Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 2, Pages 151-153, March 2017

Smart Phone-Based Peak Expiratory Flow Meter

V.Vinuraja[1], R.Vinitha[2], S.Revathi[3] and J.Karthick[4]

[1]*Assistant Professor, Department of ECE, Sri Eshwar College of Engineering, Coimbatore, India. Email: vinuraja.v@sece.ac.in*
[2]*UG Student, Department of ECE, Sri Eshwar College of Engineering, Coimbatore, India. Email: vinithasri97@gmail.com*
[3]*UG Student, Department of ECE, Sri Eshwar College of Engineering, Coimbatore, India. Email: resakthivel20@gmail.com*
[4]*UG Student, Department of ECE, Department of ECE, Sri Eshwar College of Engineering, Coimbatore, India. Email: karthickece215@gmail.com*

Article Received: 26 February 2017 *Article Accepted: 14 March 2017* *Article Published: 16 March 2017*

ABSTRACT

Asthma is a chronic condition characterized by ongoing inflammation of the airways. Common asthma symptoms include shortness of breath that worsens with activity, wheezing, and cough. The flow of exhaled air from the lungs may be restricted due to inflammation from excess mucous. The peak expiratory flow rate (PEFR) is a test that measures how fast a person can exhale. This test checks lung functioning, and is often used by patients who have asthma. For the PEFR test to be useful, the patient must keep continuous records of his or her flow rate. These patterns can help individuals prevent their symptoms from worsening before a full-blown asthma attack, for example. Individuals will know when they need to adjust their environment or medication, or make an appointment with the doctor.

Keywords: Pressure sensor, CO_2 sensor, LCD Display and Bluetooth.

1. INTRODUCTION

Asthma is a chronic air way inflammatory disease with episodes of attacks. During an asthma attack, airflow in the lungs is restricted as the airway diameter is acutely reduced by a combination of smooth muscle constriction, swelling, and increased mucus secretion. Asthma is associated with significant illness, quality of life, and cost implications. While there is no cure for asthma, the disease can be controlled by avoiding or removing triggers, closely monitoring lung function, and medication management. Monitoring of peak expiratory flow is an integral part of the management of asthma. Plans for managing asthma are used in many countries and include regular monitoring of peak expiratory flow to indicate when patients should increase their drug treatment.

2. EXISTING SYSTEM

A nebulizer changes medication from a liquid to a mist so that it can be more easily inhaled into the lungs. Home nebulizers are larger and must be plugged into an electrical outlet. To use a nebulizer, you will need air compressor, nebulizer cup, mask or mouthpiece, compressor tubing.

Fig.1.1 Portable nebulizer

Disadvantages

- Nebulizer treatments generally take about 10-20 minutes, posing a challenge in today's fast-paced society.
- A lot of drug is wasted that vapour which is coming out from the side.
- There are chances of carrying the infection from unsterile chambers or tubings into the lungs, especially with the long term use.

3. PROPOSED SYSTEM

In proposed, remote monitoring will be involved with the help of android mobile phone. Pressure sensor used to take an outcome of blow rate.

Based on systolic and diastolic rate pressure level have been fixed. CO_2 sensor used to absorb the indoor air quality. Normal person acceptable CO_2 range will be only 300ppm. Beyond the level may lead to unconscious state, fatigue or might be major issues.

Monitoring purpose will be done using android mobile phone. With this monitoring system we can able to know the range presently the patient in as well as can we suggest immediate prescription to tackle the situation which raised.

Advantages

- Can provide immediate prescription.
- Remote monitoring purpose so no need of care takers should nearby patients.
- It can be beneficial in patients for both short-term and long-term monitoring.
- Can also involve internet of things concept. If we supposed to apply this means multi user access can be possible and monitoring will be done anywhere in the world.

