

Pregnancy women fetal heart rate and kicking monitoring using embedded system

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Abstract

Fetal observing during pregnancy time is the most essential to spare the life of the mother just as the kid. In this task, we present a gadget that is utilized to quantify the fetal pulse during the hour of pregnancy. The significant part utilized for this discovery is Fetal Digital stethoscope sensor which is to be put on the mid-region of the pregnant and the signs are prepared by the miniature regulator utilized and the precise fetal pulse is recognized and sent as an instant message to the individual cell phone through the use of GSM module and furthermore by the utilization of EMG sensor the uterus compression likewise be reproduced as the yield on the work area. This framework is entirely adaptable and ease encourages the patient to screen the fetal pulse in home.

Keywords: fetal heart rate, kicking monitoring, embedded system, waveform generation, SMS

1. Introduction

In this present scenario, there are different techniques used for fetal health monitoring at the time of pregnancy. There are methods like CTG, ACOG and many methods based on acoustic techniques. In this project, we are developing a device such that it consists of a fetal digital stethoscope sensor which is made up of three electrodes anode, cathode, and a reference electrode. In this model, these are placed on the abdomen. Thus the ECG signals are fetched from these electrodes and are pre-processed and then analyzed through different standards. To be informative we are using a GSM module to transmit the fetal heart rate values to the required mobile. The message can also be followed up the doctors. Thus by using these kinds of methodologies, one can reduce the stress felt by a pregnant woman due to the movements from here and there.

The heart of this process can be defined as the microcontroller used. The microcontroller controls the whole process from fetching the electrode signals and preprocessing the signals and accurate fetal heart rate is sent to the consultant's mobile by gsm. The usage of this microcontroller can also be extended to the other applications. In this project, this can be extended by using a fetal EMG sensor with the same microcontroller to get the analogy view of uterus contraction.

2. System analysis

The monitoring of fetal heart rate during pregnancy is done using ultrasound sensor. This identifies the variations between the Non-invasive monitoring using abdominal ECG's and extracted fetal ECG's. The work is to found the need to find the peaks hidden in the fetal cardiovascular system. There are two

types of simulations used in this technique namely noise contamination and R-peak interval changing rate. The results had shown improvement in obtaining the accurate result by the percentile of 25%. The noise arisen can be eliminated by sinusoidal R-R intervals within a short interval of time which comes under milliseconds. In existing system we will be using the concept of ultrasound to find out the fetal heart rate. There are methods like CTG, ACOG and many methods based on acoustic techniques.

3. Block diagram

In this methodology, we get input from the pregnant lady by placing the two sensors namely Fetal digital stethoscope sensor and EMG sensor near the abdomen of the lady. Thus the electrodes that are present with the sensors fetch the fetal heart rate of the child and the signals are amplified by the amplifier and transmit the corresponding electrical signal to the microcontroller. As per the below diagram, we can obtain the readings from the lady. In this method, the microcontroller is programmed such that to get low noise data.

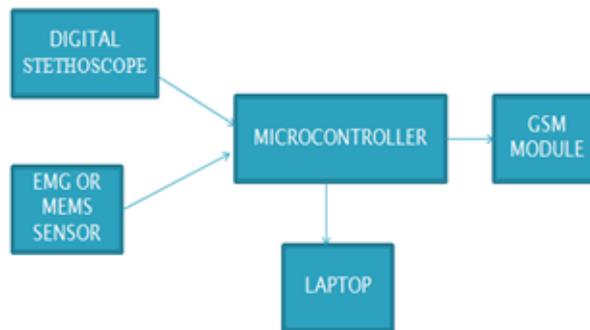


Figure 1: System block diagram

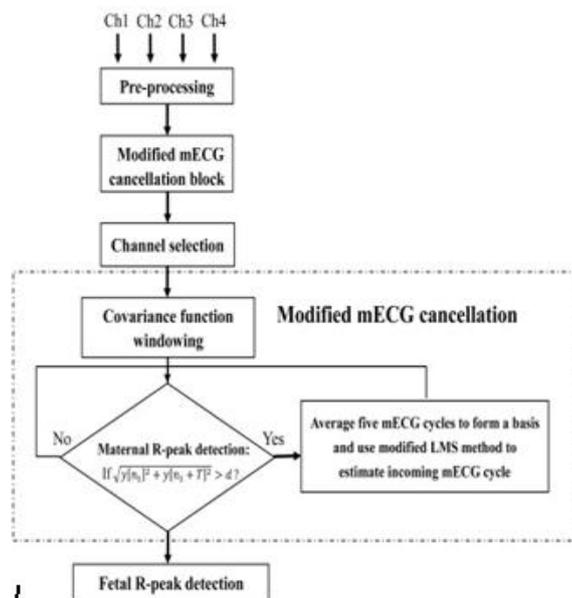


Figure 2: Flow chart

The figure 1 and 2 shows the block diagram and flow chart of the system used. After the successful fetching of the signals; they are pre-processed as per the written guidelines in the program through the microcontroller. Later the information from the microcontroller is transmitted through the GSM module to send the text message for the required mobile phone and we can obtain the graphical representation of the fetal heart rate. And also from the EMG graphical representation of the uterus contraction is obtained. Figure 3 shows the snap shot of hardware implementation of the system. Figure 4 shows the complete set up of pregnancy women fetal heart rate and kicking monitoring using embedded system.

