

## **CALIBRATION OF A NO<sub>2</sub> SENSOR USING A CUSTOM-BUILT SETUP AND MONITORING NO<sub>2</sub> LEVELS AT GALAHA JUNCTION**

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An average human inhales approximately 10000 liters of air per day, making air quality a matter of critical importance. Regular monitoring of air quality is essential; however, traditional gas sampling and quantification methods, such as gas chromatography, meet challenges due to their complexity and cost. Moreover, integrated commercial gas sensing systems are often expensive. This study employed commercially available gas sensors, calibrated using a custom-built portable setup, to monitor air pollution. Calibration was conducted by introducing five different gas concentrations, ranging from 0.10 ppm to 3.00 ppm, into an airtight chamber that contains the NO<sub>2</sub> gas sensor (MICS 6814), using a closed system. Sensor output was recorded via an Arduino Uno board. To establish the calibration curve, the sensor response was plotted against the concentration of gas. The sensor's response to NO<sub>2</sub> concentration followed a polynomial relationship with a high correlation coefficient of 0.9958. The sensor contains a tin dioxide layer, which withdraws electrons when oxidising gases are adsorbed to its surface. The polynomial response occurs because the material reaches its adsorption capacity as the gas concentration increases, limiting its sensing response. The results at Galaha junction using this portable setup indicated a significant threefold increase in NO<sub>2</sub> concentration compared to data recorded in 2020. The primary source of pollution is vehicles, which increase significantly during traffic hours. Lower concentrations were observed during periods of low traffic density, between 3:00 and 4:00 p.m., averaging 0.15 ppm, while peak levels occurred between 5:00 and 6:00 p.m., averaging 0.45 ppm. During periods of heavy traffic, NO<sub>2</sub> levels reach up to 0.75 ppm, almost six times higher than the permissible limit. In conclusion, NO<sub>2</sub> concentrations at Galaha Junction consistently exceed acceptable thresholds, highlighting the urgent need for effective air quality management in the region.

**Keywords:** Air pollution, Arduino, Sensor calibration