4. BLOCK DIAGRAM

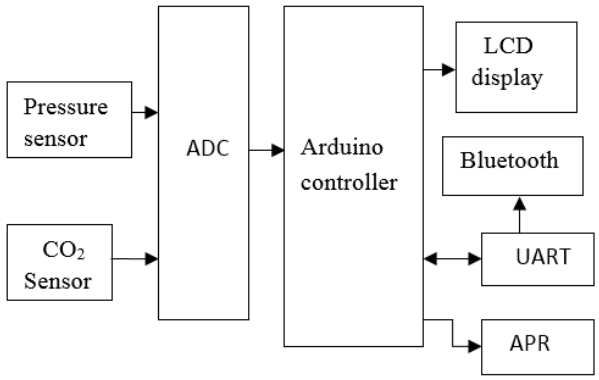

Fig.1.2 Block diagram

5. HARDWARE DESCRIPTION

5.1 Power Supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit (PSU). The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

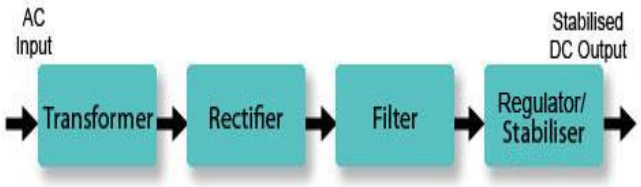

Fig.1.3 Power supply unit

5.2 Liquid crystal cell displays

Liquid crystal cell displays (LCDs) used to display numeric and alphanumeric characters in dot matrix and segmental displays. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. An LCD is made with either a passive matrix or an active matrix display grid.

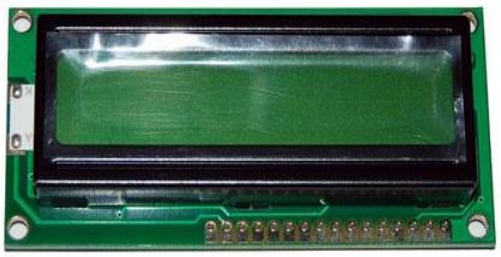

Fig.1.4 LCD display

5.3 Bluetooth

Bluetooth is a telecommunications industry specification that describes how mobile phones, computers, and personal digital assistants (PDAs) can be easily interconnected using a short-range wireless communication. It requires that a low-cost transceiver chip be included in each device and each device has a unique 48-bit address from the IEEE 802 standard. Connections can be point-to-point or multipoint. The maximum range is 10 meters. Data can be exchanged at a rate of 1 megabit per second

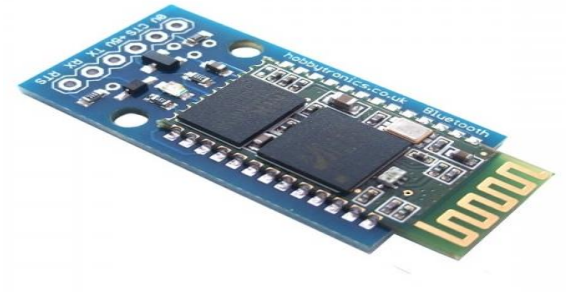

Fig.1.5 Bluetooth

5.4 UART

The universal Asynchronous Receiver/Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. UART is also a common integrated feature in most microcontrollers. The UART takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes.

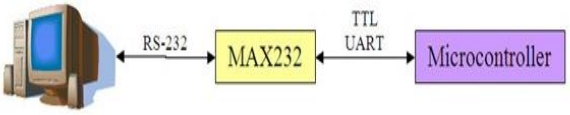

Fig.1.6 UART

5.5 APR

Auto play back recorder (APR) is a low-cost high performance sound record/replay IC incorporating flash analogue storage technique. It has a 28 pin DIP package. Supply voltage is between 4.5V to 6.5V.

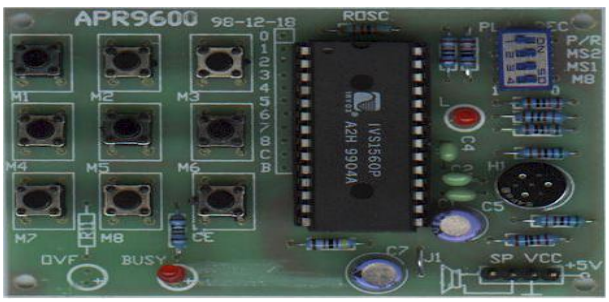

Fig.1.7 APR Experimental board

5.6 CO_2 Sensor

CO_2 sensor is a chemical optical sensor utilizing the acidic nature of CO_2 for detection. It consists of a gas-permeable membrane in which a pH-sensitive luminescence dye is immobilized together with a buffer and an inert pH of the buffer.

The measurement signal detected by the pCO_2 mini correlates to the partial pressure of CO_2 ambient.

