Design of Symptomatic and Remedial Standpoint on breathing non-invasive Bio-sensor based health monitoring

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Abstract: *Non invasive bio sensors based human body health monitor proves fast easy portable solution for detection of diseases or its intensity of spreading in human body. Disease includes diabetes, heart rate, blood pressure, kidney conditions, or urine saturation in blood, etc. ease of detection recognition without testing blood is non invasive technique which is pain free and fast recognition. Propose system in this paper uses human breathe exhales gases. Conventional method uses blood samples in most of cases. In this propose system human exhales gases is concentrated on bio-sensor. Output of bio sensor is taken and processed. This processed signal is use to detect different diseases growing in human body. Concentration of diabetes or sugar level, urine saturation in blood, oxygen saturation level in blood is displayed o lcd screen. Finally for results accuracy bio sensor based test results and blood sample test results are compared and 90% of accuracy of system is concluded.*

Keywords: **Bio-sensor, breath, biosensor, molybdenum disulfide, MQ135, MQ4, oxygen saturation, microcontroller.**

1. INTRODUCTION

As now-a-days in recent time human life style and habitat is changing completely and fast. Due to fast life human has no time to watch his own health which is degrading day by day. Over consumption of junk food, eating unhealthy food, more spicy food, consumption of opposite food, irregular time consumption of food, etc are some reasons of degrading of human health and facing too early growth of diseases such as diabetes, heart attack, blood pressure high or low, kidney failure, cancer, etc. due to lowering the immunity day by day. Therefore this paper proposed the handheld portable system to detect the health conditions. System contains bio-sensors such as MQ135 to detect diabetes, MQ4 to detect urine saturation in blood and oxy pulse sensor to detect oxygen saturation in blood. MQ135 and MQ4 works on human breathe which exhales different gases. According to concentration of this gases different diseases have been identified which is quick and easy more over no need to take sample of blood. Primary testing of diabetes level, heart rate, oxygen saturation, and kidney health can be detected. Conventional method uses blood samples in most of cases which is critical and time consuming and also more costly. In this propose system human exhales gases is concentrated on bio-sensor. Output of bio sensor is taken and processed. This processed signal is use to detect different diseases growing in human body. Concentration of diabetes or sugar level, urine saturation in blood, oxygen saturation level in blood is displayed o lcd screen. Finally for results accuracy bio sensor based test results and blood sample test results are compared and more than 90% of accuracy of system is concluded.

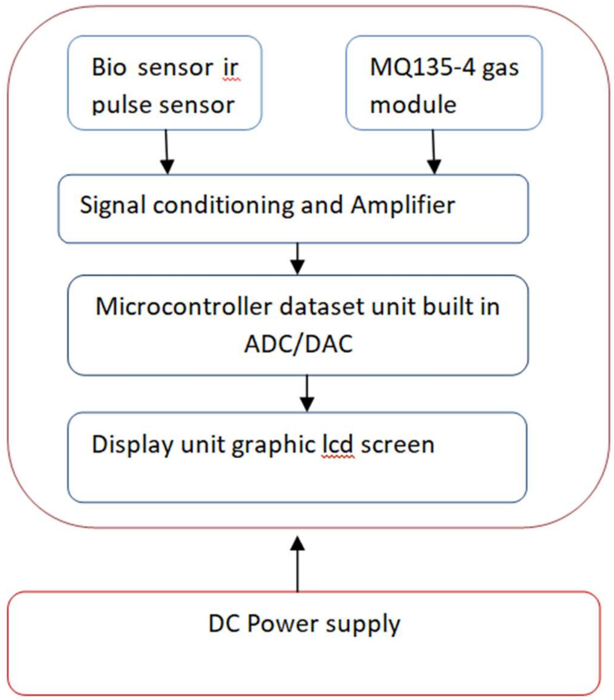


Figure 1. Block diagram for proposed system.

Human breathe exhale not only carbon dioxide but also exhales acetone gas, methane gas also. Concentration of acetone gas denotes sugar saturation in blood. As concentration of acetone gas exhales increases so as in denotes in increase in sugar saturation level in blood. Concentration of exhale of methane gas increases with increase in urine saturation in blood which means poor kidney health. For oxygen saturation in blood IR rays absorption through blood is detected sensor is placed on fingertip. Output of bio sensor is analog in nature which is then converted into analog electrical signals via sensor and amplified by amplifier to readable voltage level. This analog voltage is then converted to digital or binary form to can be read by microcontroller via ADC analog to digital conversion which is in built in ATMEGA328 controller. Then this digital value is calibrated and displayed on lcd display.

