International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER SSRN

IJIEMR Transactions, online available on 12th Mar 2018. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-08&issue=ISSUE-03

Title: AUTOMATIC ANESTHESIA CONTROLLER AND HEALTH MONITORING SYSTEM

Volume 08, Issue 03, Pages: 172–176.

Paper Authors

DR.P.V.RAMARAJU,G.NAGARAJU,B.SRAVYA,A.RAMYA,
A.YASWANTH SAI,A.UMA MAHESWARARAO
SRKR Engineering college(A), Bhimavaram, India

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

AUTOMATIC ANESTHESIA CONTROLLER AND HEALTH MONITORING SYSTEM

[1]DR.P.V.RAMARAJU,[2]G.NAGARAJU,[3]B.SRAVYA, [4]A.RAMYA,[5]A.YASWANTH SAI, [6]A.UMA MAHESWARARAO

[1]Professor&HOD, [2]Asst. Professor,[3,4,5]B.E Students Department of ECE, SRKR Engineering college(A), Bhimavaram, India

ABSTRACT

During the performance of operation, the patient should be anesthetized. If the operation lasts for a long time, then the entire dosage of anesthesia cannot be given in a single stroke. The amount of anesthesia should be regulated by the anesthetist. In this case, there may be a problem of under dosage or over dosage if not measured or given correctly. Therefore to reduce these type of anesthesia complications, we have proposed an automatic system for anesthesia injection. The amount and intervals at which the dosage should be given will be initially set by the anesthetist using the keypad in milliliters per hour. Once the operation starts the amount of anesthesia will be released by the syringe infusion system at regular intervals with the help of microcontroller. The parameters like temperature, heartbeat and respiration are measured continuously at regular intervals and are displayed on the LCD screen. If there is any abnormality in the monitored values within the interval set, there will be an alert asking permission to press a button if there is a need of anesthesia before the interval set. If pressed, then the anesthesia will be released else will not be injected. After the completion of the operation, the monitoring of parameters still continues, if there is an abnormality the bed number and the monitored values will be sent to the concerned doctor using GSM module along with sounding a buzzer to alert the staff nearby.

1.INTRODUCTION

The injecting of anesthesia to the patient during surgery is being followed by long time. The anesthesia is introduced during operation or surgeries to patient because it reduces pain and blood loss. Generally anesthesia can be given in two ways.

- Topically
- Intravenously

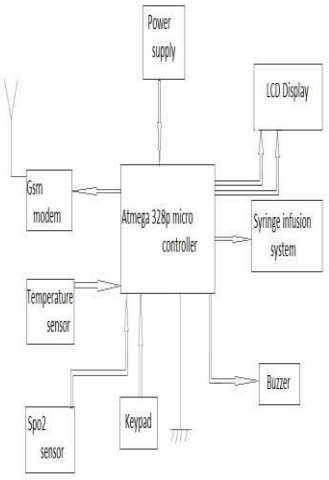
Intravenous method is to introduce anesthesia into the vein by using infusion set whereas topical method is to introduce anesthesia by using syringe. The correct amount of dosage of anesthesia is measured by monitoring patient's health condition. The decrease in patient's heartbeat, temperature and oxygen level in the blood tells us that there is a wrong dosage and we have to introduce correct amount based on these conditions.The parameters like temperature, heartbeat and respiration are measured continuously at regular intervals and are displayed on the LCD screen.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

2. PROPOSED SYSTEM

This project deals with the design and development of an automatic system for delivering anesthesia to the patient during operation, which prevents the problem of over dosage. The developed system makes use of embedded system based on GSM technology. The designed and developed system is installed in the operation theatre. In this system anesthesia level is controlled by multitask feedback and microcontroller system based on patient's condition. Mechanical syringe infusion pump is provided to deliver anesthesia to the patient. The health condition of the patient is monitored continuously throughout the operation as well as after the operation. This project will play a major role in the field of medicine and useful to the physicians during major surgery to provide the desired amount of anesthesia.

