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# **Embedded based Industrial Parameters Monitoring and Controlling System using Internet of Things**

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**ABSTRACT:** Industrial Monitoring and Control is essential to collect all the relevant information, statistics and data related to the various industrial processes, motors, machines and devices employed in industry premises. This aims at controlled access, better productivity and high quality results of industrial products being manufactured. In this new era of technological developments remote control and monitoring via communication techniques such as ZigBee, RF, Infrared, techniques has been widely used in Industries. However, these wireless communication techniques are generally restricted to simple applications because of their slow communication speeds, distances and data security. In addition, they are easily affected by noise and bad weather conditions such as snow, fog and rain. In the Present project, a new solution is adopted for the traditional monitoring and controls of Industrial applications through the implementation of Internet of things (IOT) using GSM enabled high quality communication, low cost and high security without the need for much hardware infrastructure in all the coverage areas of the GSM operator. In this system, sensors like temperature sensor, smoke sensor and fire sensor are used and data collected from the sensor will be available through webpages and can view the data anywhere in the world and decisions will be taken based upon the measurement. SMS & E-mail alert will be sent to the specific person in any emergency situation which contains collected values from the sensor.

**KEYWORDS:** Internet of things, Temperature, smoke & fire sensor, Microcontroller, Web page, GSM.

## **I. INTRODUCTION**

Technological developments have enabled to be taken classic systems place by Automatic and advanced systems. In addition, the availability of fast-processing, stable and sensitive products provided particular benefits in industrial automation. As a result of the developments in Communication technologies, systems are no longer monitored and controlled by personnel using classic methods, but automatically by computer-controlled or remote-controlled devices. Industrial environmental conditions have been upgrading day by day with this newly introduced automatic techniques as a result of getting rid of the conventional procedures of manufacturing increasing huge workloads.

The next generation industries will be definitely more advanced and automatic as compared with existing ones. This brings on a new terminology of “Smart Industries” in this new era of Monitoring as well as controlling of various Industrial applications. As an emerging technology brought about rapid advances in modern wireless telecommunication, Internet of Things (IoT) has attracted a lot of attention and is expected to bring benefits to numerous applications. The newly introduced concept of “Internet of Things” (IOT) is providing a helping hand to achieve the Industrial automation through remote access. In IOT each device or devices constituting a system will be able to communicate with the other devices or system in the same premises over a common platform. Hence this leads to exchange of relevant data, statistics, logs and various other parameters information among various devices to improve their performance, which will help industries to have better productivity, management and increased throughput.

Once the industrial process is started it runs continuously for specific period. Here, we have to monitor and control some parameters like temperature, smoke and need to observe fire safety also. Though the technology exist in industry



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need some skilled man power observing or monitoring parameters like temperature, smoke and fire safety. So here we present and implementing an automation system that works even if concerned person is not present at field, he can become aware, update and control the status of that particular plant with the help of GSM communication.

Here sensors are used to collect the data from machine or plant in industry environment. These sensor signals are transferred to the ARM controller. Based on this information user can control the respective machine that means the signals from ARM transfer to user device through GSM wireless technology. These control signals will transfer from ARM device to sensor or relays to control the operation. In this way we can control and monitor two or more tasks by user with using GSM.

## II. LITERATURE SURVEY

Y. Fan, Y. Yin, L. Xu, Y. Zeng, VOL.10 has explained how to implement IOT based system. Internet of Things (IoT) makes all objects become interconnected and smart, which has been recognized as the next technological revolution. IoT provides an effective platform to interconnect all the resources and provides immediate information interaction.

Riyaj Kazi, Gaurav Tiwari, (ICESA) has reviewed on the concepts of Internet of Things (IoT). These are applied to a number of applications ranging from home automation to industrial IoT, Where connecting physical things, from anywhere through a network. Let them take an active part in the Internet, exchanging information about themselves and their surroundings. This will give immediate access to information about the physical world and the objects in it leading to innovative services and increase in efficiency and productivity. We can monitor and control the industrial environment for the safety purpose, for this sensors are used & for alert system, SMS and emails can be used.

