Abstract

Air pollution is a major factor of consideration in the evaluation of quality of life and as an environmental issue in urban areas. Among urban air pollutants carbon monoxide (CO) is one of the most prevalent. Information about its concentrations is vital in the determination of urban air pollution. In this paper, an automatic and cost effective prototype for CO monitoring and mapping is presented. The input of the system consists of TGS2442 sensor for measuring CO, DHT11 sensors for measuring temperature and humidity and a NEO-6 u-blox 6 GPS receiver module. The output is a 20X4 LCD and GSM/GPRS TTL modem. The PIC18F45K22 microcontroller has been used as a control device.

The designed system measures CO levels in the air and tags them with location information from the GPS receiver in terms of latitude, longitude and time at which the data has been collected as well as temperature and humidity. The collected data is displayed on the LCD screen and also transmitted to a central office via the GSM modem as a text message.
The system has been used to compare CO concentrations in an urban and a rural environment in Kenya. The CO concentrations recorded in a rural area ranged from 4 ppm to 2.5 ppm while the site in an urban area ranged from 6 ppm to 5.5 ppm. A comparison of CO levels in different sites within the urban area was also done. Along a busy public road CO levels were found to range from 5 ppm to 18 ppm while at a distance of about 300 metres from the road they ranged from 3.5 ppm to 6 ppm. The results obtained above have shown that CO concentrations are dependent upon time and location where the data has been collected. To provide this information a GPS receiver has been included in the design. Thus the designed system is a cost-effective microcontroller based system for CO monitoring and mapping.

References

3. Environmental Protection Agency (2000)


Index Terms

Computer Science

Circuits and Systems

Keywords

Carbon monoxide monitoring and mapping, TGS2442 sensor, GPS receiver, Global System of Mobile Communication, C programming