpower but these peoples are not technically strong. Hence automation is become need.

Technologies which are invented for the industrial automation deals with the monitoring and controlling of the various activities and different manufacturing process running in the industry. Machinery used in the industry has its own specification. In industry boilers are used for heating purpose. These boilers have own their operating temperature range. If the temperature of the boiler exceed beyond the threshold level then there is possibility of explosion of the boiler which become more dangerous. Hence controlling of temperature is important. All other parameters such as speed of the motor, torque of the motor, pressure, available light etc must be monitor and control.

In day today life people wants to have world in their fingerprints. That means use of internet is increased in great extent. Internet of things is a new emerging technology which

connects all the living or non living things of the world using internet. Internet of things allows the communication between the people and thing anytime, anywhere using large internet network. To monitor and control such automation process we can use concept of internet of things. The data which is provided by different sensor such as temp, speed, light, pressure etc are monitor using a web page or android mobile app. We can also control this parameter by providing appropriate feedback command. For this communication between devices and web page we use controlling device along with IOT.

2. LITERATURE SURVEY

Once we get the idea about problem occurred then we have to analyze that problem. For this analysis we have to study total concept behind the problem. Before going to make new system it is more important to study the existing system. From this study we get to know what kind of requirements are fulfill till date and how to make the system more advanced and efficient than previous one using the latest technology. Our proposed system involves following research paper analysis:

According to Mr. Malikamber, Mr. Tamhankar [1] we can build a system which can be used as supervisory control and data acquisition that is SCADA. For that they uses IEEE C37.1 standard. This system provides the monitoring and controlling of the different device present in the industrial environment. Mr. Zafar [2] pointed us towards the system in which we can access the process control library from outside the college campus using web technology.

Prof. Jaikaran Singh, Prof. Mukesh Tiwari, Mr. Manish Shrivastava [3] says that how the automation becomes an essential part of the industrial development. If we replace the old running manual process of operations by new emerging automated technologies then our product efficiency is increased in great extent. We can able to produce high quality of product within a less time consumption than manual controlling. Most of the automated system based on the new emerging software technologies. Mr. Bulipe Srinivas Rao, Mr. N Ome, Prof. Dr. Srinivas Rao [4] proposed a system which is used for weather monitoring using Arduino development board. According to their research we can monitor the weather conditions of location from anywhere using internet of things. But it is a system which only monitoring the weather condition. There is no any controlling part in the

system. They used different sensor such as temperature, light, sound etc.

Nashwa El-Bendary Saumya Banerjee, Mohamed Mostafa M. Fouad [5] proposed work on the wireless sensor network. By using WSN technology they built a system which is used in smart environment monitoring. Due to large increase in the overall population, increased industrial area, increased vehicles various toxic gases such as sulfur dioxide, nitrogen oxides are released in the air and pollution is increase. It may become dangerous for human life. So it has to be monitor and control.

3. BLOCK DIAGRAM

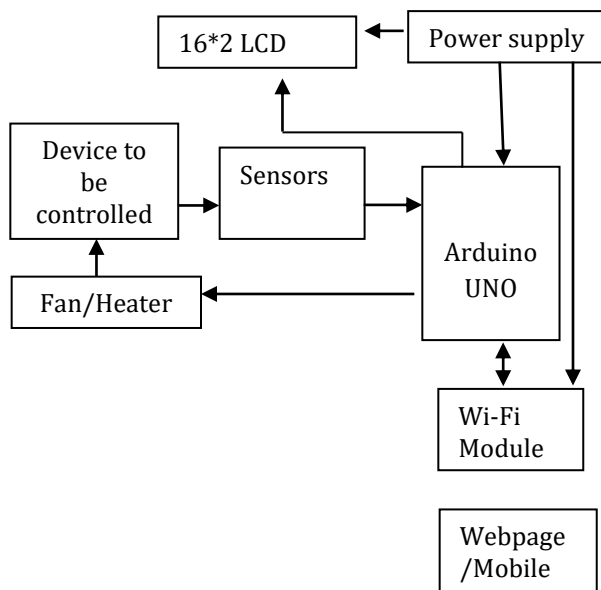


Fig1:Block Diagram of IOT based Industrial SCADA system

4. WORKING

Fig1 shows the block diagram of internet of things based industrial SCADA system. It mainly consists of sensors, Arduino UNO, LCD display, along with Wi-Fi module and controlling device such as fan/heater. This system is used to monitor and control the various parameters of the industrial operational process such as temperature, pressure, speed etc. Arduino UNO is the heart of the system. Arduino UNO uses ATMEGA 328 as a microcontroller. Power supply is used to power up the various devices used in the system. Arduino UNO, LCD display and temperature sensor requires 5V dc power supply. This 5V dc power supply is made up from 230V ac with the help of step down transformer, bridge rectifier, filter and voltage regulator that is LM7805. The

sensor output is mostly analog in nature hence we have to convert it into digital form. For this purpose we require analog to digital converter. ATMEGA328 has inbuilt ADC which convert sensors analog data into digital form and that digital data will be read by the microcontroller. ESP8266 is used as Wi-Fi module. It is used to send the temperature data to the webpage. It also receives the controlling instructions from the webpage and given to the microcontroller. ESP8266 requires power supply of 3.3V. Webpage/mobile app is used to monitor and control the process from anywhere, anytime. Controlling devices are used to control the output of system that means if one of the parameter goes above the threshold level then with the help of controlling device we have to keep it within predetermined operating range

