



GSM BASED MONITORING AND ALERTING IN NEBULIZATION SYSTEM

S.Agalyah, D.Dhivyabharathi, T.Harshavarthi, V.Jayashri

Guided by

Saranya.M , Assistant Professor

Department of Medical Electronics,

Sengunthar College of Engineering.Thiruchencode, Tamil Nadu, INDIA

Saranyabm34@gmail.com ; stmag.agal@gmail.com ; dhivyakavitha2.0@gmail.com

lavyasubbume@gmail.com ; jayashri050698@gmail.com

Manuscript History

Number: IJIRAE/RS/Vol.06/Issue03/Special Issue/SI.MRAE10093

Received: 20, February 2019

Final Correction: 05, March 2019

Final Accepted: 20, March 2019

Published: **March 2019**

Editor: Dr.A.Arul L.S, Chief Editor, IJIRAE, AM Publications, India

Copyright: ©2019 This is an open access article distributed under the terms of the Creative Commons Attribution License, Which Permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Abstract—The existing system of nebulizers are either for patients to clear spasm up to some extent and in some systems dosage limit is known. Normally most of the drug gets wasted during exhalation phase and the patients have to breathe according to the medicine flow which might cause suffocation. For persons with chronic asthma attacks may not be able to breathe effectively, for this case flow of medicine must be regulated according to one's breathing pattern. This involves the monitoring of breathing rate. There are medicines like Albuterol, Intel solution, Ipratropium which would cause nasal bleeding, itching and nausea after the patient is nebulized. This is not an uncommon symptom in case of chronic asthma patients which requires a blood detector to stop the treatment immediately. And everything yet again needs to be reminded for care takers to provide immediate care for patient's well being. This would require monitoring of vital parameters like temperature and heart rate. The system will now be suitable for both hospitals as well as a home care product.

Index Term- Monitoring and alerting in nebulization; flexible sensor; albuterol medicine;

INTRODUCTION

There are two types of nebulization like jet nebulizers and ultrasonic nebulizers. Amostwidely used one is jet nebulizers because of its effectiveness, affordability and maintenance in domiciliary use. Nebulization system is not a new health care. An overview of this progress is provided which begins by describing how the nebulizer controls flow of medicine based on the breathing characteristics of the patient. Nebulization system is the main device that is used to deliver medications to treat breathing diseases such as chronic obstructive pulmonary disease, bronchospasm and dyspnea. By the simultaneous development of the nebulizer system designs along with flow regulation techniques lead to effective treatment for breathing disorders. The conductivity sensor which works based on the ions present the solution helps to identify the bleeding nose which is due to bursting of mucous layers. Most of the times bleeding nose is mild but not always. Certain time it extends for 15-20mins where then patient goes unconscious. Nebulizers are sustained for many years since, they are best known for treating children. So, it is always important to check on their treatment levels and the emergency conditions.

Bleeding nose is one of the emergency situations during nebulization. Conductivity sensor used in this system detects the bleeding nose and alerts the caretaker/nurse station. Hence the patient could be rescued on time. The nebulization system that we are presenting here consists of two motors to regulate medicine flow and oxygen flow. Oxygen is present in the system to convert aerosol solution into the mist form which is then inhaled by the patient. Both the motors depend on the patient breathing pattern. This enables doctor to treat multiple disorder patients. Because some medicine used for treating chronic asthma attack could vary these parameters incase of BP or diabetic patients. The caretaker unit is necessary at homes as well as in hospitals. It helps to handle the patient well, especially in case of children with pre amplifier is used. Hence, brething control nebulization is accomplished. Microcomtroller such as Atmel ATMEGA 8 is used to process the information and provide necessary actions. RF transmitter and receiver communicate between systems. It has no wastage of expensive drugs to the environment. Condition like bleeding nose is detected. Better communication is setup between the patient and the caretaker unit. Time and duration of the therapy is unknown hence it may create a problem during medication.

METHODOLOGY

A. Wireless sensor

A wireless sensor network (WSN) is a wireless network consisting of specially distributed autonomous devices using sensor to monitor physical or environmental condition. A WSN system in corporate a gateway that provides wireless Connectivity back to the wired world and distributed nodes. Nodes are the tiny computers, which work jointly to form the networks. The sensor node is a multi-functional, energy efficient wireless device. Typically a wireless sensor network contains hundreds of thousands of sensor nodes. The sensor nodes can communicate among themselves using radio signals.

