



Project Domain – Medical/Assistive Technologies

PORTABLE ECG, BIO-PARAMETER MONITORING AND ALARM SYSTEM WITH WIRELESS SONOGRAM MACHINE USING MSP430

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Abstract

This project is about portable ECG and bio-parameters monitoring device which can be used by any individual and has an alarm which notifies the patient's doctor or relatives in any case of emergency (based on the pulse measure) The ECG sensor which is used in this device is ADS2193 which is short circuited as a single electrode device . The body temperature is monitored using a thermocouple all the above sensors are connected to a microcontroller (MSP430F4619) which is connected to a wireless transmitter and the ECG is displayed in a display device (mobile phone ,computer ,etc). The sonogram part of the project is made by fixing a piezoelectric transducer behind the stethoscope which is used as the matching layer .The piezoelectric crystal and the backing material are fixed behind the stethoscope and output is displayed in a display device (mobile phone, computer, etc)

Keywords: *Ecgsensor (ADS2193), thermocouple, MSP430F4619, Stethoscope as matching layer for sonogram, wireless transmission, display unit*

Market Analysis

In many cases the doctors cannot attend the patient in personal or they cannot always be with the patient. This project is to help the doctors and the attenders (relatives) to keep a track with the condition of the patient in the serviceable market there are many products to monitor the heart rate pulse and body temperature but this product help not only the patient but also the doctors to keep track of their patients the alarm system in this device will alert the patients doctor and his/her relatives using wireless transmission and text message. This product is cost efficient and handy .As it is portable and wearable it doesn't occupy much place .This can be used by an individual at any place and time. This project can have a change in the medical field by helping the doctor to analysis their patients without having personal contact with them .

Project Description

INTRODUCTION

The main intention of this project is to help the doctors and the patients attenders to keep a track on their patients at any time. By analyzing the present market there are many android based and other technology based devices which are used to measure and record the bio parameters but we are trying to upgrade those devices into alarm system and make it more useful .we are also working on the cost part of the device to make it cost efficient. This project records the bio parameters from a patient's body and converts it into digital signal and transmits it to a external display unit. The project covers various parameters such as ECG, body temperature and etc. The sonogram part of the project is build behind the stethoscope. The stethoscope is used as the matching layer and the piezoelectric crystal and the backing material is place behind it.

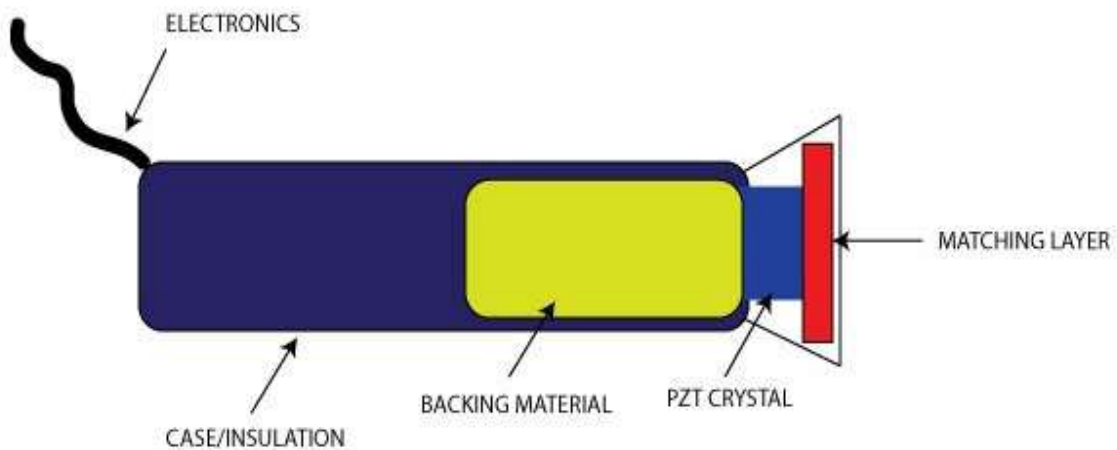
TECHNICAL BACKGROUND

The most relevant product found in the market is the **BASIS HEALTH AND HEART RATE MONITORING DEVICE**. This device is used to monitor the heart rate and other fitness related parameters. We are trying to build the same device for bio parameters monitoring and alarm purpose using the same technologies .The following image is a basis device:



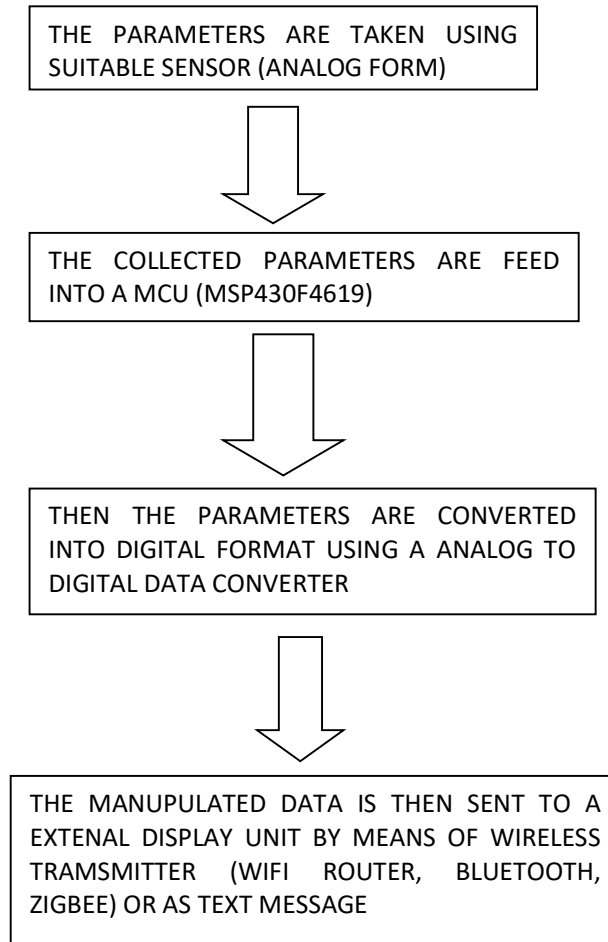
We are trying to design a similar model portable device which can be wore by the patient .The sonogram part of the project is the reference of our mentor. In this the part of a transducer fixed behind the stethoscope and transmitting the data using wireless transmission methods.

THE FOLLOWING IMAGE SHOWS THE PARTS OF AN WIRED ULTRASOUND TRANSDUCER :



PROPOSED SOLUTION

The following block diagram shows the total function of the system:



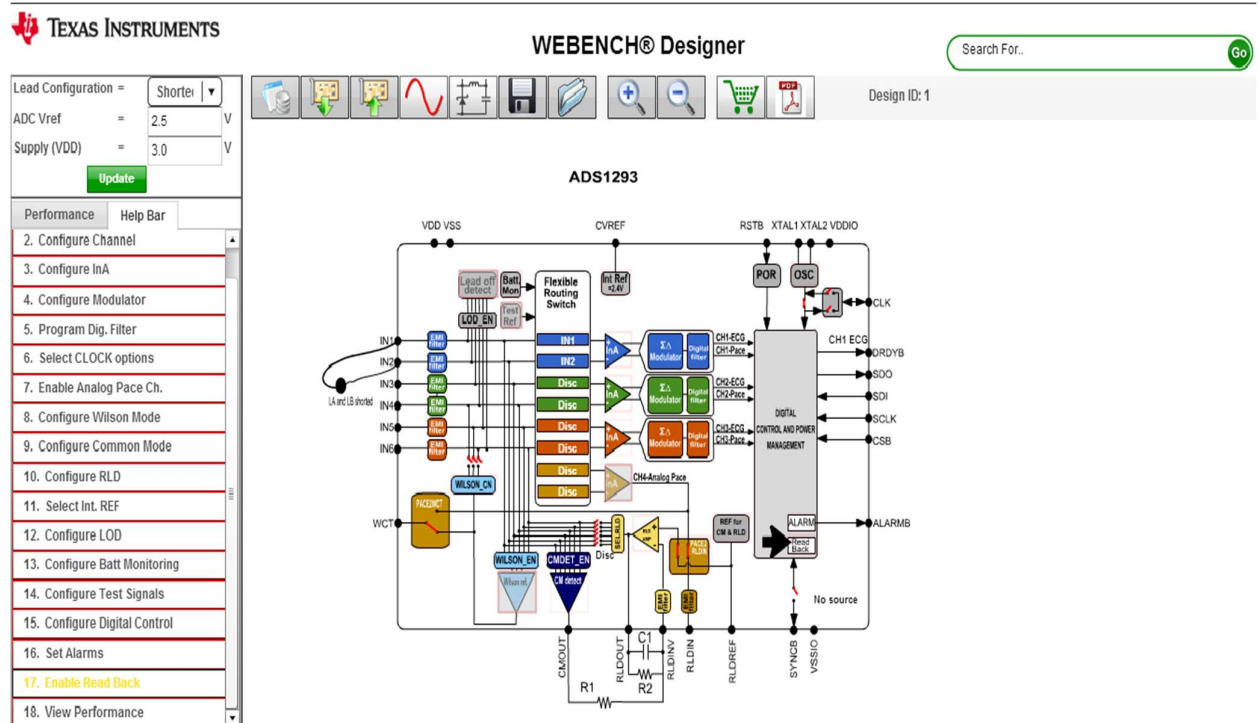
The bio parameters are collected using suitable sensors. The values got from the sensors are recorded using a microcontroller unit (MSP430F4619). The values got from the sensors are in analog form. An **ANALOG TO DIGITAL DATA CONVERTOR** is used to convert the analog data to digital data. This data can be then transmitted through wireless transmitter to multiple display units