This type of noninvasive method of testing human health parameters is easy to diagnose, easy to read, instrument is portable and can be carried anywhere, no need to take blood sample from body each and every time. Can able take readings in any conditions. Low cost. Higher accuracy, no pain, etc.

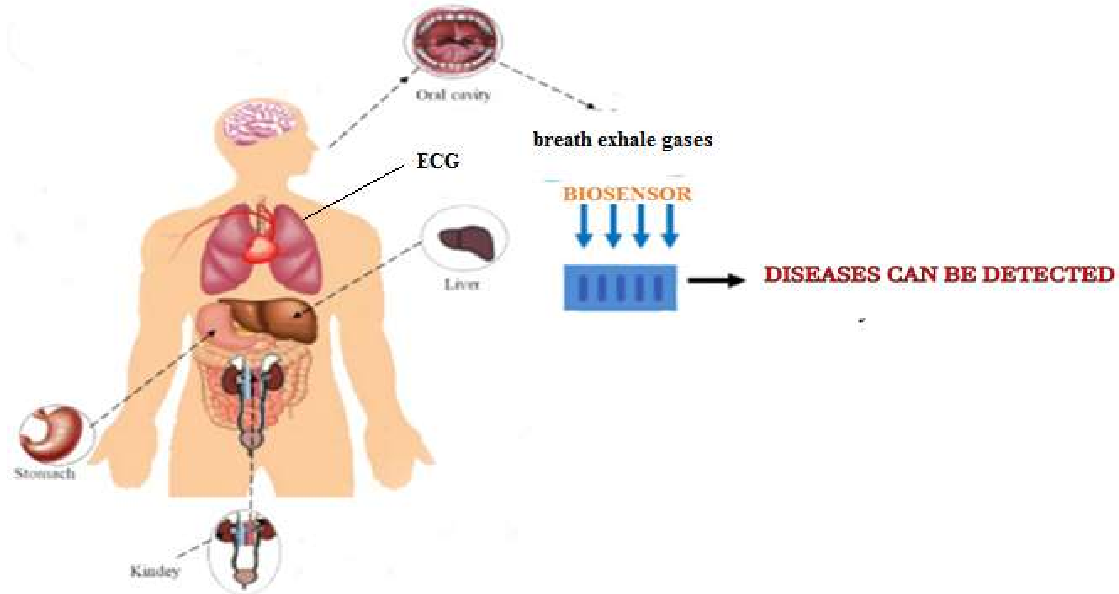


Figure 2. Architecture of breath test and list of disease detection

2. Proposed System

Breath exhales different gases concentration along with carbon-dioxide should be used as a diagnostic medium to track health and illnesses for several important reasons. It satisfies the desire for affordable, non-invasive, and user-friendly diagnostic techniques. Breath exhales acetone gas in different concentration with respect to blood sugar concentration that can be diagnosing using acetone gas sensor. Concentration of methane gas increases with increase in concentration of urine saturation in blood can be sense through methane sensor. Optical ir sensor can be used to detect oxygen saturation signals to detect oxygen concentration in body. This system can uses for initial portable fast diagnose of different chemical levels in human body to detect health.