5. FLOWCHART

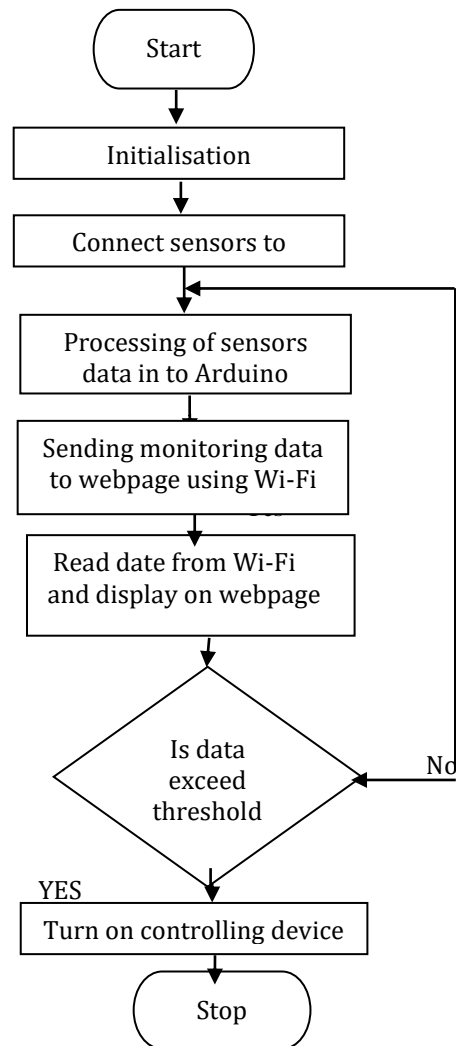


Fig2:Flow Chart of System

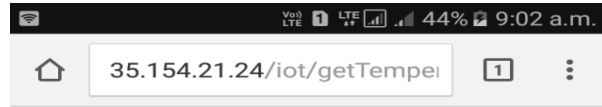
6. RESULTS

Once the power supply is on all the devices get powered up. Temperature sensors detect the current temperature and send it to the analog to digital converter of Arduino UNO. Here we use LM35 as a temperature sensor which has operating range in between -55°C to 155°C. LM35 generates 10mV per change in degree change in temperature. ADC has a 10 bit resolution. Hence it has 1024 steps. If we use such steps then full scale voltage goes to 10.24V but it is not accepted by the microcontroller of Arduino. Hence we have to convert it. For 10 bit ADC steps are in the range of 0 to 1023.

$$1V = 1/1023 = 977.51 \text{ microvolt}$$

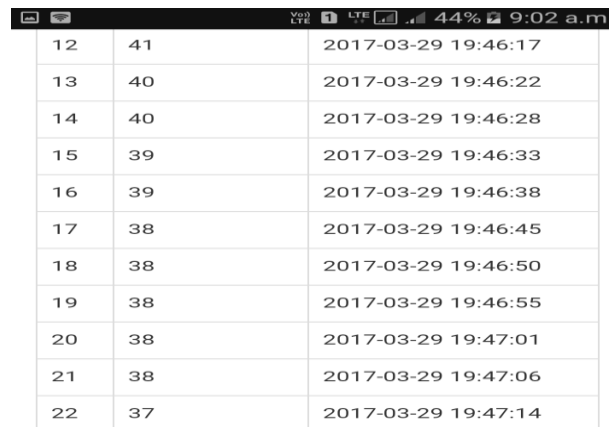
$$\text{For } 5V = 0.0048875 \text{ volts}$$

Hence we have to multiply each incoming temperature by factor 0.0048875 volts to get actual temperature. Once we get actual temperature then that will display on LCD display. With the help of ESP8266 Wi-Fi module we simultaneously send this data to webpage/app. On that webpage we can monitor the process temperature from any remote location with the help of internet. The button which is added on the page is used to indicate the alert if the temperature is exceeds beyond threshold level. If we press that tab then fan will be turn on to cool it. Fan is used as controlling device and it will turns on until temperature comes down in predetermined range.



IOT Based Temperature Monitoring

No.	Temperature	Date
1	56	2017-03-29 19:44:57
2	62	2017-03-29 19:45:05
3	60	2017-03-29 19:45:11
4	57	2017-03-29 19:45:19
5	56	2017-03-29 19:45:24
6	55	2017-03-29 19:45:29
7	46	2017-03-29 19:45:49
8	45	2017-03-29 19:45:54
9	43	2017-03-29 19:46:00
10	42	2017-03-29 19:46:05
11	41	2017-03-29 19:46:10
12	41	2017-03-29 19:46:17



12	41	2017-03-29 19:46:17
13	40	2017-03-29 19:46:22
14	40	2017-03-29 19:46:28
15	39	2017-03-29 19:46:33
16	39	2017-03-29 19:46:38
17	38	2017-03-29 19:46:45
18	38	2017-03-29 19:46:50
19	38	2017-03-29 19:46:55
20	38	2017-03-29 19:47:01
21	38	2017-03-29 19:47:06
22	37	2017-03-29 19:47:14

Fig3:Temperature Monitor on webpage

7. CONCLUSION

Thus we built a system for monitoring and controlling of industrial environment by using new emerging technology of internet of things. This system gives efficient solution than other systems. In this system we collect the data from the sensor and made it available to the user from remote location

anytime. Once we monitor the temperature from the webpage then we can control it through webpage. Hence it will become low cost, high efficient embedded system.

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