Design and construction of an Electronic Smart Nose

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Objectives

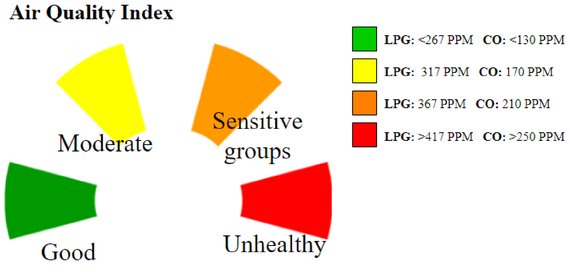
The objective of this project is to design and construct an Indoor air quality monitoring system.

The system should:

- Monitor at least two different gases.
- Transfer sensor data wirelessly.
- Always visually show the state of air quality in the specific environment.
- Log sensor data concentrations in PPM.

Background

According to MailGardian article written in 2016, about 10 million people around the universe die prematurely due to health problems caused by air pollution. This has necessitated the need for air quality solution. The system hence provides a CO and LPG concentration level monitor that warns occupants when safe limits are exceeded. The systems' warning mechanism is based on the air quality index chart below. The air quality ranges from good to moderate and approaches the unhealthy air quality for sensitive groups which are people with asthma, heart disease and other respiratory diseases.

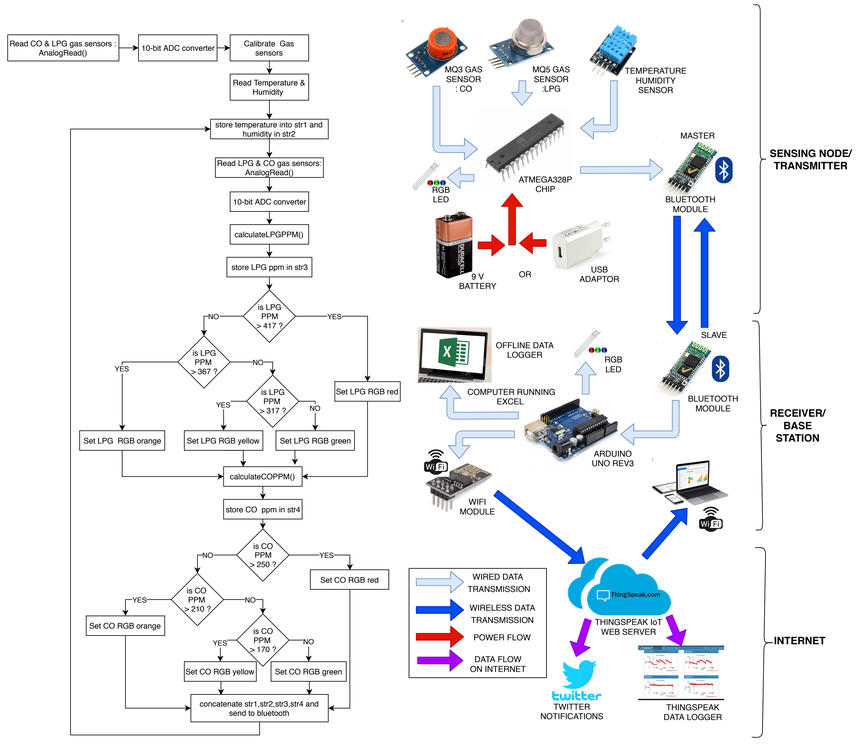


Application

The system can have multiple applications such as:

- Indoor air quality monitor (Home & Office).
- Industrial application (chemical plants).
- Gas leakage detection systems.

