**Air Quality Monitoring System Based on IoT using Raspberry Pi**

Somansh Kumar School of VLSI Design and Embedded System NIT Kurukshetra Kurukshetra, Haryana [somansh.nitk@gmail.com](mailto:somansh.nitk@gmail.com)

Ashish Jasuja School of VLSI Design and Embedded system NIT Kurukshetra Kurukshetra, Haryana [ashishkkr@gmail.com](mailto:ashishkkr@gmail.com)

* Aduino Uno is used to collect sensor information for its effective adc
* Uno is interfaced with raspberry pi 2 model b with usb
* Wifi adapter is used for providing internet connectivity
* MQTT protocol is used to provide sensor data to clients
* IBM bluemix IOT platform is used for accessing dashboard worldwide

Sensors:

* DSMA501A dust sensor, high-sensitivity
* MQ9 carbon monoxide/combustible gases, prolonged life
* MQ135 NH3, alcohol, CO2, smoke…
* DHT22 humidity, temperature
* BMP180 barometric air pressure, altimeter, low const

Software:

* Node-red : visual programming tool
* Arduino IDE
* MQTT protocol

Future scope:

* SO2, NO2, ground level ozone monitoring
* Long-term pollution patters can be discovered and certain relationships between the air pollutants can be found.

Disadvantages:

* The combination of two boards(UNO and PI), Wi-Fi adapter, wide range of sensors add up to a cost, which can be further minimized
* The UNO board might be used for its ease in programming language and wide library support and the ADC support, but it is not required for collecting sensor data, it could directly be done in raspberry pi and the ADC chips can be used for ADC
* This project is not very resilient in long term data collection as it requires constant internet for connection to IBM cloud and to display real-time data
* The project doesn’t store the data locally, which could be easily done in the sd-card. Some analysis of the data could also be done locally since the pi is a powerful computer.

**Indoor Air Quality Monitoring and Controlling System based on IoT and Fuzzy Logic**

Fadli Pradityo Computer Science Department, Binus Graduate Program – Master of Computer Science Bina Nusantara University Jakarta, Indonesia,11480 [fadli.pradityo@binus.ac.id](mailto:fadli.pradityo@binus.ac.id)

Nico Surantha Computer Science Department, Binus Graduate Program – Master of Computer Science Bina Nusantara University Jakarta, Indonesia,11480 [nico.surantha@binus.ac.id](mailto:nico.surantha@binus.ac.id)

* Sensor data sent to AWS for dashboard and monitoring
* Raspberry pi’s built in Wi-Fi used
* Arduino UNO used as interfacing sensor for ADC and connected to RPi via serial cable
* Automated exhaust fan
* Sensor data -> fuzzification -> fuzzy logic rules -> defuzzification -> fan running interval

Sensors

* MQ135: co2
* Sharp GP2Y1010AU0F: PM10 density

Cloud

* AWS
* Modules: AWS IoT, Elastic Search, Kibana
* Data storage
* Real-time Dashboard
* Protocol: MQTT

Disadvantages

* Only two sensors are used for CO2 and PM10, there can be many other pollutants, which are not considered in this project
* Data logging/storage in done on AWS cloud
  + limited in free plan and requires money to upgrade
  + requires continuous internet connectivity
* Using Arduino UNO as an ADC is expensive, inexpensive ADC chips such as the MCP3008, can be connected to RPi’s GPIO

**INDOOR AIR QUALITY MONITORING ON AWS USING MQTT PROTOCOL**

1Vrushali Ladekar MTech (Electronics), Electrical & Electronics Department, VJTI, Mumbai, India [ladekar.vrushali@gmail.com](mailto:ladekar.vrushali@gmail.com)

2Dr.Rohin Daruwala Professor, Electrical & Electronics Department, VJTI, Mumbai, India [rddaruwala@el.vjti.ac.in](mailto:rddaruwala@el.vjti.ac.in)

* Sensors interfaced with Node-MCU ESP8266
* Esp connected to RPi via Wi-Fi using MQTT protocol
* RPi acts as a gateway and as a MQTT server
* RPi sends collected data to AWS IoT core
* AWS Kibana used to visualize real time data on dashboard
* Alert system using email and SMS

Sensors

* GP2Y20100UF dust sensor
* MH-Z19 CO2 sensor
* Grove-Gas sensoO2
* MH-Z19 NDIR infrared gas module CO2 sensor

**IoT based Indoor Air Quality Monitoring system using Raspberry Pi4**

* Arduino UNO used to interface sensors
* Raspberry pi 4 acts as a gateway to cloud

Sensors

* CC811 sensor voc, co2
* Dht11 temperature, humidity

Cloud

* ThingSpeak for real-time dashboard

Disadvantages

* UNO used is expensive
* Cloud requires constant internet connection

**Novel Approach for Air quality Monitoring**

* ADS1115 used as an adc
* Exhaust fan used to remove excess heat

Sensors

* Mq2 gas sensor h2, co, lpg, propane
* Mq9 gas sensor co, methane, lpg, co2, alcohol, smoke, propane
* Pms7003 suspended particles

Cloud

* ThingSpeak

**Idea:**

* Indoor air quality monitoring
* Local data storage on sd card
* Hazard detection Telegram alert system
* Periodically air quality summary report sent as notification to telegram

Novelty:

* Data stored on sd card and processed/analysed locally, no involvement of a cloud provider
* Does not require constant internet connection
* User does not have to remember to open any app/dashboard, periodic notification containing the air quality summary is sent to user’s mobile