Song Han Yi-Hung Wei, Aloysius K. Mok Deji Chen, Mark Nixon, Eric Rotvold has reviewed on The Internet of Things (IoT). It is considered to be the biggest challenge and opportunity for the Internet today. The Internet of Things makes it possible to connect embedded devices in physical environments to the Internet and interact with those devices through both IP and web interfaces. As a subset of the Internet of Things, the wireless embedded Internet targets at enabling resource-limited wireless devices with IP functions and connecting them to the Internet through low-power and low bandwidth wireless networks. In this paper, author describes the design of the network infrastructure of wireless embedded Internet for industrial automation.

T. Murugan, Azha. Periasamy, S. Muruganand, has proposed Industrial Temperature Monitoring Systems using GSM. It describes the design of a simple low cost microcontroller based temperature monitoring system using GSM technique. The temperature monitoring system using GSM undergoes three stages signal conditioning circuit, analog to digital converter and with GSM Modem the message is sent to mobile. ADC is used because microcontroller works with digital inputs. GSM modem can be used to send and receive SMS through AT commands. At the transmitter side, the user sends an SMS to the GSM modem using AT commands. The LM35 is an integrated circuit sensor that can be used to measure temperature with electrical output proportional to the temperature. The LM35 sensor is connected to PIC microcontroller and varying temperature is sent to GSM modem, which is simultaneously displayed in LCD. The GSM modem performs the operation of sending message to a particular SIM number. GSM technology provides users with high quality signal and speech channels, giving them access to high quality digital communication at very affordable rates. GSM network operators can provide their customers with cheaper calling and text messaging options.

Nagarjuna Telagam, Nehru Kandasamy, Menakadevi Nanjundan, Anuradha Thotakuri has proposed Smart Sensor Network based Industrial Parameters Monitoring in IOT Environment using Virtual Instrumentation Server. This project explains the real time scenario of monitoring temperature and humidity in industries. National Instruments myRIO is used and results are observed on LabVIEW front panel and VI Server. The server VI program and client VI program is developed in block diagram for the two sensor data. This proposed system develops a sensor interface device essential for sensor data acquisition of industrial Wireless Sensor Networks (WSN) in Internet of Things (IOT) environment. By detecting the values of sensors like temperature, humidity present in the industrial area. The results are displayed on the web page. The data can be accessed with admin name and password. After logging into the web page the index of files is displayed. After restarting the myRIO kit and initiate the deploying process the file the excel sheet will appear on the VI Server. This VI server is tested for its working, using a data acquisition web application using a standard web browser. The critical situation can be avoided and preventive measures are successfully implemented.

### III. NEED FOR INDUSTRIAL MONITORING & CONTROLLING

In present industrial processes are manually monitored. It leads to the accidents due to excessive temp., smoke & fire. Thus, there is a need of Industrial Monitoring & Controlling System.

So, Proper Monitoring & Controlling system performs following functions:

- i. Sensors continuously monitors temp., smoke & fire.
- ii. Compare these values with threshold values.
- iii. Avoids manual interference.

This system also gives an Alert signal using SMS & E-Mails

### IV. SYSTEM ARCHITECTURE

Industrial monitoring and control is a combination of architectures, mechanisms, and algorithms used in the industrial factory for monitoring and control the activities of industrial processes, motors, machines and devices employed in industry premises to achieve the goal. The present project is focused on Industrial applications that will be continuously monitored through a set of sensors that constitutes a sensor module. The sensor module collects the relevant data to determine whether the applications to be monitored are working well under certain threshold values. The data from various sensors in the sensor module is fed to the controlling device basically a microcontroller. This controlling device is interfaced with a GSM module to get accessed by the users. The controlling device simultaneously forwards data to the main server. The main server located at the industry premises displays the corresponding data received from the controlling device. If the industrial applications seem not to be working properly after being monitored then they can be controlled by mobile users through accessing the controller by means of GSM module. Thus, industrial applications will be precisely monitored and controlled by means of GSM communication technique

#### A. Block Diagram

The block diagram of the proposed system is as follows:

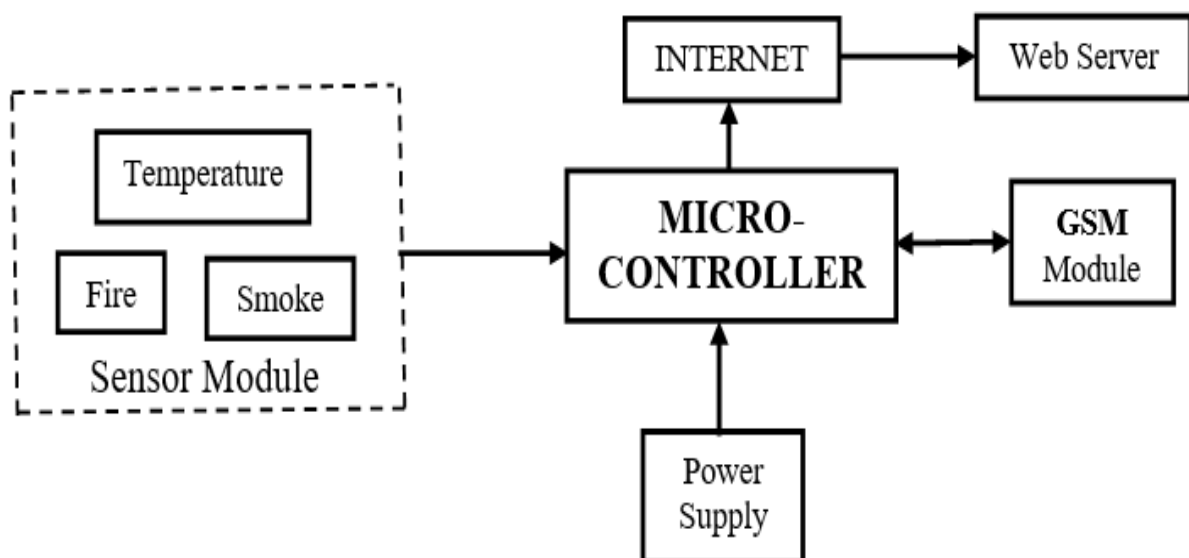


Fig. 1: Industrial Monitoring & Controlling System Block Diagram

The IoT based Industrial Monitoring & Controlling system is divided into three units as:

- Sensing & Monitoring Unit
- Controlling Unit
- Alert Unit



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The Sensing and Monitoring Unit consists of sensor module which includes Temperature, Fire & smoke sensor. These sensors are interfaced with the Microcontroller. The temperature, Fire & Smoke sensor will continuously measures the industrial parameters at regular intervals. These measured values are sent to the microcontroller. The Microcontroller is programmed in such a way that it checks measured values of the sensor with the threshold values. Whenever the measured values exceeds the threshold limit an alert system is activated and the controlling action is performed.

The Controlling unit comes into action when the measured sensor values are greater than the threshold values. Here, the threshold values are set according to the industrial safety measures. In this system, Temperature is monitored whereas smoke & fire are to be monitored as well as controlled. Whenever boundary conditions are exceeded, the control unit relays are activated so that any hazards are prevented.

An Alert unit gives an alert message in the form of SMS and E-mail to the user when the measured values exceeds the threshold limit. If there are any changes in temperature, smoke or fire we get instantaneous information from the site through automatic generated mail and SMS.