3.WORKING



Automatic anesthesia controller is used to deliver the required amount of anesthesia automatically to the patient during operation without any manual intervention. It consists of ATmega328P microcontroller, temperature sensor and SpO2 sensor to monitor the person health condition continuously, keypad to take the amount and interval at which the liquid must be released, syringe infusion system to take and release the anesthesia as per requirement, LCD to display the monitored values, GSM module to send an SMS to the concerned doctor about the patient's condition in case of any abnormality in the monitored values, buzzer to alert the staff nearby if there is a case of emergency. During the operation, initially the amount and interval at which the anesthesia must be released are set by the anesthetic manually depending on the duration, type of operation and patient's condition. Depending on the inputs given the microcontroller controls the syringe infusion system. The person's health is monitored continuously during the operation as well as after the operation. If there is an abnormality in the readings, there will be a beep and LCD displays the readings and asking a permission whether to allow the anesthesia or not. The monitoring continues even after the operation, only the infusion system stops. In case of abnormality the buzzer sounds along with sending a message to the concerned doctor.

4.TEMPERATURE SENSOR DS18B20

The DS18B20is a small temperature sensor with a built in 12bit ADC. The output of temperature sensor is checked within two given limits. Microcontroller controls system based on those monitored values. If abnormality in temperature occurs then it sends message to the allotted doctor through GSM.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

FEATURES

- Supply : 3.0V to 5.5V
- Measurement of temperatures : -55°C to +125°C.
- Fahrenheit equivalent : -67°F to +257°F
- Accuracy : -10°C to +85°C
- Conversion (temperature to digital word): 12-bit in 750 ms (max.)

5. SpO2 SENSOR-MAX 30100

SpO2 stands for peripheral capillary oxygen saturation, an estimate of the amount of oxygen in the blood. It measures amount of haemoglobin present in the blood. When a light wave passes through the finger with variation, it gives the value of SpO2 measurement in the blood because saturation in oxygen causes change in blood color. Generally SpO2 output values are checked within two limits and based on those values microcontroller operates the anesthesia system and also monitors patient's health condition.Normal SpO2 values vary between 95 and 100%.It also measures heartbeat of patient.

FEATURES

- Design is simplified by complete Pulse Oximeter and Heart-Rate Sensor
- Tiny 5.6mm x 2.8mm x 1.2mm 14-Pin Optically Enhanced System-in-Package
- Ultra-Low-Power Operation Increases Battery Life for Wearable Devices
- Programmable Sample Rate and LED Current for Power Saving
- Ultra-Low Shutdown Current (0.7µA, type)
- High SNR Provides Robust Motion Artifact Resilience with Integrated Ambient Light Cancellation
- High Sample Rate and fast data output

6.MICROCONTROLLER

The heart of this project is Micro Controller. The Micro Controller having the internal memory to store the data or written program by the user and also having the control system to control the input and output data corresponding to the internal program written by the user. All the components like temperature sensor, SpO2 sensor, GSM module, Buzzer and LCD display will be connected to the microcontroller with the help of connecting tracks.

FEATURES

- It is 28-pin AVR Microcontroller
- It has 32 Kb of Flash Program
- It Consists of 1 Kb of EEPROM Data Memory
- It has 2 Kb of SRAM Data Memory
- Consists of 23 I/O Pins
- Consists of Two 8-bit / One 16-bit timers
- A/D Converter: 10-bit Six Channel
- Consists of six channels of PWM
- MSSP: SPI and I²C Master and Slave Support
- USART: Yes
- External Oscillator: up to 20MHz