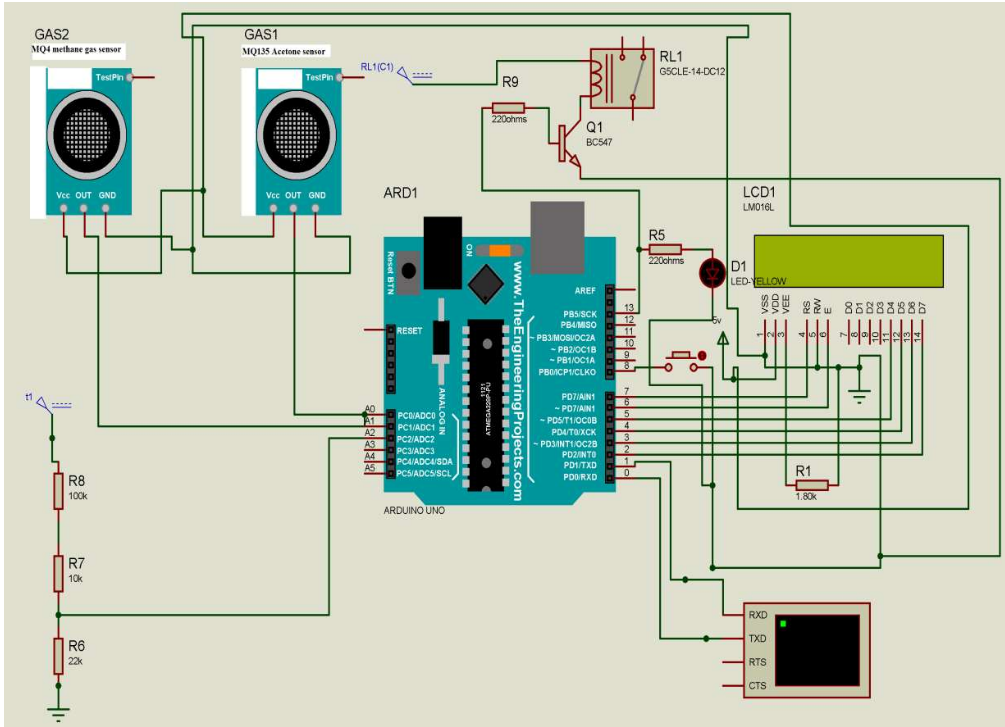


Figure 3. circuit diagram

Human breathe exhales not only CO2 but also some different gases as per organ health condition. Concentration of acetone gas in breathes exhale increases with increase in blood sugar saturation or diabetes level. Same as concentration of methane gas increases with increase in urine saturation in blood. Detecting the gases levels can detect organs health so as easy to detect human health. Above circuit shows experimental setup to detect sugar level in blood, urine saturation in blood, and oxygen saturation in blood. Setup includes MQ135 sensor for detection of acetone for blood sugar saturation, MQ4 for urine saturation in blood, pulse sensor for oxygen saturation. Output of all this sensors is analog in nature. AVR atmega328p will read analog value form sensors via ADC in-built and then calibrate it and display readings. It takes only 5 seconds to read the parameters.