B. Albuterol : Albuterol also called salbutamol outside of the is a type of medicine. It is a bronchodilator.

- This United means it makes the bronchi - the tubes that bring oxygen to the lungs - getwider.
- This makes it easier for oxygen to get to the lungs. From the lungs,oxygen goes into the blood and travels to the rest of the body. In medicine, Albuterol is called a β_2 adrenergic receptor agonist.
- Albuterol is also used to prevent exercise Induced bronchospasm.
- Albuterol sulfate is available in generic form.

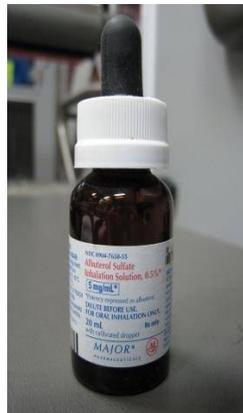


Figure No: 1.1 Albuterol medicines

C. Albuterol treats: Sometimes, diseases like asthma or chronic obstructive pulmonary disease (COPD) make the bronchi get narrower. This makes it harder for oxygen to get to the lungs. This can cause trouble breathing or even respiratory failure, which means the body is not getting enough oxygen to survive. Every part of the body needs oxygen to live. Without enough oxygen, parts of the body - like the brain - will start to die. Finally, a person's heart can stop if they do not get enough oxygen for a long enough time. Albuterol can often keep these things from happening. Often, people with diseases like asthma or COPD are prescribed albuterol inhalers. As soon as they start having trouble breathing, they can use the inhaler to breathe albuterol right into their lungs. The albuterol will stop the bronchi from getting narrower, and will make them wider again. This makes it possible for normal amounts of oxygen to get to the lung.

Albuterol Side Effects

- Nervousness.
- Shaking of a part of the body.
- Headache.
- Nausea.
- Irritation in the throat.
- Muscle, bone, or back pain.

HARDWARE REQUIREMENTS:

- ATmega8microcontroller
- Relay
- Power supply
- Solenoidvalve
- Temperature sensor
- Heart beat sensor
- Blood sensor

SOFTWARE REQUIREMENTS:

- Platform - AVRSTUDIO
- In System Programmer - ProgISP172
- Compiler - Win AVR

BLOCK DIAGRAM

Here the power supply consists of a 12 volt step down transformer. Then it passes through a rectifier and followed by a 5 volt regulator.

