# IOT Based Industrial Parameters Measurement and Monitoring

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**Abstract - Paper is based on industrial machinery and environment monitoring system. Using sensors like pressure, temperature and humidity, the sensor values are monitored through three required ways. A 14-segment alphanumeric display[3] is used to display TPH (temperature, humidity, pressure) values at the reading sight, displaying sensor data through Wi-Fi access point when PC/Laptop is connected to it and monitoring data using IoT technology. Temperature, humidity and pressure sensor BME280[6] and connected to the Microcontroller using I2C communication protocol. Microcontroller collects sensor values and displays at alphanumeric display using i2c communication protocol which is placed at the sensor. Microcontroller collects data through sensors and transmits collected using Wi-Fi access-point, displayed in browser using IP address. Wi-Fi module connected to Microcontroller is integrated using SPI (Serial Peripheral Interface) protocol. PC receives data in the Html format through Microcontroller's Wi-Fi shield and accessing in browser through Wi-Fi shields IP address. Sensor data monitoring, storing and analysis is done in IoT cloud platform service called Thingspeak [5]. This sensor data can be accessed from anywhere through internet. Using I2C data transmission between two microcontrollers (sensor connected microcontroller used to connect to internet and another used to create access-point). Each sensor data analysis can be done through previous data readings and present data readings. Temperature, Humidity and Pressure sensors data can be monitored in the form of graphs.**

***Keywords - Wi-fi, IoT, I2C, Wi-Fi access-point.***

## I. INTRODUCTION

IoT based Industrial monitoring and measurement system is developed based on the literature survey done on the existing systems[2]. Our system had overcome the existing system disadvantage of limited access distance by using IoT. Wired Local Area Networks are replaced with Wi-Fi access-point which creates wireless local area network for data sharing and data can be access through any connected computer

## II. LITERATURE SURVEY

There are standalone systems for the measurement of temperature, pressure, and humidity, these standalone systems are used to measure the TPH values at the measuring position. TPH values can't be accessed for the remote users, multiple devices are required to measure the temperature, pressure, and humidity which increases the complexity of measuring.

Most of the local area networks are wired networks, which are used to share the data only for the wired connected devices. Most of the networking devices use MODBUS technology (RS432, RS232) for data sharing among them.

The main problem is to solve:

- To decrease the complexity of the multiple measuring devices of temperature, pressure, and humidity. Single sensor is used to measure those parameters.
- To overcome the monitoring distance, we use IOT (Internet of Things) to monitor the parameters through internet.
- Wired LAN data sharing is complex in industries (where boilers and pressurized environment is present).
- To overcome the wired LAN problems, wireless Local Area Network is created using Wi-Fi technology.

## III. OBJECTIVE

The main objective of implementing the IoT based industrial parameter measuring and monitoring system is Temperature, Humidity and Pressure are measured and monitored from anywhere.

- To minimize the device complexities of standalone systems.
- To maximize the monitoring range using IoT.
- To decrease complexities of data sharing using wired LAN networks.

 DOI : 10.18231/2454-9150.2018.0078 

***EXISTING SYSTEM & LIMITATIONS***

Currently Industrial temperature, humidity, pressure measurement systems are standalone systems.

TPH values are monitored through wired networks, there accessing distance is a limited. Multiple devices are used to measure the temperature, pressure, and humidity. Monitoring the temperature, pressure, humidity values from far distance is not possible. Using multiple devices to measure TPH values makes system not portable.

