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SMART ELECTRONIC NOSE

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Abstract: This paper describes approach towards development of Electronic Nose device. Electronic Nose is smart instrument that is designed to detect various gases by metal oxide sensors (MOS) array. This system have successfully classified various volatile organic compounds such as methanol, ethanol, propane, toluene, benzene, alcohol, and evaluated the resolution among them. To achieve a portable Electronic nose with sample delivery system. The E-Nose system demonstrated the identification of gases from perfume and wine.

Index Terms **– Electronic nose, Metal oxide, Gas sensor.**

I. INTRODUCTION

The sense of smell is extraordinarily powerful. For years, engineers worldwide have been working to develop mechanical systems that can mimic the human senses of smell, since it is one of the most subtle and most powerful features of mammalian existence. From the comprehensive review of literature made, it is proposed to apply this machine olfaction (Electronic nose) technology for the present investigation on medical diagnosis. This chapter gives an introduction to the how and why of Electronic noses. Nose got attention due to major. Applications like food quality control, medical diagnosis, and environmental monitoring of pollutants.

At present there are continuous efforts to improve E-Nose systems even though PC or hand-held products are commercially available. In particular, a miniaturized and intelligent E-Nose module could become a promising digital component, possibly integrating into the personal mobile phone. E-noses consist four elements: a sensor matrix, signal processing unit, data storage, and pattern recognition. These four pieces simulate the data acquisition from the olfactory receptor neurons, the codification in the olfactory bulb, brain memory, and data processing performed by the human olfactory system, Beverages have characteristics that distinguish them from each other and one the most important is their aroma.

Commercially, the aroma has a fundamental role in attracting the consumer, besides being an indicator of product quality. Several studies using e-noses have been developed to analyze the quality and characteristics of beverage as dairy products, coffees, fruit juices, and alcoholic beverages, being these last ones the most common. There is a need for a commercial device which is portable and inexpensive, able to detect the volatile organic compounds (VOCs) present in alcoholic beverages and food with high sensitivity sensors, the development in sensor technology has enabled e-noses to become simple devices with high accuracy, and these, in turn, are increasingly being used as an alternative to traditional methods. In addition, e-noses can also be applied to the monitoring of air quality of gases emitted by the soil, in the evaluation of the food quality, the quality of wine, medical applications, among others.,

II. METHOD OF DEVELOPMENT

E-nose Construction and Equipment:

the methodology of development divided into E-nose construction and equipment in figure1 and 2: . In e-nose construction selection of sensors was first stage . in this metal oxide gas sensors were used. Five sensors (MQ-2, MQ-4, MQ-7, MQ-9, and MQ-135) belongs to the MQ line manufactured by Hanwei Electronics Co., Ltd. (Zhengzhou, China). These sensors work as follow when it detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage. The signals of each sensor are different due to the different semiconductor materials used. Sensors were due to less expensive in addition to showing sensitivity to the target substance. E-nose hardware ATMega328 was used to prototyping, all analog pins of arduino are used to read the gas sensor values .the designed prototype placed in the box with dimensions 17 X 13 × 8.5 Inches, two sides of the box has holes and cooling fans are connected to the holes, which pulled inside the device is called as the inlet and after that some time air is pulled out by outlet ,the sensor array is placed in the middle of the box and micro controller below the sensor array and which has Bluetooth for data accusation

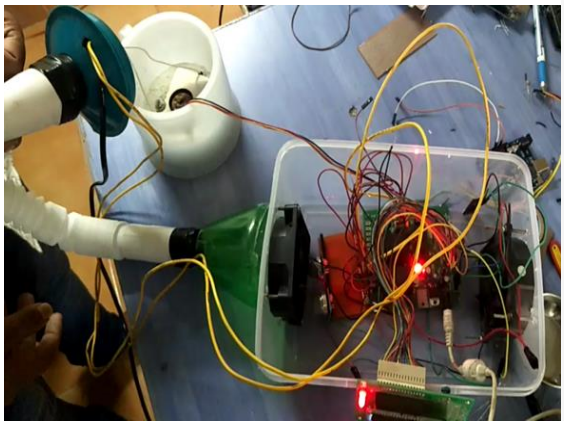

Figure1:Smart Electronic nose system.