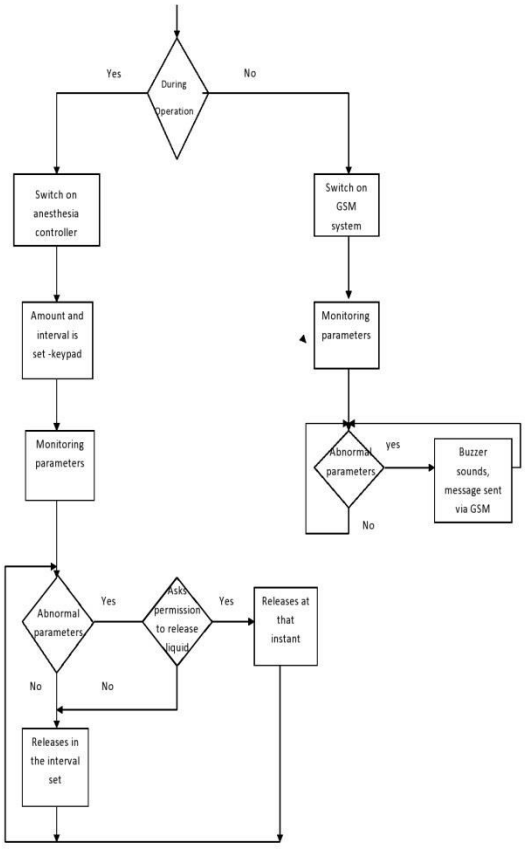
7. SERVOMOTOR

A **servomotor** is a rotary actuatorthat allows for precise control of angular or linear position, velocity and acceleration.The servo motor consists of a normal DC motor, a gear reduction unit, a position-sensing device and a control circuit.The DC motors get powered from a battery and run at high speed and low torque. The Gear and shaft assembly

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

connected to the DC motors lower this speed into sufficient speed and higher torque. The position sensor senses the position of the shaft from its definite position and feeds the information to the control circuit. The control circuit accordingly decodes the signals from the position sensor and compares the actual position of the motors with the desired position and accordingly controls the direction of rotation of the DC motor to get the required position. The Servo Motor generally requires DC supply of 4.8V to 6 V.

8.FLOWCHART



9.GSM MODULE

It stands for Global system for mobile communication (GSM). It is widely used mobile communication system in the world. It is an open and digital cellular technology used for transmitting mobile voice and data services. GSM operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. This system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. It digitalizes and reduces the data which further sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

Features of GSM Module:

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real time clock with alarm management
- High-quality speech
- Uses encryption to make phone calls more secure
- Short message service (SMS)

10. CONCLUSION

The above proposed system helps in delivering anesthesia to the patient automatically without any human intervention. By using this, the problems of over dosage and under dosage can be eliminated. The combination of health monitoring system along with anesthesia controller minimizes the circuit size as there is no need of extra circuitary for monitoring parameters. The parameters are monitored continuously using sensors and the further

operations of the system are controlled by the microcontroller depending on monitored parameters.

11.REFERENCES

[1] Konrad S. Stadler, Peter M. Schumacher. "Control of Muscle Relaxation During Anesthesia: A Novel Approach for Clinical Routine", IEEE Transactions on Biomedical Engineering, vol. 53, no. 3, pp 387-398 , Mar. 2006

[2] Jin-Oh Hahn, Guy A. Dumont and J. Mark Ansermino, "Closed-Loop Anesthetic Drug Concentration Estimation Using Clinical-Effect Feedback", IEEE Transactions on Biomedical Engineering, vol. 58, no. 1, pp 3-6, Jan. 2011.

[3] Professor A.K.Jain, Maulana Azad Medical College, Delhi, "Textbook of Physiology", TMH Printing Press, Volume 1, 4th edition, 2007.

[4] T M Hemmerling, MdWehbe, Cedrick Zaoter, "Robotic Anesthesia – A Vision for the future of Anesthesia", Translational Medicine Conference,ISSN-2239-9747, 2011.

[5] Schuttler J, Schwilden H, " Present state of closed-loop drug delivery in anesthesia and intensive care", IEEE Transactions on Biomedical Engineering, vol. 55, no. 1,pp 187– 191, Jan.2009.

[6] Richard A Jaffe, Stanley I Samuels, "Anesthesiologists Manual of Surgical Procedures", Lippincott Williams & Wilkins Printing Press, Fourth Edition, 2009

[7] A T Mazzeo, E La Monaca, R Di Leo,G.Vita , LB SantaMaria, "Heart Rate Variability- A diagnostic and prognostic tool in anesthesia and intensive care", ActaAnesthesiologica Scandinavia , pp.797-811,2011

[8] A. Lazaro, D. Girbau, and R. Villarino," Analysis of Vital Signs Monitoring using an IRUWB Radar ", Progress In Electromagnetics Research, pp. 265-284 ,2010

[9] D. Ghisi, A. Fanelli, M. Tosi, M. Nuzzi, and G. Fanelli, "Monitored anesthesia care," Minerva Anestesiol., vol. 71, no. 9, pp. 533–538,2005

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org