

RESPIRATION DETECTION TOOLS IN HUMAN BASED ARDUINO UNO

Winarno Fadjar Bastari*, Mohamad Habib Amanullah

Department of Electrical Engineering

University of PGRI Adi Buana Surabaya

*Corresponding email address: winarnofbastari@unipasby.ac.id

Abstract — The vital capacity value of the lungs is very influential with the health of the human lungs because with the results the value of the vital capacity of the human lung can be diagnosed as normal or abnormal of the lungs. This study aims to make a means of detecting respiration gas flow rates in humans using an arduino uno-based YF-S201 flow sensor. From the results of data analysis of respiratory gas flow in adult male breathing with ages (20 years - 30 years), (30 years - 35 years), (35 years - 45 years) and (45 years - 50 years) as many as 15 users. there is an error of 3.86%, the value is generated from comparing the output of the equipment made by researchers with other tools of the brand Spirolab with as many as 15 users of different height and age. From 15 different users there are 2 users with abnormal lung conditions and 13 other users with normal lung conditions. The result of this error occurred because of the 15 users who were less relaxed when exhaling and breathing.

Keywords: *YF-S201 flow sesnsor, vital capacity of the lungs, lung condition.*

I. INTRODUCTION

Spirometry is a measuring tool used to measure the flow of air into and out of the lungs. A person who breathes through a spirometry "mouthpiece" needs to be covered in his nose. Respondents who blow are instructed about how to breathe during the procedure. Three breathing maneuvers were tried before determining the procedure data and the highest data from three trials were taken to evaluate breathing. This procedure measures air flow through the principles of electronic or mechanical displacement and uses a microprocessor and recorder to calculate and plot air flow [1], [2], [3].

Vital Capacity is the amount of air (in liters) that comes out of the lungs during normal

breathing. Respondents were instructed to inhale and inspire normally to get maximum expiration. The normal value is usually 80% of the total lung. As a result of lung elasticity and thoracic state, a small amount of air will remain in the lungs after maximal expiration. This volume is called the residual volume (RV) [4], [5], [6].

The purpose of this study is to make hardware devices for detecting gas flow rates of human respiration with YF-S201 flow sensors using Arduino UNO, and to know the performance of YF-S201 flow sensors when respiration gas flow rates in humans [7], [8].

II. RESEARCH METHODS

The product design in this study is a tool that uses a powerbank as the main power supply, then uses the YF-S201 flow sensor as a detection of respiration gas flow that is released by the patient, when inhaling and exhaling the respiratory gas in the form of voltage output. On the arduino board given buttons or push buttons up, down, left, and right for the selection of modes as input data for patients in the form of age, gender, and height, the data input function is used to find vital predictive capacity, when all input data has been done, the next menu measures the vital capacity of the patient in a way exhale as strong as possible, breathe in as strong as possible, and breathe normally, the results of vital capacity measurement will appear on the LCD when the results of vital capacity measure appear on the LCD together also appear vital capacity prediction of the results of input of patient data if the results of vital capacity measure 80% of vital capacity prediction then the patient's condition is normal otherwise if vital capacity measure is less or more than 80% vital capacity prediction then the patient's condition is abnormal.

The scope of this research is to use the Arduino Uno module as a set of all programs, YF-S201 flow sensor to detect respiration gases

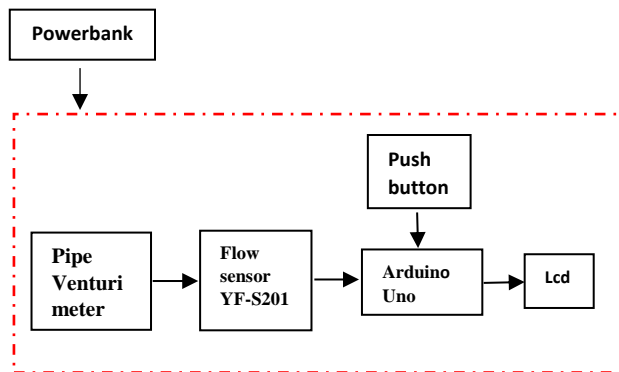


Figure 1. Diagram Block Module

emitted by patients when sucking and exhaling gas, using LCD 2x16 to display the settings menu for age, sex, height, vital capacity prediction results, and measurable vital capacity results Retrieval of data as many as 15 adult male patients with age (20 years - 25 years), (30 years - 35 years), (35 years - 45 years) and (45 years - 50 years) , and using Powerbank as a power supply.

While the variables used in this research method include the independent variable including the value of human respiration gas, as the

dependent variable, the YF-S201 Flow sensor, and the controlled variable, Arduino uno.