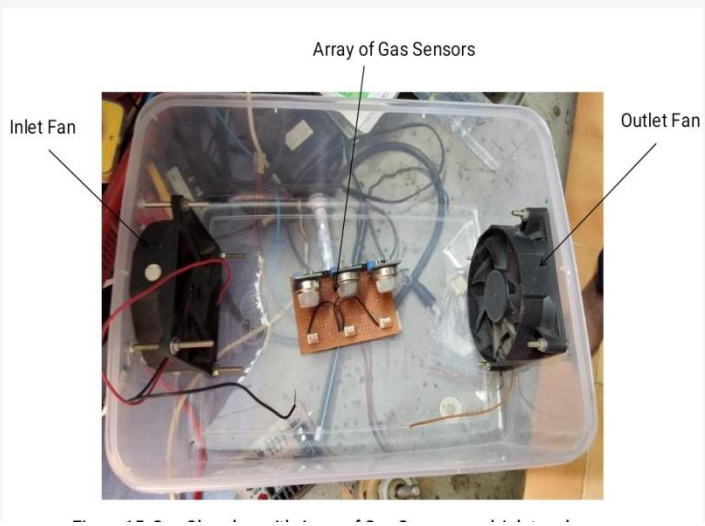

Figure2:E-Nosechamber

Experiments:

The gaseous experiment of electronic nose the target gas that was injected to the chamber. A fan is used to pump the gas in to chamber diffusing evenly. E nose has experimental steps

Step1: Gas preparation and collection.

Different gases are collected.

Step 2: Data collection. Turn on the E-NOSE system to pre-heating the sensors. Then sensors will have the quick response to the target gas and sensor reaches steady state after that sample collection and repeat for all gases.

Step3: Air exhaust and cleaning. After one experiment of sample collection, air exhaust by pump is important for chamber cleaning to recover sensor response

Step 4: Data transferring the sensor response data in experiment is obtained through a Bluetooth is connected to the electronic nose the collected data is used for analysis.

Data analysis:

In this generated data samples are used to classification. Data analysis consists in dividing data into separate columns, defining type of the columns, filling out missing number values. For classification, it requires samples to be classified into one or more predefined classes in this multiple linear regression (MLR) used multiple linear regressions (MLR), also known simply as multiple regression, is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. The goal of multiple linear regression (MLR) is to model the linear relationship; between the explanatory (independent) variables and response (dependent) variable. In essence, multiple regressions is the extension of ordinary least-squares (OLS) regression that involves more than one explanatory variable. Algorithms were implemented in the MATLAB software. Block diagram of smart electronic nose system shown in Figure 3

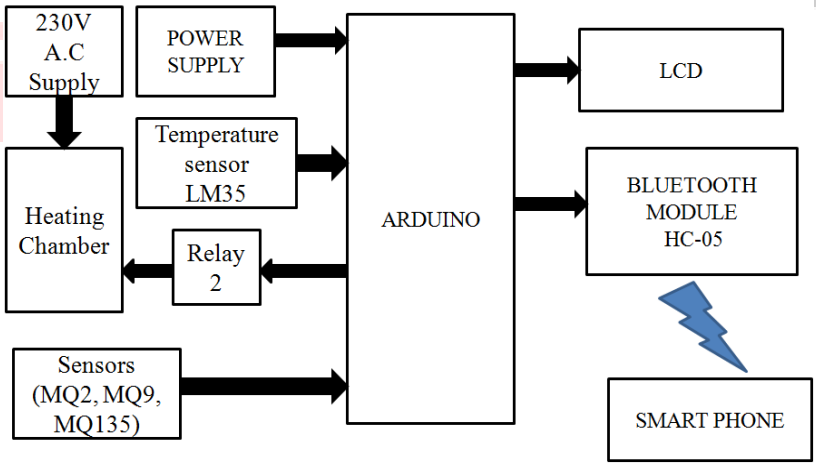

Figure3: Block diagram of smart electronic nose system

III. RESULTS AND DISCUSSION

In this paper further contribution analysis of selective MOS gas sensors to low –cost electronic nose in recognition of odors. Qualitatively analyze the contribution of each sensor to the gas classification by e-nose.it used the three metal oxide gas sensors mq2, mq9, mq135. Those sensors are selected in order to relate to the Volatile organic compounds. The sensors will responds to each component of gas .the sensor sensitivity will affect the different compounds, this make the Different of resistance and flow current. This resistance and current is converted to digital data and pass through the data acquisition. By this device tested the wine to know the alcohol percentage, by placing the liquid in the sample delivery system .system got the alcohol percentage in wine in parts per million (ppm) .Alcohol samples

