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Endothermic Process Monitoring and Control using IIOT

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Abstract - *In industries using Endothermic processes it is essential to monitor the levels of toxic gases as there are high chances of leakage of toxic gases .In such processes there is a significant contribution of CO (Carbon Monoxide).This project will perform real time monitoring of CO levels and escalate warnings if it reaches alarming level and also take control actions to reduce the effect of toxic conditions. It will also inform about energy wastage and some fault/malfunction in the machinery as increased CO levels indicate inefficient burning of fuel. We are making this process smart and* ***Industry 4.0*** *compatible by integrating* ***IIOT****.*

Key Words**: Endothermic process, Carbon Monoxide, Sensors, ARM controller, IIOT**

1. INTRODUCTION

Industrial Internet of Things, also known as Industrial IoT or IIoT, is the application of connected sensors, and other devices to machinery and processes in industry. The Industrial IOT applications can give the plant manager's, supervisor or any other responsible person, a Real time view of the critical Parameter's that they need to monitor.

An endothermic process is any process with an increase in the enthalpy H of the system. In such a process, a closed system usually absorbs thermal energy from its surroundings, which is heat transfer into the system.

By using this system in Endothermic process industry, it gives the organisation a real-time visibility of critical parameters, and avoiding any Hazardous conditions.

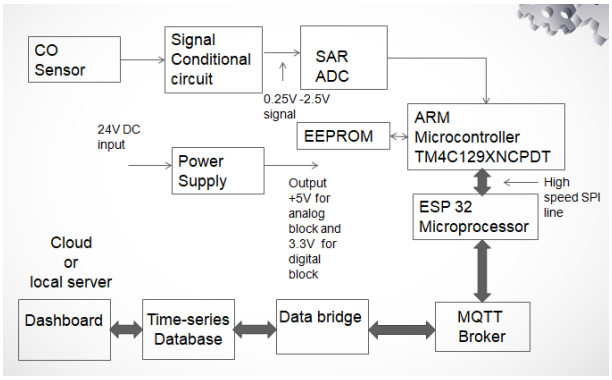
1.1 Objectives

To make a healthy environment for workers. Energy saving, to make scaled data available on, on-premises server or cloud for remote monitoring.

1.2 Scope

The parameters like CO will be detected by the sensors and processed by the controller which will give output in PPM, This data will further will be sent through the used protocol on the IOT network to the server were it can be viewed by the organization or responsible persons in the industry.

2. BLOCKDIAGRAM



- **CO Sensor**:- It is a electrochemical sensor and need external supply of 5V
- **Signal conditional circuit** :- Scale Sensor signals in to 0.25V to2.5V for ADC to accept this
- **SAR ADC**:- This is 12bit internal Successive approximation analog to digital converter inside ARM controller. It will convert analog voltage into digital counts to process it in microcontroller
- **ARM microcontroller**: This is one of the advanced Arm controller available in the market. It is 32bit controller with 1mb Flash and 256Bb RAM**.** Speed is 150DMIPS and works with 120Mhz clock.
- **EEPROM**: This is 6Kb internal EEPROM inside ARM controller with more than 10Lac write cycle. This is used to store calibration and configuration data.
- **ESP32** : It is a feature-rich MCU with integrated Wi-Fi and Bluetooth connectivity for a wide-range of applications, At its heart, there's a dual-core Tensilica Xtensa LX6 microprocessor with a clock rate of up to 240 MHz, its performance is upto 600 DMIPS.
- **MQTT Broker**: An MQTT broker is a server that receives all messages from the clients and then routes the messages to the appropriate destination clients.
- **Data bridge**: Bridge between Broker and database.
- **Database**: This will be used to store all the data sensed by the sensor.

- **Dashboard**: A dashboard is a data visualization tool that tracks, analyzes, and displays KPIs, metrics, and critical data points. Dashboards empower both technical and non-technical users to understand and leverage business intelligence to make more informed decisions.

HARDWARE REQUIREMENT

- TM4C1294NCPDT
- ESP32
- MQ7 Sensor

SOFTWARE REQUIREMENT

- Code composer studio V7.3.0
- Arduino V 1.8.19
- Teraterm

ADVANTAGES

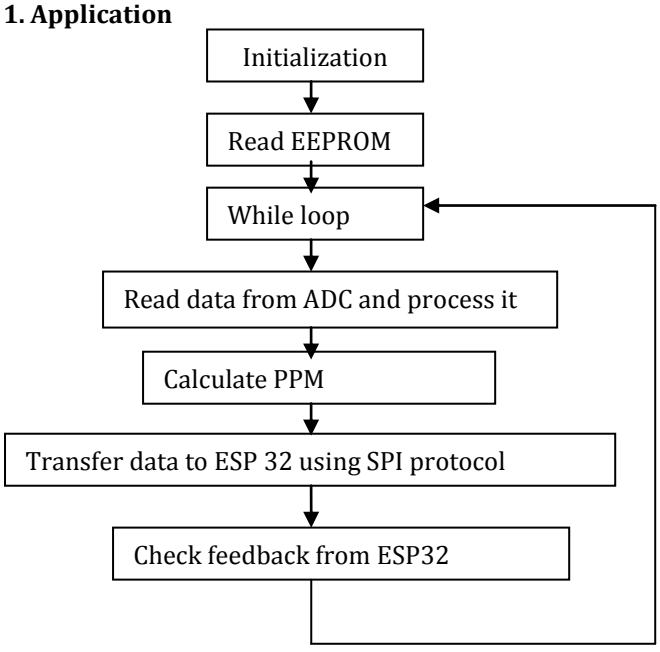
- Avoid fatal health issues or even death of a worker by monitoring and controlling CO.
- Energy saving by timely Alarming Customer about the energy wastage.
- Reducing CO by increasing ventilation.
- Smartness added due to Industrial IOT.

Applications

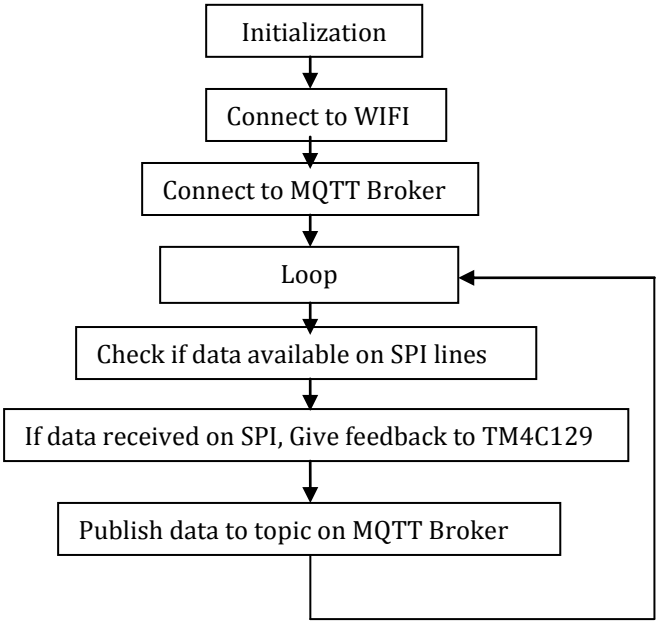
- It can be used in Furnaces to monitor and controlling CO.
- Can be modified to use in many endothermic processes like, forging industries, or oil & natural gas industries for monitoring critical gases.

3. FLOW CHART

1. Application



2. Communication



4. CONCLUSIONS

We conclude that by using this we can measure CO values of atmosphere .Getting satisfactory CO values in PPM and same can be viewed remotely using IIOT.

ACKNOWLEDGEMENT

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