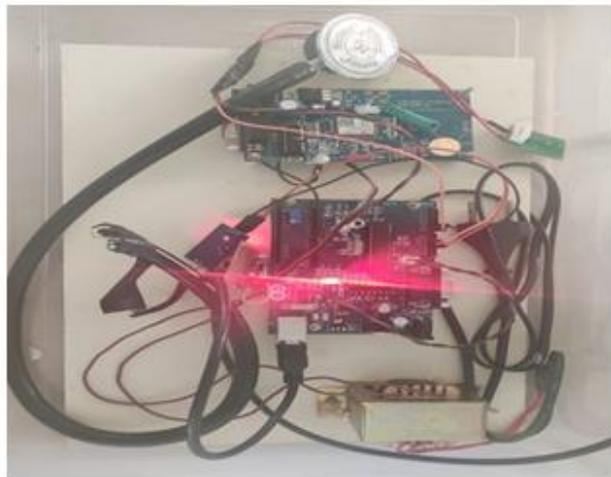


Figure 3: Snap shot of hardware implementation



Figure 4: Snap shot of complete hardware setup

4. Result and Discussions

The software tools which are used for the implementation are listed below, they are

- PROTEUS IDE
- C18 COMPILER

Embedded C language is used in PROTEUS IDE. Embedded C is a lot of language augmentations for the C programming language by the C standard council to address shared characteristic issues that exist between C expansions for various installed framework. Verifiably, implanted C programming requires nonstandard augmentations to the C language so as to help extraordinary highlights, for example, fixed-point math, numerous particular memory banks, and fundamental I/O tasks.

- Code speed is administered by the formulating power, timing imperatives
- Code size is administered by accessible program memory and utilization of programming language.

The Embedded programming is related with every processor which goes about as intelligence in each implanted frameworks. In the event that equipment shapes the body of an installed framework, inserted processor goes about as the intelligence, and implanted programming structures its spirit. It is the inserted programming which essentially administers the working of implanted frameworks. Objective of installed programming writing computer programs is to get greatest highlights in less space and least time. Installed programming needs to incorporate all required gadget drivers at assembling time and the gadget drivers are composed for the particular equipment.

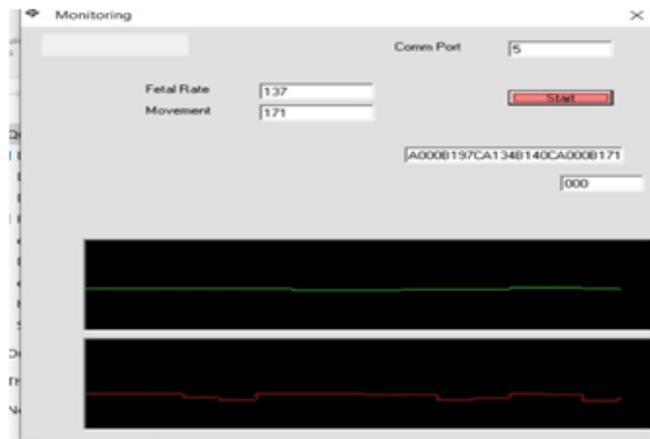


Figure 5: Waveform generation screen

The MPLAB C18 compiler is a detached, enhancing ANSI C compiler for the PIC microcontroller unit. The compiler goes astray from the ANSI standard X3.159-1989 just where the standard encounters with productive PIC miniature MCU provision. The compiler is a 32-piece Windows reassure application and is completely viable with Microchip's MPLAB IDE, permitting secure level investigating with the MPLAB ICE in circuit emulator, the MPLAB ICD 2 in circuit debugger or the MPLAB SIM test system



Figure 6: SMS generation in the mobile

In this paper, we are developing a device such that it consists of a fetal digital stethoscope sensor which is made up of three electrodes anode, cathode, and a reference electrode. In this model, these are placed on the abdomen. Thus the ECG signals are fetched from these electrodes and are pre-processed and then analyzed through different standards. To be informative we are using a GSM module to transmit the fetal heart rate values to the required mobile. The figure 5 shows wave form generation of the heart signal. The message can also be followed up the doctor's. The message (SMS) can be send to the doctors mobile and it is shown in figure 6. The heart of this process can be defined as the microcontroller used. The microcontroller controls the whole process from fetching the electrode signals and preprocessing the signals and accurate fetal heart rate is sent to the consultant's mobile by GSM. The usage of this microcontroller can also be extended to the other applications.

5. Conclusion

From the above method, the heart rate of the fetal is monitored and the output is accurate. By using the noise reduction method the clear data is carried out. The sensors are placed on the abdomen region to evaluate the fetal heart rate. The clinical experiment is carried out by using the method in 10 pregnant women the data obtained are stored in the database. The data are get analysed with one another all the result shows the accurate value. The normal heart rate value is compared with the value obtained by this device it shows maximum efficiency.

6.References

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