Test results are shown in Figure 4

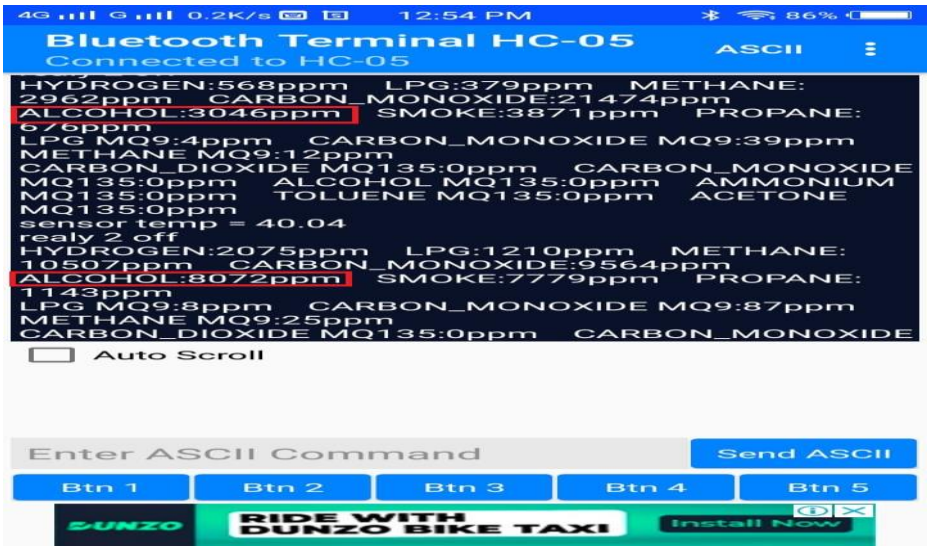

Figure 4: Alcohol Sample test results

IV. CONCLUSION

This paper is aimed to develop potential electronic nose with low cost and using small size metal oxide gas sensors analysis using mq2.mq9, mq135 to detect the various gases and selectivity and reliability problems that occur when measuring multiple gases pattern recognition module can extract patterns with greater reliability. The proposed system is an intelligent odour monitoring system for monitoring various odours that occur in hazardous situations. This system tested for monitoring the odor of basic perfume and Wine. To validate the proposed method, this system compared the success rate using ANN

REFERENCES

1. Kim, Yong Shin, et al. “Miniaturized electronic nose system based on a personal digital assistant.” ETRI journal 27.5 (2005): 585-594.
2. Voss, Henike Guilherme Jordan,et al .“A Prototype to Detect the Alcohol Content of Beers Based on an Electronic Nose.”Sensors19.11 (2019): 2646.
3. Zhai, Xiaojun, et al. “MLP neural network based gas classification system on Zynq SoC.” IEEE Access 4 (2016): 8138-8146.
4. Zhang, Lei, Fengchun Tian, and Guangshu Pei. “A novel sensor selection using pattern recognition in electronic nose.” Measurement 54 (2014): 31-39.
5. Benrekia, Fayçal, Mokhtar Attari, and Mounir Bouhedda. “Gas sensors characterization and multilayer perceptron (MLP) hardware implementation for gas identification using a field programmable gate array (FPGA).” Sensors 13.3 (2013): 2967-2985.
6. Srinonchat, J. “Development of electronic nose and program for monitoring air pollutions and alarm in industrial area.” (2013).
7. Keller, Paul E., et al. “Electronic noses and their applications.” World Congress on Neural Networks (WCNN). 1995.
8. Wilson, Alphus D., and Manuela Baietto. “Applications and advances in electronic-nose technologies.” Sensors 9.7 (2009): 5099-5148.
9. Kim, Eungyeong, et al. “Pattern recognition for selective odor detection with gas sensor arrays.” Sensors 12.12 (2012): 16262-16273.
10. Fonollosa, Jordi, et al. “Chemical discrimination in turbulent gas mixtures with mox sensors validated by gas chro Matography-mass spectrometry.” Sensors 14.10 (2014): 19336-19353.