Breast Cancer: Current Research

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Non-Invasive Detection of Pleural effusion and Emphysema

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Abstract

In this project we design a low cost non-invasive type of measurement system for detecting and conforming pleural effusion and emphysema .This is analyzed by recording the volume of CO_2 from exhaled air by using gas sensor. From this O_2 value is calculated. This is helpful in detecting emphysema patient. To detect pleural effusion blood glucose level is required, for this purpose we designed a prototype for measuring glucose level. By using this method we can able to conform either the patient is having emphysema or pleural effusion. If oxygen is abnormal state but the blood glucose level is normal condition then the patient is emphysemapositive. If the patient has normal range in oxygen level but abnormalities in blood glucose level then the condition of patient is pleural effusion positive.

INTRODUCTION

AIM

Non – obtrusively deciding the pleural emanation and emphysema through breathed out air and glucose level.

OBJECTIVES

- To identify the oxygen level in breathed out air for emphysema persistent.
- To measure the glucose level non-obtrusively for pleural radiation persistent.

PLEURAL EFFUSION

A pleural emission is overabundance liquid that aggregates in the pleural depression, the liquid occupied space that encompasses the lungs. This abundance liquid can weaken the breathing by constraining the extension of the lungs. Different sorts of pleural radiation, contingent upon the idea of the liquid and what caused its entrance into the pleural space, are hydrothorax (serous liquid), hemothorax (blood), urinothorax (pee), chylothorax (chyle), or pyothorax (discharge) usually known as pleural empyema. Interestingly, a pneumothorax is the aggregation of air in the pleural space, and is ordinarily called a "fallen lung".

EMPHYSEMA

Emphysema is a sort of incessant obstructive pneumonic sickness (COPD).The air sacs in the lungs become harmed and extended. This outcome in a constant hack and trouble in relaxing. It includes in the loss of flexibility and amplification of the air sacs in the lung. The alveoli toward the finish of the bronchioles of the lung becomes extended in light of the fact that their dividers breakdown or the air sacs are demolished, limited, crumbled, extended or over expanded.

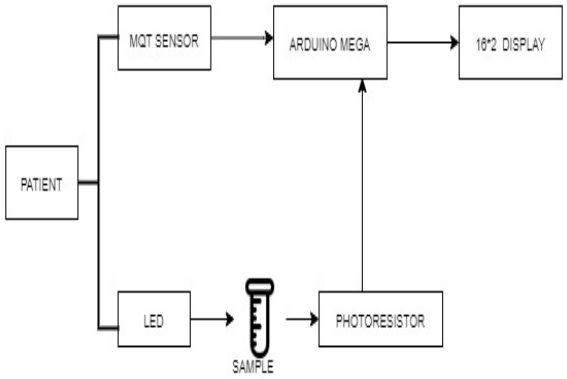
Having less and bigger harmed sacs implies there is a diminished surface zone for the trading of oxygen into the blood and carbon dioxide out of it. The harm is perpetual. The capacity to inhale appropriately can't be completely recuperated.

CT scan of emphysema

Emphysema is an assortment or social occasion of discharge inside a normally existing anatomical pit. For instance, pleural emphysema will be emphysema of the pleural hole. It must be

Separated from an ulcer, which is an assortment of discharge in a recently shaped pit

METHODOLOGY:



WORKING OF MQ-135 SENSOR:

This sensor consists of 6 pins, 2 pins is connected with a heating coil. One end of the coil is connected to VCC and it sends to non-inverting terminal. The other end is connected to ground and it send to inverting terminal. The rest 4 pins are combined to 2 pins and the output is received. This set up is act as a comparator and sends the output by comparing the input value. The working of sensor begins when the patient exhale the air .The exhaled air passes through the sensor and heated coil begins to cool. From this the amount of gases such as N_2 and CO_2 and water vapour.

FORMULA TO CALCULATE THE O_2:

100% of exhaled air = CO_2+ O_2+water vapour + N_2

NOTE:

Here the water vapour and N2 are constant for all patient and it may be vary by only in points of decimal.

100%= CO_2+ O_2+H_2O + N_2

FOR EXAMPLE:

100%=10%+ O_2+1%+79%

100% -= +90%+ O_2

O_2=100-90 = 10%

WORKING OF PHOTO-RESISTOR AND RED LED :

In this project the photo-resistor triggers by using red LED. The red led as a large wavelength and hence it can penetrate deeply. By the triggering of red LED, theresistance of the photo-resistor is decreased with respect to the receiving luminosity. Here two principles play a major role in the interaction between arduino and the entire system. The principles are photo-conductivity and electro-luminescence.