## IV. SYSTEM ARCHITECTURE

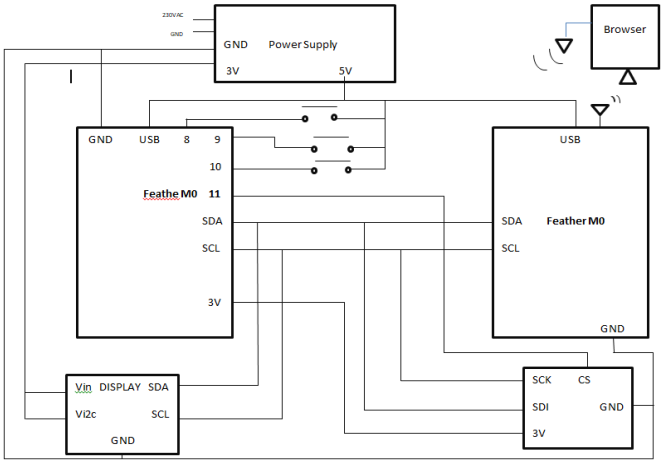


**Fig.1. System Block diagram**

The total workflow is divided into following modules

*1. Measuring sensor data and Displaying at that position*

This block is needed to measure sensor data into Micro controller, displays in Quad alphanumeric display and send data to another Micro controller using I2C protocol.

*2. Monitoring using IoT(Thingspeak)*

This block is responsible for connecting Wi-Fi module to Internet providing Hotspot and sends data to the Thingspeak server. Thingspeak will analyses the TPH data and displays in selected graph formats.

*3. Master and Slave controllers*

This block is responsible to share data between sensor connected Microcontroller and slave controller (which is used as Wi-Fi access point) using I2C protocol.

*4. Monitoring through browser*

This block is responsible for creating Wireless LAN using specific access point and accessed through IP address. TPH values are monitored through browser by connecting to created access point and response is sent using assigned IP address.

## V. PROBLEM OUTLINE

Most of the industrial tools uses standalone systems which can used to monitor TPH values at that measuring position. Monitoring systems uses wired Local Area Networks to connect monitoring devices using MODBUS(RS432). Wired LAN networks increases complexity at industries where boilers and high temperature rooms are used. Temperature, Pressure and Humidity values can be monitored at limited distances, cannot be stored and analised.

