

Air Pollution Monitoring & Prediction Using Artificial Neural Network

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Abstract: Air pollution is critical issue in world facing daily. Air pollution is caused by natural cause's also manmade machines, industries, vehicles. Some of hazardous gases are entered in air. Air pollution cannot be eliminating totally but control. Monitoring gases is 1st step to controlling pollution. CO₂, SO₂, CO gases are monitored continuously using sensor and values predicted for particular day. Artificial Neural Network is used for gases and K nearest Neighbour to calculate temperature. User can monitor saved data and predicted data Collected data set from sensors is directly uploaded to webpage where anyone can access the data.a wirelessly. This system can be install anywhere and can also trigger some devices when pollution goes beyond certain level.

Keywords: Gas sensor, Temperature, ADC MCP3008, ANN, KNN.

INTRODUCTION

The Air pollution monitoring designed to monitor the intensity of pollutant gases in air. Task includes identifying gases using MQ series sensors, which will store in database and shows values on LCD display. This will let the peoples know the quality of air at any place. Then system will upload the values of gases on webpage using wifimodule .This project involves monitoring of gases done using MQ135Air pollution. Air pollution is one of the most important environmental problem around the world and it is increasing day by day. It is necessary to monitor air quality and try to keep it under control for healthy living for human being. Pollution is caused by both natural and man-made activities. Harmful effects such as mild allergic reactions such as throat eyes and nose and some serious problems like bronchitis, heart diseases lung asthma etc. . Monitoring system is required to monitor hazardous gases like CO₂, NO₂, CO etc. Using gas sensors like MQ135, MQ2, MQ3 etc. and temperature sensor like LM35. Amount of air pollutants from environment and temperature of that

specific area is calculated. Calculated values are displayed on webpage along with temperature of that particular area . Monitored database of gases and temperature is made available for any user using webpage. By using collected database prediction of air pollution and temperature is done by using Artificial Neural Network. In ANN multi layer perceptron (MLP) method is used . ANN is used for predicting air pollution and KNN (i.e. K nearest neighbour) is used for temperature prediction .

I .BLOCK DIAGRAM

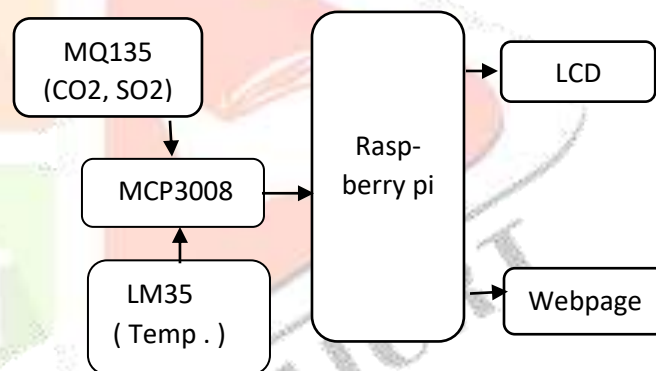


Fig.1. Block Diagram

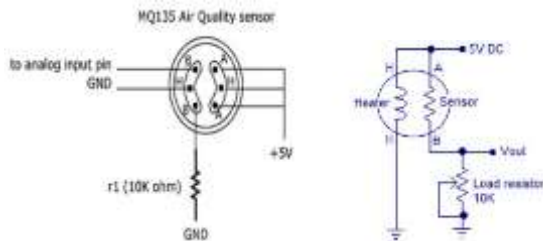
II.HARDWARE COMPONENT

1. Raspberry pi:

Raspberry Pi is a small single board computer. By connecting peripherals like Keyboard, mouse, display to the Raspberry Pi, it will act as a mini personal computer. Raspberry Pi is slower than laptop or desktop but is still a computer which can provide all the expected features or abilities, at a low power consumption. Raspbian OS is official Operating System available for free to use..Raspberry Pi is more than computer as it provides access to the on-chip hardware i.e. GPIOs for developing an application. By accessing GPIO, we can connect devices like LED, motors, sensors, etc and can control them too.

2. MQ-135

Performs a good detection to smoke and other harmful gas, especially sensitive to ammonia, sulphide and benzene steam. It detects various harmful gases from air. MQ135 is used in air quality control equipment for buildings/offices, are suitable for detecting of NH₃, NO_x, alcohol, Benzene, smoke, CO₂, etc. The enveloped MQ-135 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current.



The MQ-3 alcohol gas sensor consists of total 6-pins including A, H, B and the other three pins are A, H, B out of the total 6-pins we use only 4 pins. The two pins A, H are used for the heating purpose and the other two pins are used for the ground and power. There is a heating system inside the sensor, which is made up of aluminium oxide, tin dioxide. It has heat coils to produce heat, and thus it is used as a heat sensor. Gas detection is fast and high sensitive, Stable and long life Simple drive circuit.

III.

1. ARTIFICIAL NEURAL NETWORK

Artificial Neural Networks (ANNs) are biologically inspired networks based on the neuron organization and decision-making process as human brain. ANN approach is that most of the intense computation takes place during the training process. ANN trained for particular task which perform very fast & unknown samples are identified in end of process. By collecting enough databases ANN can predict the pollution of specific area in upcoming days. A feed-forward ANN consists of an input layer of neurons, an arbitrary number of hidden layers, and an output layer. To classify the pattern the weights are provided to neuron connections, Each output neuron is identified with one of the possible classes. Learning for the MLP is the process to adapt the connections weights to obtain difference between the network output and the desired output.

2 K NEAREST NEIGHBOR

For accurate prediction of temperature KNN algorithm is used. This system uses numeric historical data to

forecast the climate of a specific region, city. KNN based on Euclidian Distance formula is used to find the hidden patterns inside the large dataset so as to transfer the retrieved information into usable knowledge for prediction of temperature value. Distance metric used to identify nearest neighbours. After calculating euclidian distance KNN gives prediction using the values getting from monitoring.

IV.APPLICATION

- Roadside air pollution monitoring.
- Detection of harmful gases.
- Industrial pollution detection.
- To make this data available to common man.
- To predict air pollution in urban areas.

V.RESULT

This study reveals that, by carefully choosing inputs to represent yearly, monthly and daily data of temperature and gases ANN model can give prediction of SO₂ AND CO₂ These predicted values are obtained from monitored dataset

VI.CONCLUSION

Air pollution monitoring system is placed at various part of city so, user can check different parameters like temperature and hazardous gases present in environment. User get access to check data from webpage. Monitored data is used to train ANN for prediction.

VII.REFERENCES:

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