The main reason for using red LED is that the red light absorbed the energy of light photons to enhance cellular potential, this promote oxygen utilization within cell and generate the absorbance and transmittance. Hence the level of oxygen from the blood glucose is calculated.

By triggered values from the LED, the photo-resistor provides the luminous value from which the intensity value is calculated. The set up consist of a 100K resistor. This resistor is used because in order to allow the maximum flow of current to pass through the output. Therefore the intensity value passed through the glucose can be calculat

FORMULA TO CALCULATE THE INTENSITY VALUE

$V_r = lux_{(ADC)} / ADC_{max} * ADC_{ref.v}$

$ADC_{max} = 1023$; $ADC_{ref.v} = 5V$

$V_{ldr} = ADC_{ref.v} - Vr$

$R_{ldr} = V_{ldr} / V_r * R_{ref}$

$R_{ref} = 100k$

$Lux = lux_{scalar} * R_{ldr}^{(lux.exp)}$

Where $lux_{scalar\ and}$ (lux.exp) are constants whose values are

Luxscalar = 12518931 ; (lux, exp) = -1.405

Where,

V_r = Reference voltage

Lux $(_{ADC})$ = Analog input for photo resistor

ADC_{max} = Maximum voltage that the ADC pin withstand

$ADC_{ref.v}$ = Analog to digital pin in ardiuno ref.voltage

V_{ldr} = Light dependent resistor voltage

R_{ldr} = Light dependent resistor resistance

R_{ref} = Reference resistance

Lux = Intensity value to be calculated

Luxscalar = Constant should be calculated to find intensity value

lux.exp= Constant should be calculate to find intensity value.

RESULT

The result of the glucose level and oxygen value are tabulated The glucose value is tabulated by means of trial and error method .the oxygen level in exhaled air is also tabulated.The result of either the patient having Pleural effusion / Emphysema is tabulated.

DISCUSSION:

From the tabular column we can able to differentiate patient having either Pleural effusion / Emphysema

I) Oxygen level in exhaled air:

SUBJECT	EXHALED LEVEL
1	CO_2 =24 O_2 = 63 Water vapour = 1 N_2 = 12
2	CO2 =33 O2 =55 Water vapour =2 N2 =10
3	CO2 =39 O2 =40 Water vapour =0.5 N2 =20.5
4	CO2 =40 O2 =46 Water vapour =0.5 N2 =13.5

II) Patients having either Pleural Effusion/Emphysema

Patient	Bio .ref value	Types of diseases
1	Exhaled air =78ml/L Blood glucose=<60 mg/dl	Pleural Effusion
2	Exhaled air =63ml/L Blood glucose=80mg/dl	Emphysema
3	Exhaled air =79ml/L Blood glucose=>260mg/dl	Pleural Effusion
4	Exhaled air =82ml/L Blood glucose=<65 mg/dl	Pleural Effusion
5	Exhaled air =55ml/L Blood glucose=110 mg/dl	Emphysema

CONCLUSION

I. Tabular column of oxygen level in exhaled air

II. Tabular column of patients having either Pleural effusion / Emphysema

FUTURE WORK

- In our project, photoresistor is used to calculate the glucose level. This is a bit heavy process because of using trial and error method there is a time delay in result
- In order to overcome this either NIR sensor or direct plethsmography for detecting glucose value can be used.
- Also in future ,if there is a oxygen sensor is invented we can replace the MQ-135 sensor can be replaced with the oxygen sensor for Calculating direct oxygen reading from the exhaled air.

REFERENCES

- E. A. Suma, D. M. Krum, and M. Bolas, "Sharing Space in Mixed and Virtual Reality Environments Using Low-Cost Depth Sensor," in P*roceedings ofthe IEEE International Symposium on VR Innovation (ISVRI), pp. 349-350*, 2011.
- L. Huakun et al., "A Remote Usability Testing Platform for Mobile Phones," in Proceedings of the IEEE International Conference Computer Science and Automation Engineering (CSAE), pp. 312-316, 2011.
- J. L. Olson, D. M. Krum, E. A. Suma, and M.Bolas, "A Design for a Smartphone-based Head Mounted Display," in *IEEE Virtual RealityConference (VR), pp. 233-234*, Mar. 2011.