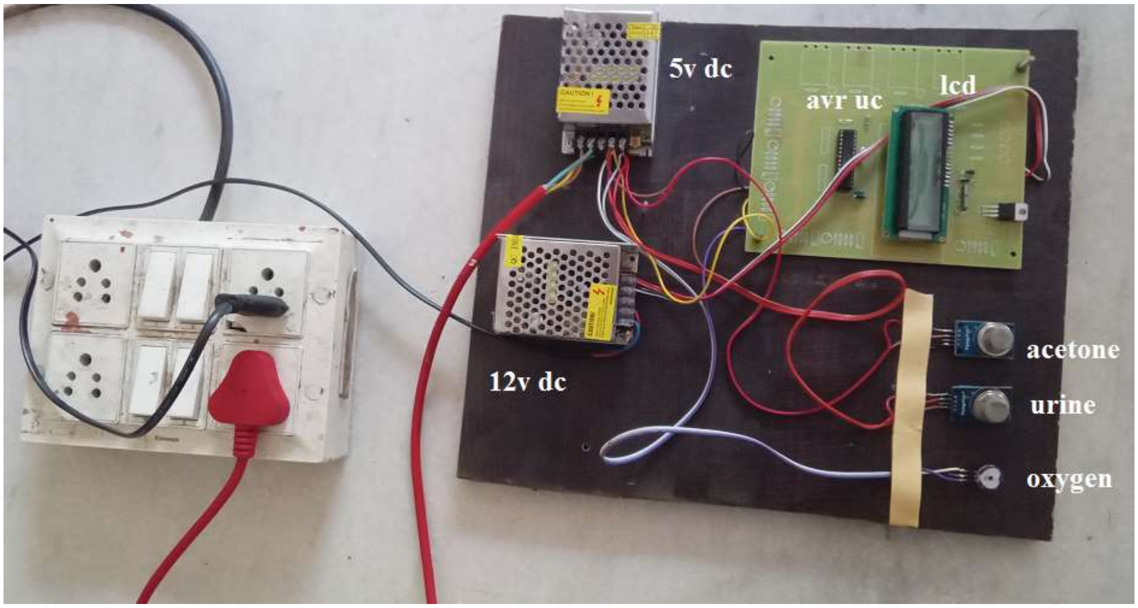


Figure 4. Experimental hardware setup

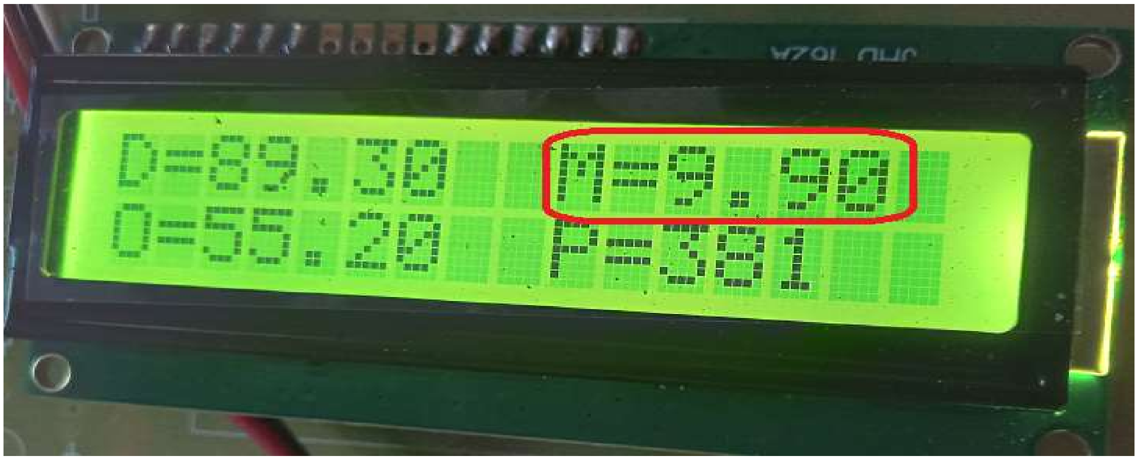
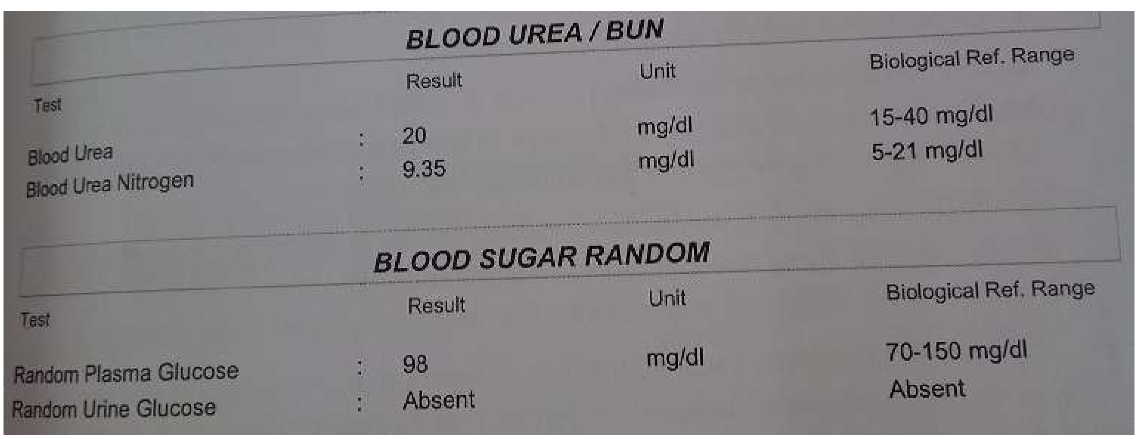


Figure 5. Urine saturation blood urea nitrogen

Figure 6. diabetes detection or sugar saturation in blood

Figure 7. oxygen saturation in blood



BLOOD UREA / BUN

Test		Result	Unit	Biological Ref. Range
Blood Urea	:	20	mg/dl	15-40 mg/dl
Blood Urea Nitrogen	:	9.35	mg/dl	5-21 mg/dl

BLOOD SUGAR RANDOM

Test		Result	Unit	Biological Ref. Range
Random Plasma Glucose	:	98	mg/dl	70-150 mg/dl
Random Urine Glucose	:	Absent		Absent

Figure 8. Blood test report

Above section shows the result for parameters checked on given experimental setup. Results are compared with blood test report for five persons. Blood urea nitrogen saturation in blood test report is 9.70 where as kit shows 9.90 mg/dl.

Random plasma glucose in blood test comes 98mg/dl kit shows 98.80. Oxygen saturation is 96.6% whereas kit shows 96%. Therefore accuracy of this kit showing accurate result is up to 95%.

3.Conclusion

Proposed system in this paper is non-invasive method and low-cost biosensor based testing method for checking human health conditions diagnose by testing breath exhale gas contents such as acetone for sugar saturation, methane gas for kidney health. The development and implementation of portable handy non-invasive bio-sensor testing kit for physical health diagnose of any user at any time gives instant results, painless, cost effective, effortless, time saving. Early prediction means early care and minimum treatment and lesser time required to recover from any disease or to stop further spreading of diseases to critical value or untreatable value lead to increase in percentage of average human lifespan. Portable biosensor for saliva test can diagnose kidney health, heart health, cholesterol level, cancer, skin diseases, diabetes, COVID-19, oral dental issues, viral diseases, immunity level and much more with higher accuracy percentage of diagnose as compared with conventional serum technology. This system has accuracy results more than 90 percent.

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