The alarm system in this devices works on the continuous values got from the sensors. These values are matched with the pre defined values using suitable software by trial and error method. If there is any match found then the alarm system is turned on and a txt message or a alarm note is send to the display unit using GSM MODULE or wireless transmitter.

INFORMATION ABOUT SUBSYSTEM

ECG SENSOR:

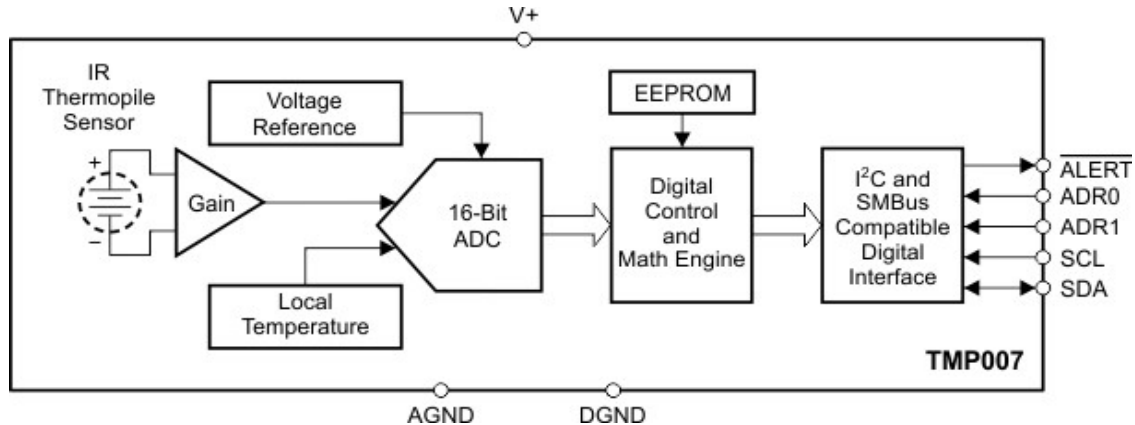
The ECG sensor used in this project is ADS2193. The sensor used consist of one short circuited electrode .This sensor was designed using **WEBENCH DESIGNER** .



The inputs are taken from the shorted electrode IN1 and IN2 then the input values pass through the EMI FILTER. The values then pass through the flexible routing switch IN1 and IN2. A inverter InA is used to invert the input values. The values then pass through the modulator and digital filter from where the **ECG and phase of ECG** are taken to a digital control and power management unit which is in turn connected with a microcontroller.