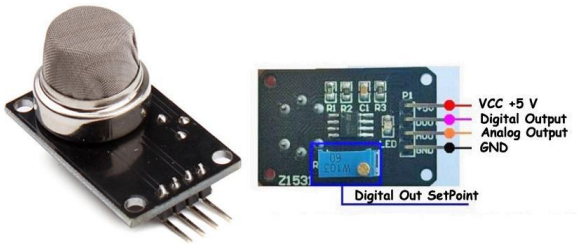

Fig.1.8 CO_2 sensor

5.7 Pressure Sensor

Pressure sensor measures pressure, typically of liquids or gases. Pressure is an expression of the force required to stop a fluid from expanding, and is stated in terms of force per unit area. It can also be used to indirectly measure other variables such as fluid or gas flow, speed, water level, and altitude.

Fig.1.9 Pressure sensor

5.8 ADC

Analog to digital conversion (ADC) is an electronic process in which a continuously variable signal is changed, without altering its essential content, into digital signal. The input to the ADC consists of a voltage that varies among a theoretically infinite number of values. The ADC0808 data acquisition component is a monolithic CMOS device with an 8-bit ADC, 8-channel multiplexer and microprocessor compatible control logic.

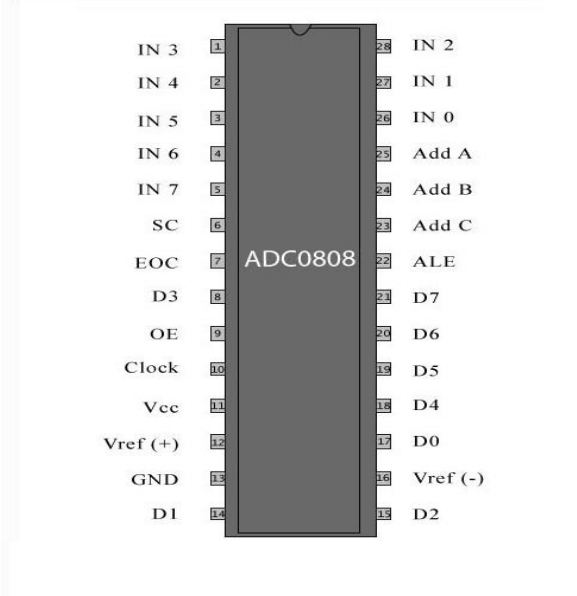

Fig. 1.10 ADC0808 pin diagram

5.9 Microcontroller

The Arduino Uno R3 is a microcontroller board based on the ATmege328. It has 14 digital Input or Output pins. The operating voltage is 5V, and the clock speed is 16MHz. The external supply to the board is 6 to 20 V.

Fig.1.11 Arduino Uno R3 controller board

6. RESULT

After sensing the level of CO_2, and pressure of air in the atmosphere, our peak expiratory flow (PEF) sends the message to the asthma patient that which level of dosage should be taken.

7. CONCLUSION

Thus the peak expiratory flow rate for asthma patients monitors and determines the lung disease in asthmatics. It is used to finds the various parameters and determines the level of seriousness in patient's health. The data are sent to the specialist by using mobile communication module interfaced with the designed hardware. After examining the results of the patient's, he can change the medications and severity of disease to the patient. Quick and effective way of asthma examination is achieved by the developed device.

REFERENCES

[1] National Asthma Education and Prevention Program: Expert Panel Report III: Guidelines for the diagnosis and management of asthma. Bethesda, MD. National Heart, Lung, and Blood Institute, 2007. *(NIH publication no. 08-4051) www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm.*

[2] Global Initiative for Asthma. Global strategy for asthma management and prevention. *http://www.ginasthma.org /local/uploads/files/GINA_Report_2015_Aug11.pdf.*

[3] Menghan Liu and Ming- Chan Huang, "Asthma Pattern Identification via Continuous Diaphragm Motion Monitoring", *IEEE Transactions on Multi-Scale Computing Systems*, Vol 1, No.2, April-June 2015.

[4] Manuel Lozano, Jos'e Antonio Fiz, and RaimonJan´e, "Automatic Differentiation of Normal and Continuous Adventitious Respiratory Sounds Using Ensemble Empirical Mode Decomposition and Instantaneous Frequency", *IEEE Journal of Biomedical and Health Informatics*, Vol 20, No.2, March, 2016.