## VI. RESULT ANALYSIS

***Quad Alphanumeric Display:***

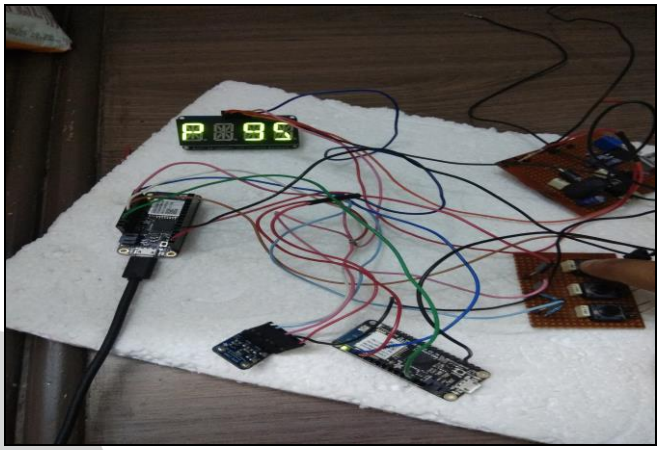

**Fig 1.1 output of Pressure Sensor**

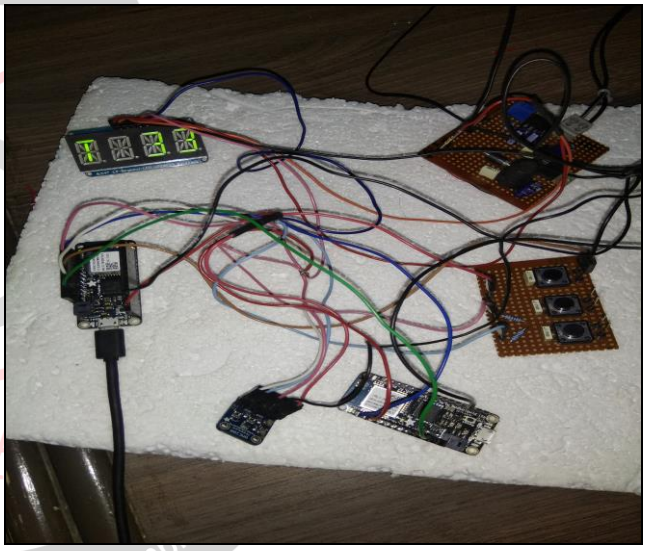

**Fig 1.2 output of Temperature Sensor**

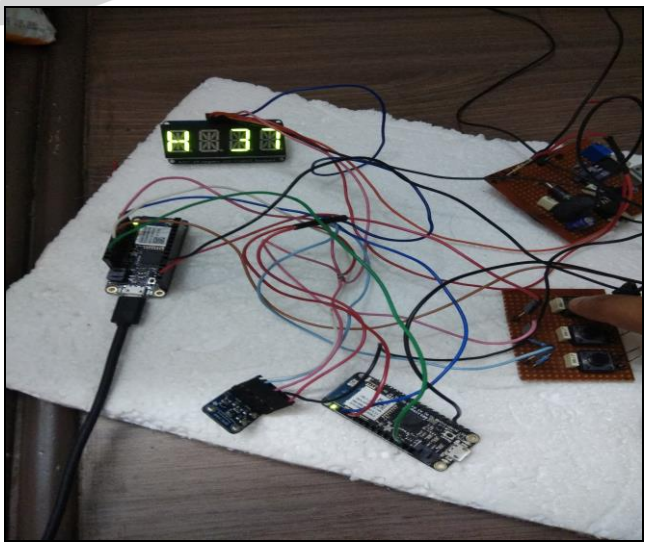

**Fig 1.3 output of Humidity sensor**

 DOI : 10.18231/2454-9150.2018.0078 

Fig 1.1,1.2,1.3 represents the pressure, temperature and humidity display respectively at the measuring position. Buttons are used to select the parameter as per the requirement.

***Output responses of Thing Speak:***

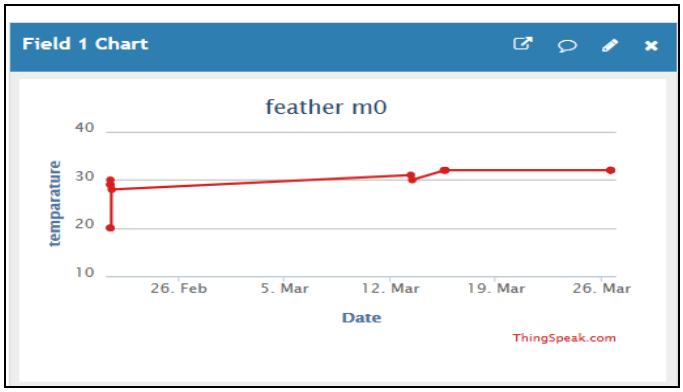


**Fig 2.1 output of Temperature Sensor Graph**

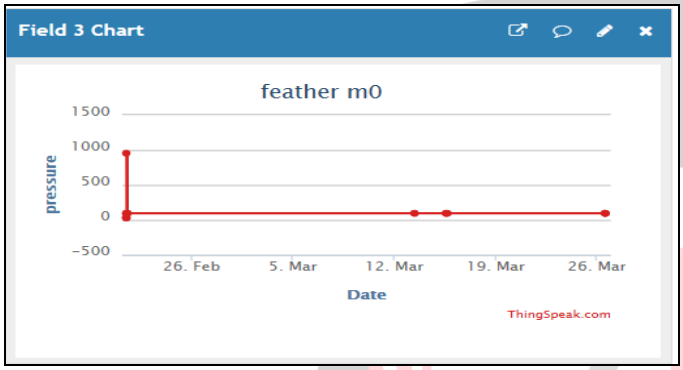


**Fig 2.2 output of Pressure Sensor Graph**

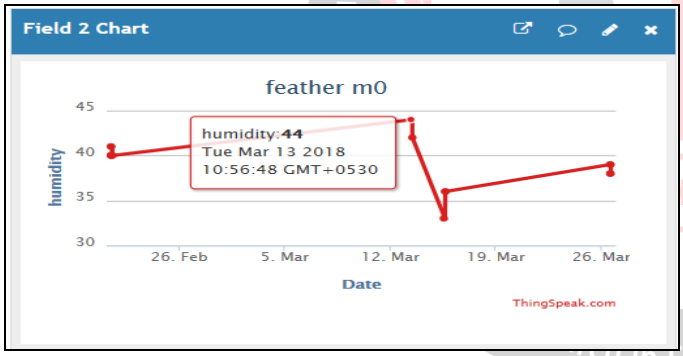


**Fig 2.3 output of Humidity sensor Graph**

Fig 2.1,2.2,2.3 shows the temperature, pressure and humidity graph values respectively in the Internet using IOT(Thing speak).

