Industrial Air Quality Monitoring Project (Tiva C)

Overview

This project focuses on **real-time monitoring of industrial air quality** using a Tiva C microcontroller. It integrates sensors and applies signal processing techniques for data acquisition, noise reduction, and visualization.

Objectives

- Design an embedded system for detecting industrial gases in real time.
- Integrate temperature and acoustic sensors for multi-parameter monitoring.
- Apply digital signal processing techniques for noise cancellation and filtering.
- Visualize and analyze captured data using MATLAB/Simulink.

Hardware & Software Used

- **Microcontroller:** Tiva C LaunchPad (TM4C123G)
- **Sensors:** CO_2, LM35, microphone
- **Communication:** Bluetooth module
- **Software Tools:** Embedded C (Tiva C), MATLAB/Simulink

Project Structure (GitHub)

- Final report and presentation
- PDFs – reference papers and reports
- Screenshots and circuit – hardware setup and schematics
- Matlab codes – signal processing scripts
- Noise cancellation.pptx
- Additional reports – sensors, signal processing, test results

Key Features

- Real-time gas detection with embedded firmware
- Wireless communication for industrial IoT
- MATLAB-based noise cancellation
- Structured documentation for easy reference

Key Learnings

- Microcontroller programming in Embedded C
- Sensor calibration and data acquisition
- Signal processing (filtering, noise cancellation)
- Real-time embedded systems and Bluetooth comm.
- Documenting and presenting a full project