UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF DYNAMIC OLFACTOMETER FOR THE AIR ODOUR LEVEL DETECTOR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Automation and Robotic) with Honours.

by

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Tajuk: DEVELOPMENT OF DYNAMIC OLFACTOMETER FOR THE AIR ODOUR LEVEL DETECTOR

Sesi Pengajian: 2019

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I hereby, declared this report entitled DEVELOPMENT OF DYNAMIC OLFACTOMETER FOR THE AIR ODOUR LEVEL DETECTOR is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automation and Robotic) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor: Ts. Ahmad Muzaffar Bin Abdul Kadir

ABSTRAK

Bumi ini dikelilingi oleh udara yang bercampuran dengan gas yang sangat penting seperti oksigen, karbon dioksida dan nitrogen. Gas-gas ini memberi manusia dan haiwan oksigen untuk sistem pernafasan berlaku. Secara umumnya, pencemaran udara dalam kehidupan seharian kita semakin teruk. Selain itu, udara persekitaran kadangkala mendapat bau yang tidak memuaskan seperti bau sampah, asap, dan gas. Untuk mengesan bau udara ini, terdapat beberapa teknologi yang dicipta oleh manusia untuk memeriksa dan mengesan bau yang dikenali sebagai "hidung elektronik". Hidung elektronik atau E-hidung adalah alat buatan olfaksi dengan pelbagai sensor gas kimia yang digunakan untuk menganalisis gas. Kaedah ini digunakan untuk mengendalikan projek ini dengan menggunakan sensor MQ-135 untuk mengesan bau dan merasakannya. Arduino NANO digunakan sebagai mikrokontroler. Projek ini akan dikendalikan oleh program yang mengunakan Arduino IDE Software dengan pengkodean C++. Seterusnya, objektif projek ini adalah untuk membuat peranti mudah alih yang dapat mengesan bau yang boleh digunakan dalam sensor bau tertentu untuk mengesan persekitaran udara, dapat mencatat data bau dalam kualiti udara dan akhirnya dapat mengumpulkan data dan melakukan perbandingan untuk analisisnya. Perkembangan peranti mudah alih ini dapat membantu manusia mengesan dengan mudah dan menjimatkan masa untuk mengukur tahap bau yang sesuai dengan udara untuk manusia bernafas.

ABSTRACT

The earth is surrounded by air, a mixture of extremely important gases such as oxygen, carbon dioxide and nitrogen. These gases provide human and animals with oxygen for respiration to occur. In general, the air pollution in our daily life that getting worst. Besides that, air environment sometimes getting an unsatisfactory of smell such as garbage smell, smoke, and gases. For detecting this air odour, there are some technology create by human to check and detect the smell which are known as "electronic nose". Electronic nose or E-nose is an artificial olfaction device with a range chemical gaseous sensor used to analyse gas. This method is applied in this project by using MQ-135 sensor to detect odour and senses it. The Arduino NANO are used as the microcontroller of the project. The project will be controlled by the program in the Arduino IDE Software with coding C++. Next, the objective in this project is to create a portable device that can detect smell to used in specific smell sensor to detect air environment, can record a data of odour in air quality and lastly can collect the data and do comparison for analysis. The development of this portable device can help people detect with easy and save time to measure the level of smell that suits the air for human to breathing.

DEDICATION

To my beloved parents,

Halimi Bin Ibrahim, my father

Noor Linda Binti Yahaya Afandi, my mother

My Supervisor,

Ts. Ahmad Muzaffar Bin Abdul Kadir

To all Lecturers,

And not forgetting to all my dear friends

Without me

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Praise to Allah, with successful and smooth sailing I can finish the final year project. A very appreciative of my supervisor Ts. Ahmad Muzaffar Bin Abdul Kadir who guides me through this final year project process all the way. Without my supervisor's guidance, the process will not be as smooth as this when completing this project.

Then a very grateful one for my friends that helps make this project. The idea and improvement in my project is really helpful in the discussion with my friends. Last but not least, I am very grateful and grateful to my parents for providing moral support throughout this project making process. Their support really helps me to make this project much better by ensuring the process.

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LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

LIST OF ABBREVIATIONS

PPM	**Part Per Million**
USB	**Universal Serial Bus**
E-nose	**Electronic Nose**

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INTRODUCTION

INTRODUCTION

This chapter is mainly concerned with the title of the research, the Development of The Dynamic Olfactometer, the background information, scale and the purpose of this study for air odour level detectors.

1.1 BACKGROUND

Electrochemical is an artificial olfaction device with a range chemical gaseous sensor, sampling system and algorithm used to analyse gas, steam or odour as a classification pattern. Simply put, it consists of chemical gas sensors housed in a device with the purpose of recognizing, identifying and comparing odours using a pattern. The lungs add smells to the epithelium layer in human smells, while the e-nose uses a pump. Filters and concentrations in the human nose are hair, membranes and mucus. In comparison, the filtration in the e-nose model is provided by the inlet sampling system. The human epithet represents millions of sensing cells interacting with fragrances, while the e-Nose uses sensors interacting differently with fragrances. In humans the chemical reaction to smells is converted into electronic nerve pulses much like the chemical sensor of the nose reacts to electric signals with odour.

Olfactometric techniques can be divided into two olfactometry which is indirect (static) or direct (dynamic). Dynamic olfactometry is now a common and widespread method of odour concentration quantification (Munoz et al., 2010). Furthermore, the olfactometric analysis requiring the participation of a panel of experts has the disadvantage for dynamic olfactometry

because of the need to travel with the proband to the odour scene is very expensive. In addition, the presence of test persons at the site may have an impact on their answers to collect data.

Field olfactometry may be used in combination with laboratory-based methods in some instances. For example, in laboratory, air samples from odour sources can be collected and analysed to quantify the rate of source emission, while odour transport in the area by field olfactometric methods can be evaluated (Henry et al., 2011). For the confident measurement of the smell is using in some places that most common to be checking the air quality such as at property lines and at locations in the neighbouring community. Field olfactometry can be used as a proactive monitoring or enforcement tool (Nicell, 2009). For real-time analysis, the field olfactometers are excellent, but are limited because of insufficient dilution, accessibility of panellists to odours, replication and duration of the sampling (Traube et al., 2011).

1.2 OBJECTIVE

Based on objectives such as the following:

- Create a portable device that can checking odour quality
- Can be used in specific smell sensor to detect air depends on sensor capable
- Used to record a data of odour in air quality
- Collect the data and do comparison for analysis

1.3 STATEMENT OF THE PURPOSE

The aim of this project is to make it easy to use low-cost and higher-performance chemical sensors. As the pattern recognition and classification algorithms progressed. At the same time, these technologies were joined together with low-power Arduino microprocessors, enabling devices to be portable. The MQ sensor has been the core structure of this equipment and a few types of it with a different classified, also in this project is to design & develop of a smell detector using Arduino concept. This device has been designed and developed by the MQ sensor as the core structure, and a few types of MQ with a different classification are also involved with this project.

1.4 PROBLEM STATEMENT

- No method of finding an air quality level
- The design of the device such as air intake needs to be improved on how an air can detect the sensor.
- Need to make the flexibility and versatile device for user
- Choose the best sensor types, power and display for this project
- To convert and chemical substance to electrical output

The problem statement is to create the portable product that can be portable to detect the quality of the air level, because in Malaysia don't have own olfactometers device which is hard to get such device and finding the suitable method of specific in monitoring air quality level. With this product it will be easier to solve the problem about some smell that disturbing in some places such as neighbouring and workplace.