III. RESULTS AND DISCUSSION

In this section, the test results are collected when the respiration detection gas device is compared with an existing spirolab brand. The data is presented in table 1, table 2, and table 3. Among the test results are.

The data obtained obtained several explanations, among others, namely the average value and the results of the comparison of the vital value of the measuring capacity of researchers with the existing tools spirolab brand. The results of measurements on 15 patients of different ages and height, with measurements of 1 patient 3 times so that the average value of the patient data can be obtained, then it can be calculated what percentage of each patient has an average error of the number of 15 patients. Of the 15 patients, subjects named Novan 30.2 percent and Ryan 16.9 percent VC error was very high and the lowest error was the percentage of patients named Wira 0 percent. So, the average total error of 15 patients is 3.86 percent, so it can be said to be feasible to use

Table 1. Results of Comparison of Vital Capacity of Researcher and Spirolab

Name	VC measure Spirolab	Result VC measure device researcher			mean	deviation	% error	Standard Deviation	Ua
		X1	X2	X3					
Aji	3.57	3.75	3.68	3.25	3.56	0.01	0.28	2.47	1.426
Novan	4.10	3.20	3.10	2.30	2.86	1.24	30.2	0.487	0.281
Arik	3.90	3.91	3.88	3.80	3.86	0.04	1.02	0.054	0.031
Akbar	4.20	4.77	3.98	3.84	4.19	0.01	0.23	0,5	0.288
Toni	4.01	3.98	3.95	3.90	3.94	0.07	1.74	0.141	0.081
Nabil	4.30	4.68	4.35	3.63	4.22	0.08	1.86	0.519	0.299
Giri	4.39	4.83	4.77	3.56	4.38	0.01	0.22	0.716	0.413
wira	3.60	3.84	3.67	3.30	3.60	0	0	0.273	0.157
Irul	4.69	4.68	4.56	4.45	4.56	0.13	2.77	0.114	0.065
Puji	3.73	3.98	3.60	3.46	3.68	0.05	1.34	0.268	0.154
Noldi	3.40	3.60	3.40	3.18	3.39	0.01	0.29	0.209	0.120
Radit	3.56	3.82	3.56	3.29	3.55	0.01	0.28	0.258	0.148
Ryan	2.60	2.39	2.31	1.80	2.16	0.44	16.92	0.317	0.183
Nizam	3.59	3.85	3.47	3.41	3.57	0.02	0.55	0.236	0.136
Mifta	3.40	3.56	3.40	3.21	3.39	0.01	0.29	0.173	0.099

because the tolerance limit is not up to 5 percent of the error value.

Table 2. Results of Comparison of Vital Capacity of Researcher and Spirolab

Name	Measurement VC error%
Aji	0.28
Novan	30.2
Arik	1.02
Akbar	0.23
Toni	1.74
Nabil	1.86
Giri	0.22
wira	0
Irul	2.77
Puji	1.34
Noldi	0.29
Radit	0.28
Ryan	16.92
Nizam	0.55
Mifta	0.29
Average	3.86

IV. CONCLUSION

Based on the results of planning, module making, writing and data analysis can be concluded as follows:

1. Making this module or tool using the YF-S201 Flow sensor as a detector for respiration gas rate in humans, the LCD character serves to display the vital results of the subject, the keypad as a selector for the selection of measurements, and Arduino Uno as a regulator of all systems. Of these components are synchronized and functioning properly from the comparison of the VC measuring spirolab measuring instrument with the VC measuring instrument the researcher measured 15 subjects with different height and age.

2. When measuring 15 subjects with different height and age the performance of the YF-S201 Flow sensor can be said to be good or feasible because in the measurement and analysis results show an average error of 3.86%. Of the total measurements of 15 different subjects age, and height.

Table 3. Result Vital Capacity measure, Vital Capacity prediction and lung condition

Patient	Name	Old (years)	height (cm)	VCmeasure device (liter)	VC Prediction device (Liter)	Lung condition
1	Aji	22	158	3.56	4.47	Normal
2	Novan	24	165	2.86	5.05	Abnormal
3	Arik	23	160	3.86	4.81	Normal
4	Akbar	25	167	4.19	5.13	Normal
5	Toni	30	157	3.94	4.50	Normal
6	Nabil	32	168	4.22	5.03	Normal
7	Giri	31	168	4.38	5.05	Normal
8	wira	35	161	3.60	4.12	Normal
9	Irul	37	166	4.56	4.77	Normal
10	Puji	40	162	3.68	4.54	Normal
11	Noldi	42	159	3.39	3.67	Normal
12	Radit	45	160	3.55	4.23	Normal
13	Ryan	46	165	2.16	3.20	Abnormal
14	Nizam	48	171	3.57	4.26	Normal
15	Mifta	50	170	3.39	3.86	Normal

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