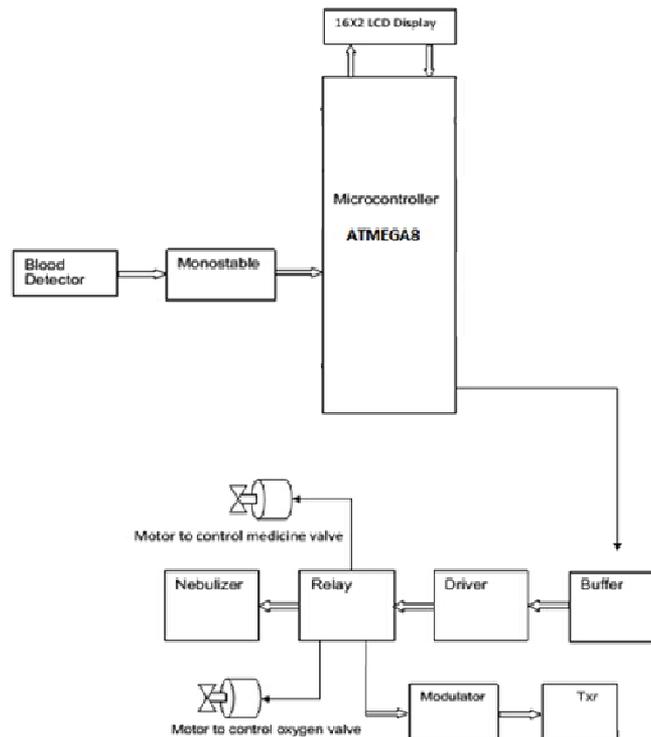


Figure No: 1.2 Block diagram of microcontroller

- The 12v supply is utilized by the relays and valves and the 5v is supplied to the microcontroller.
- The microcontroller is the central control unit that controls the associated components.
- Here we have used the atmel microcontroller ATmega8
- The microcontroller ATmega8 switches the relays on a timely basis based on the sensor signals
- The sensors are connected to the adc port of the microcontroller
- The microcontroller ATmega8 reads the signal from these sensors continuously
- The time delay between the switching have to be predefined and checked before installing the system
- **Power supply:** a group of circuits that convert the standard ac voltage(120V,60Hz)provided by the wall outlet to constant dc voltage
- **Transformer :** a device that step up or step down the ac voltage provided by the wall outlet to a desired amplitude through the action of a magnetic field
- **Rectifier:** a diode circuits that converts the ac input voltage to a pulsating dc voltage
- The pulsating dc voltage is only suitable to be used as a battery charger, but not good enough to be used as a dc power supply in a radio, stereo system, and computer and soon.
- **Filter:** a circuit used to reduce the fluctuation in the rectified output voltage or ripple. This provides a steadier dc voltage.
- **Regulator:** a circuit used to produces a constant dc output voltage by reducing the ripple to negligible amount. One part of power supply.

MICROCONTROLLER - ATMEGA8

- High-performance, Low-power AVR@8-bit Microcontroller
- Advanced RISC Architecture
- High Endurance Non-volatile segments
- Peripheral Features
- Special Microcontroller Features
- I/O and Packages
- Operating Voltages
- 2.7 - 5.5V(ATmega16)
- Speed Grades
- - 0 - 8 MHz(ATmega16L)
- - 0 - 16 MHz(ATmega16)
- Power Consumption at 4 MHz, 3V,25°C

PROCEDURES

The nebulization system that proposed here consists of two motors to regulate the medicine flow and the other one is for the oxygen flow .oxygen is present in the system for converting aerosol into mist format which is then inhaled by the patient. Both the motors depend on the patients breathing pattern. This enables the doctors to treat multiple chronic asthma. Because some medicines are highly dilating the bronchous which tends to make a leakage of blood from bronchial areas through the blood vessels. Alarm and message to the respective physician about the whenever there is an indication of blood leakage from the nasal path it will be sensed by the glucoflex sensor that is placed in the frontal portion of the nasal cavity. Once the glucoflex sensor senses the blood and its indicated components it will send an complications of the patient and the complexity of drug wastage could be avoided and the further treatment procedures will bead ministered.

CONCLUSION

It has a greatest advantage for the purpose of earliest detection of blood leakage from the mucous path and it is made as non invasive a major advantage to our project. The sensor could sense blood by means of the blood and its respected components and thereby makes and alarm signal to the physicians and it is a life saving measure in medical field. The system is designed in such a way that the administration of the medications would end supand alerts the physicians.



REFERENCE

1. B. Fabian, "Intravenous complication: Infiltration," *J. Intravenous Nurs- ing*, vol. 23, no. 4, pp. 229–231, Aug.2000.
2. J. P.F.Cortes, T.H.Ching C.Wu,C.Y.Chionh,S. Nanayakkara,andS. Foong, "Bward: An optical approach for reliable in-situ early blood leakage detection at catheter extractionpoints,"in*Proc.7thIEEEInt. Conf. Cybern. Intell. Syst. Robot., Autom. Mechatronics, Angkor Wat, Jul.2015*, pp. 232–237.
3. T. W. Major and T. K. Huey, "Decreasing IV infiltrates in the pediatric patient—System-based improvement project," *Continuing NursingEdu.*, vol. 42, no. 1, pp. 14–20,2016.
4. H.-D. Polaschegg, "Venous needle dislodgement: pressure measurement and possible alternatives, are view,"*J.RenalCare*, vol. 36, no. 1, pp. 41– 48,2010
5. B. Axley, J. Speranza-Reid, and H. Williams, "Venous needle dislodgement in patients on hemodialysis," *Nephrol. Nursing J.*, vol. 39, no. 6, pp. 435–445,Nov./Dec.2012.
6. C.-H. Lin, W.-L. Chen, C.-D. Kan, M.-J. Wu, and Y.-C. Mai, "Detection of venous needle dislodgement during hemodialysis using fraction alorder shape in dexratio and fuzzy color relation analysis," *IET Healthcare Technol. Lett.*, vol. 2, no. 6, pp.149–155,2015.
7. R. S. Boersma, "Clinical practices concerning central venous catheters in hematological patients," *Eur. J. Oncol. Nursing*, vol. 14, no. 3, pp.200–204,2010.
8. J. Hurst, "It can happen without warning: Venous needledislodgement,"*Renal Bus. Today*, vol. 4, no. 9, pp. 18–22, 2009.
9. G.S.SathiyaDeviandA.K.Joshi,"Bloodleakage monitoring system using IR sensor in hemodialysis therapy," in *Proc. 57th IRF Int. Conf., Pune, India, Jun. 2016*, pp. 38–42, ISBN:978-93-8