Process Methodology



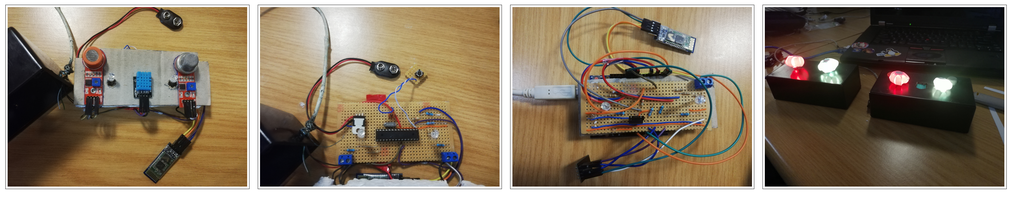
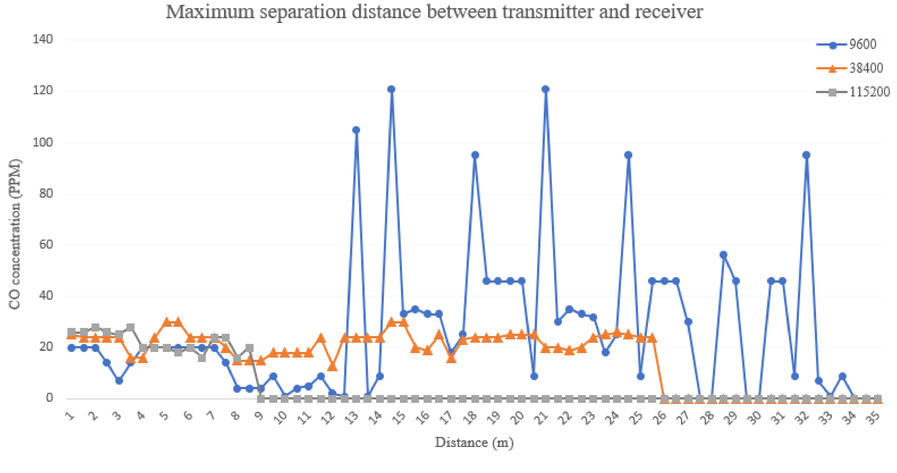


Figure 1: Left to right: Sensor node interface, Sensor node circuit connections, Receiver node, Monitoring device interface

Results



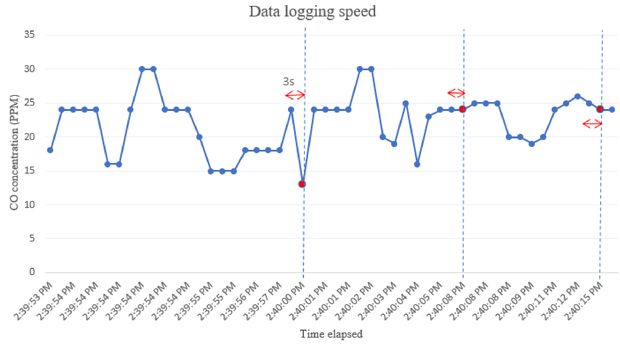


Figure 2: Air quality index chart to indicate color meaning

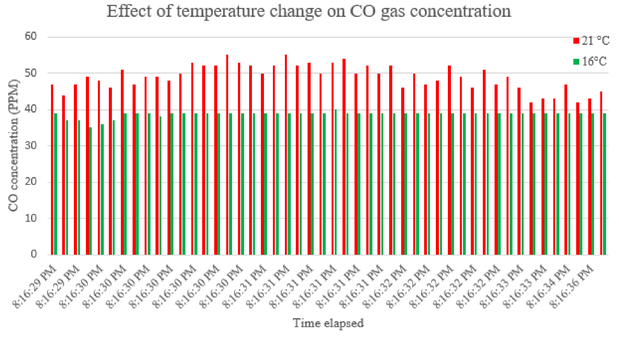


Figure 3: Air quality index chart to indicate color meaning

Technical specifications

Specification	Value
Voltage supply	5 V
Max. operating current	470 mA
Logging speed	3 s
Dimensions	131 x 69 x 44 mm
Humidity range	15 %RH to 65 %RH
Operational temperature	16 °C to 26 °C
Concentration resolution	1 PPM
Temperature resolution	1 °C
Humidity resolution	1 %RH
Cost	R 885.00
Max. separation distance	26 m (open space)

System Advantages

- Local and cloud data logging capabilities
- Mobile sensing node with visual warning mechanism
- Cost effective