ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST)
Vol. 2, Issue 3, March 2016

MULTI-PARAMETER MONITORING SYSTEM FOR ORAL FEEDING OF PREMATURE INFANTS USING ZIG BEE

S. Solasubbu[1] A. Archana[2] B. Rohini[3]

[1]Assistant professor [2,3]Student

[1]Solasubbu@gmail.com [2] archanaappasamy74@gmail.com [3]rohinibala94@gmail.com

[1, 2, 3] Department of Biomedical Engineering

[1, 2, 3] Adhiyamaan College of Engineering, Hosur, India

ABSTRACT

Preterm infants often cannot successfully and co-ordinately complete their oral feeding. As a result, the infants may be at the risk of weight loss, poor nutrition's, pneumonia and so on. It also became one of the important indicators of high risk group for neurodevelopment delay in preterm infants. In this paper, Wireless multi-parameter monitoring system is designed for oral feeding of preterm infants, for monitoring the sucking-swallowing-respiratory activities, heart rate to provide quantitative indices of oral feeding and wet condition. Here the sensor units are developed for monitoring the sucking, swallowing, respiratory or breathing activity, heart rate and wet condition during the oral feeding. The result is displayed in the personnel computer.

INTRODUCTION

The oral feeding disorder is one of the common disease for premature infants which is life threating. Feeding disorder is due to incomplete process of an oral feeding. This affects the absorption of nutrients and may results in bradycardia and apnea. There is no physiological or medical condition that can explain about the food that the infants consume or the lack of nutrition. In this study, a wireless multi-parameter monitoring system for oral-feeding evaluation of preterm infants was proposed to quantitatively evaluate the suck-swallow-respiration function, heart rate measurement and wet condition during oral feeding. The technology used in our project for wireless transmission is ZigBee. In our prototype system we analysis through lab view.

SYSTEM ARCHITECTURE

The system consists of both hardware and software. Block diagram is shown in the fig.1. The code is written in embedded C and is burnt into the microcontroller. The proposed system is mainly contains the sensing device for monitoring the sucking pressure, respiration rate, heart rate, wet condition and zig bee. The following subsections provides details of the components in our proposed system.

All Rights Reserved © 2016 IJARBEST

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST)
Vol. 2, Issue 3, March 2016