## B. Algorithm

### Algorithm: Industrial Monitoring & Controlling Mechanism

#### Inputs:

Measured Sensor Values

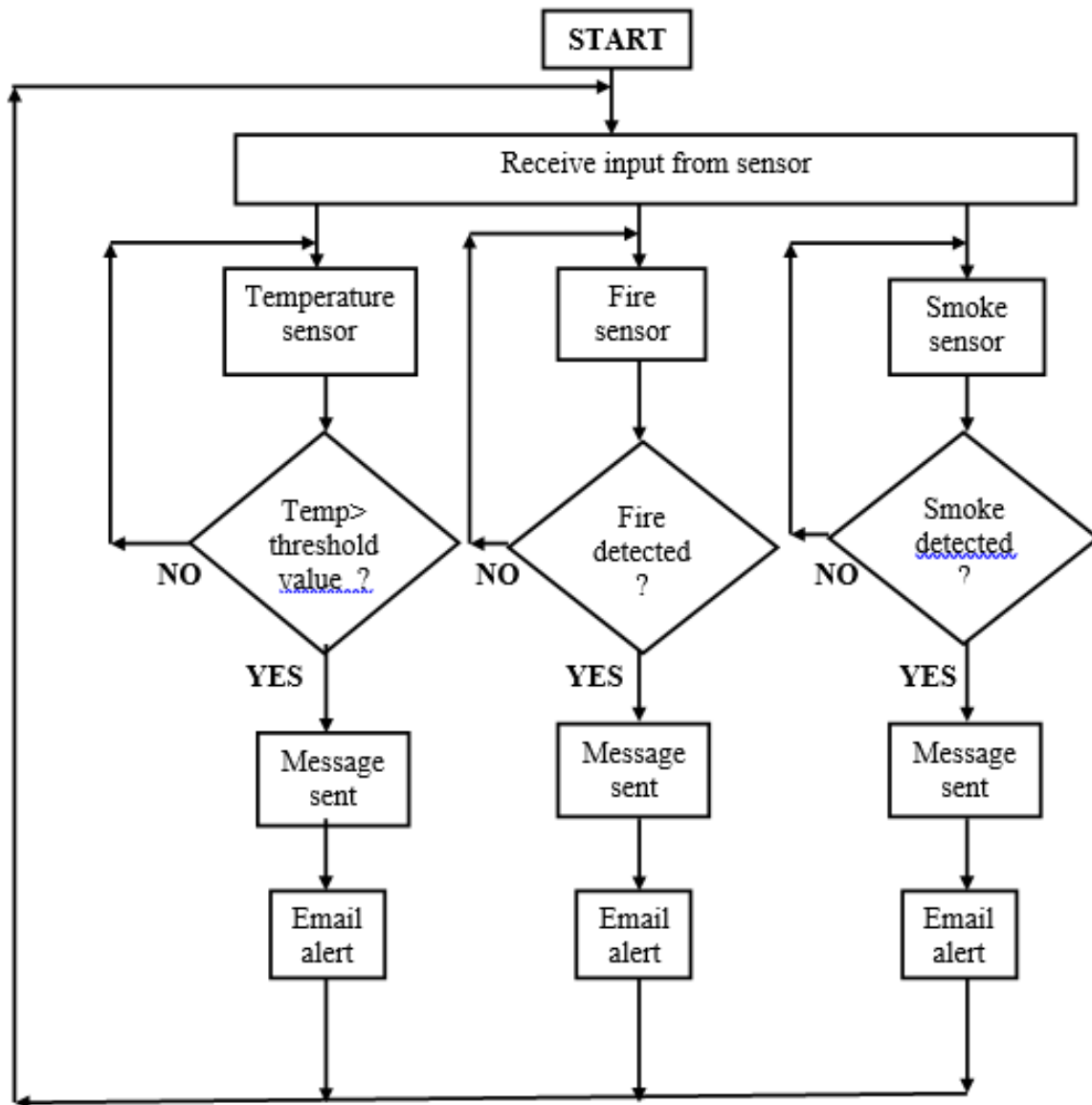
#### Output:

Alert message to the workers

#### Description:

- i. Start
- ii. Initialize the port
- iii. Set the threshold values of Temperature, Smoke & Fire.
- iv. Receive the measured values from sensor at regular intervals.
- v. Display the measured values on the webpage.
- vi. Compare the measured values with the threshold values.
- vii. If measured value  $>$  threshold value, then send SMS and e-mail alert& perform control action.
- viii. If measured value  $<$  threshold value, it will go back and continuously check and display the sensor value.

C. Flowchart



Flowchart 1: Industrial Monitoring & Controlling System

**V. ADVANTAGES**

1. Proper industrial monitoring & controlling
2. Effective remote monitoring of industrial processes
3. Prevent accidents from occurring due to excessive smoke, fire & temperature
4. Reduces manual process of monitoring & verification
5. System can be accessed anytime and from anywhere.
6. Real-time data transmission and access.
7. The cost & effort are less in this system.

**VI. APPLICATIONS**

This project can also be used in the industries that are using Boiler Plants such as- Food Industry, Foundry Industry, Sugar Industry, Chemical Industry etc.

**VII. CONCLUSION**

This paper has presented the design and implementation of Internet of things for monitoring and controlling of various application and parameters in industries using GSM wireless communication technique. The key idea of the proposed work is to provide flexible and long distance connectivity between industrial environment and user. The advantages of the developed system are to have a continuous monitoring over industrial applications and also control them if going beyond their threshold conditions. Future work will focus on improvement of above proposed work and adding features to make a reliable smart Industrial monitoring and controlling system.

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