***Web Browser:***

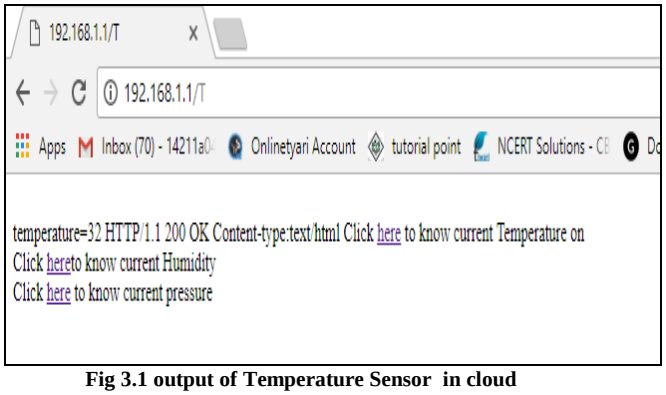


**Fig 3.1 output of Temperature Sensor in cloud**

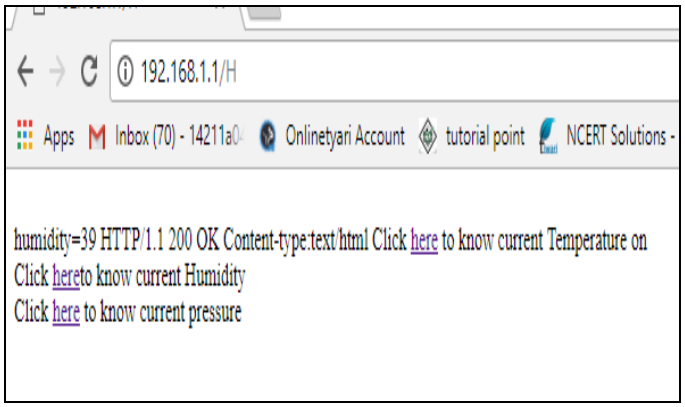


**Fig 3.2 output of Humidity Sensor in cloud**

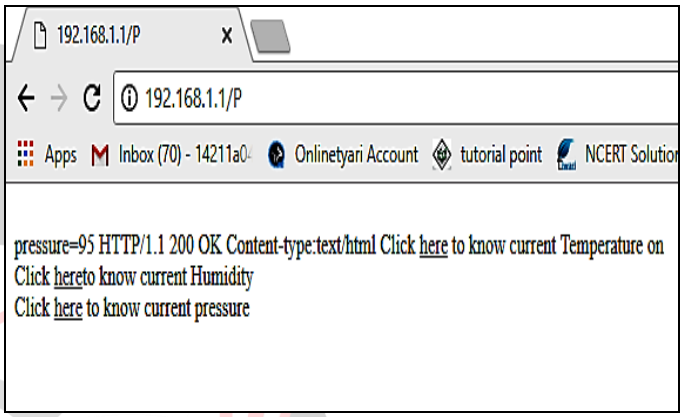


**Fig 3.3 output of pressure Sensor in cloud**

Fig 3.1,3.2,3.3 represents the temperature, pressure and humidity values respectively in the browser. We can choose the parameter which we want to monitor as per the requirment.

## VII. CONCLUSION

In this paper we analyzed some of the industrial parameters of Temperature, Humidity and Pressure are measured using a single sensor and decreases system complexity. Wireless LAN is created using Wi-Fi module as Wi-Fi access point and data is monitored using web browser which is connected to created access point with IP address. Two Wi-Fi shielded modules are used for creating access point and other is to connect to internet. IoT platform(Thing speak) is used to Analise, store and display data of Temperature, pressure and Humidity by connecting to internet

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