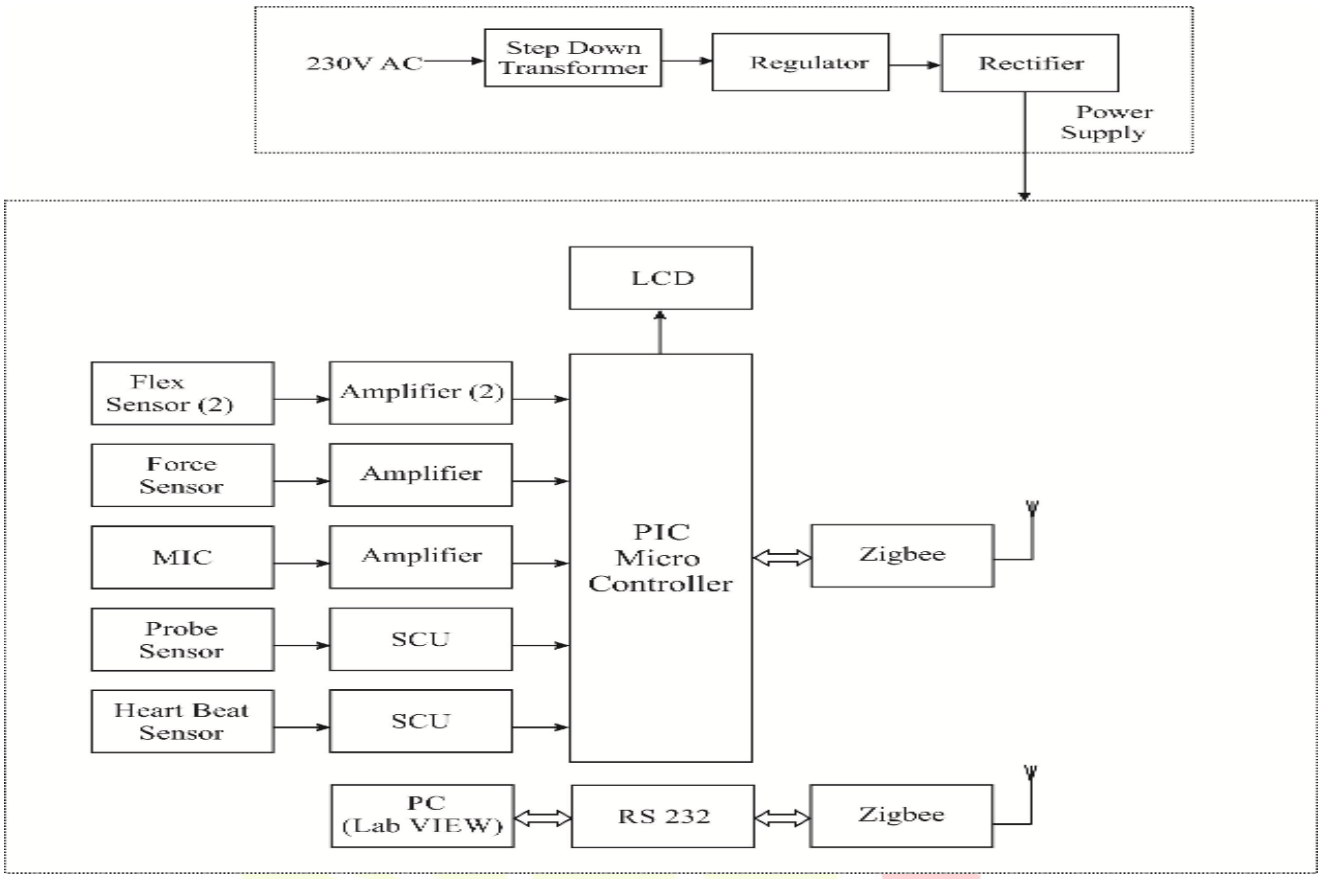

Fig 1: Block Diagram

A. Flex Sensor

To determine the respiration rate, flexsensor is used. It is placed over an infant abdomen. For accuracy two flexsensor are used and it placed over a left and right side of an abdomen. As the sensor is flexed during breathing in and out, the resistance across the sensor is increases. The resistance of the flexsensor changes when the metal pads are on the outside of the bend. The signal acquired by flex sensor is amplified and sent it to the microcontroller.

B. Force Sensor

Force Sensing Resistors are known as "Pressure Sensing", or "Force sensitive resistors". In our system, FSR is used to sense the sucking pressure of an infants. A force-sensing resistor is a piezo resistivity conductive polymer material whose resistance changes when a force or pressure is applied. The resistance is inversely proportional to the force applied. It is delivered as the polymersheet which had the sensing film applied by screen printing. The sensing film consists of both electrically conducting and non-conducting particles suspended in matrix. The sensing force signal acquired by force sensitive resistor is amplified and send it to the microcontroller.

C. Microphone

In our system, microphone is used to hear the swallowing sound of food which is taken by infants. Here the microphone is placed near the throat. If any sound detected by a microphone is amplified then it send to a microcontroller.

All Rights Reserved © 2016 IJARBEST

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST)
Vol. 2, Issue 3, March 2016

D. Probe Level Sensor

Probe level sensor is used to measure the moisture level of the infants. Probe sensor has two probes one is longest probe (common) and shortest probe (return). If there is a moisture, the two probes comes to contact with each other. Probe sensor is safe for the infants because they use the low voltage and they supply the limited power supply. The sensing level is send to the signal conditioning unit.

E. Heart Rate Sensor

Heart rate sensor is used to measure the heart rate. Heart rate is a term used to describe the frequency of the cardiac cycle. Usually it is calculated as the number of contractions (heart beats) of the heart in one minute and expressed as "beats per minute" (bpm). The heart beats up to 120 times per minute in childhood. When resting the adult human heart beats at about 70 bpm (males) and 75 bpm (female), but this rate varies among people. However the reference range is normally between 60 bpm (if less termed bradycardia) and 100bpm (if greater, termed tachycardia). In our system the heart rate is measured IR transmitter and receiver. IR transmitter is one type of LED which emits Infra-Red rays. Similarly IR receiver is used to receive the IR rays transmitted by IR transmitter. Both should be placed in straight line opposite to each other. The IR transmitter and IR receiver are placed in the pulse rate sensor. Sensor has to be clipped to the finger for measure the heart rate.

F. Microcontroller

The PIC 16F877 is a 40-bit microcontroller. The technology that is used in PIC 16F877 is flash technology where the data is retained even when the power is switched off. The amplified signals are fed to the microcontroller.

G. LCD

In our system 16 X 2 LCD is used. Liquid Crystal Display is thin, flat, flat electronics visual display that uses the light modulating properties of liquid crystals. All sensor output is displayed continuously as it being measured.

H. ZigBee

The technology used in our proposed system is ZigBee. It is a mesh network specification for low power wireless local area networks that cover a large area. It is based on standards. It is reliable, low cost, can be used globally, easy to deploy, very long battery life and secure.

G. Lab View

Laboratory Virtual Instrument Engineering Workbench is used. In the proposed system, the result obtained by the LCD is displayed as graphical representation.

RESULT

The baby was feeding through the feeding bottle while the force sensor sense the pressure while the baby sucking the milk. Simultaneously we measures swallowing sound, breathing rate, heartbeat and wet condition are displayed in LCD and analysis the output through lab view for graphical representation.

CONCLUSION

The proposed system is inexpensive and simple to use. In this study, multiparameter monitoring for oral feeding of premature infants using ZigBee was designed using the different sensing device. For analysis purpose lab view is used. As ZigBee

All Rights Reserved © 2016 IJARBEST

technology is used which make the user to communicate through large distance using mesh networks. This is convenient to monitoring the baby condition during oral feeding from any distance.

REFERENCE

1) *Yu-Lin Wang, Jing Sheng Hung, Lin-Yu Wang, Mei- Ju Ko, Willy Chou, Hsing-Chein Kuo, and Bor-Shyh Lin, member in IEEE* ***"development of a wireless oral feeding monitoring system"***

2) I. H. Gewolb, F. L. Vice, E. L. Schweitzer-Kenney, V. L. Taciak and J. F. Bosme, ***"Developmental patterns of rhythmic suck and swallow in preterm infants,"*** *Develop. Med child Neural, vol. 43.pp. 22-27*

All Rights Reserved © 2016 IJARBEST