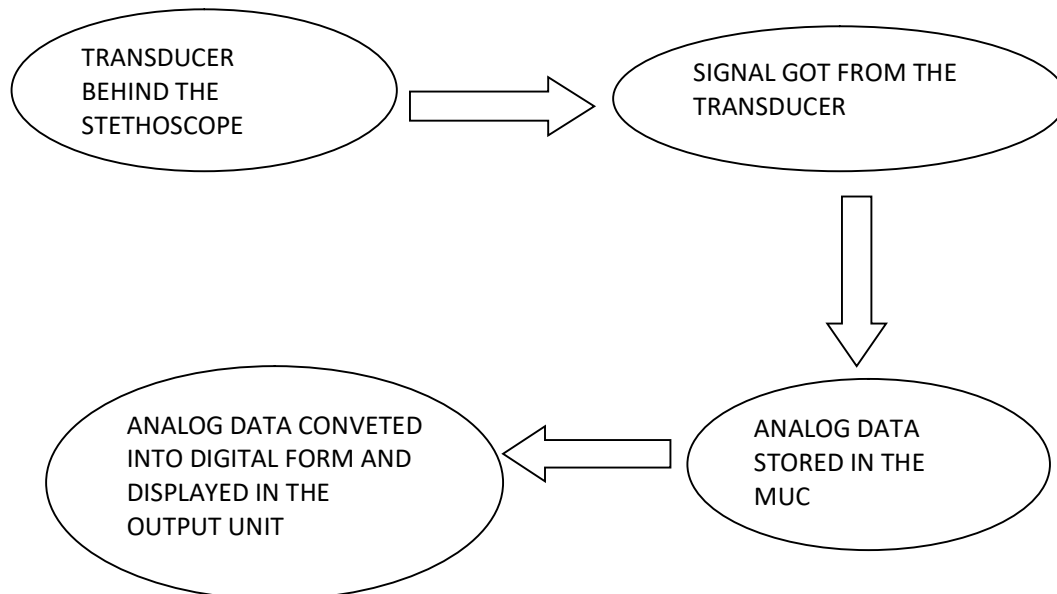
TEMPRETURE SENSOR:

The temperature sensor (**TMP007**) takes the readings from the persons body and then register it in the microcontroller. The readings are then converted into digital form and transmitted using a wireless data converter.



SONOGRAM:

The sonogram machine is step-up behind the stethoscope which is used as the matching layer. The transducer parts (**piezoelectric crystal and backing material**) are kept behind the stethoscope. Then the signals got from the transducer is transmitted through a wireless transmitted to MICROCONTROLLER. Then the signal is converted into digital output and displayed in the output device using suitable software



We are also trying to include other bio parameters. And make it into a total body bio parameter analyzer

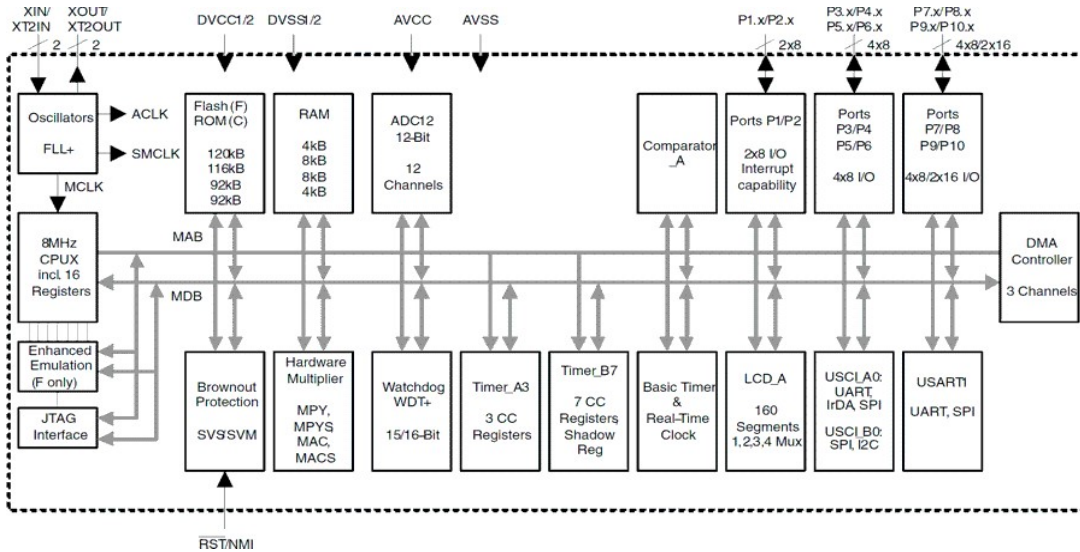
SOFTWARE USED

The software used in the project is

- WEBENCH --- used for creating and analyzing sensors
- CODE COMPOSER STUDIO – used for coding the microcontroller (msp430f4619)

We are also using other software’s such which is used in the display unit for the users to interpret the data easy and understand it

FUNCTIONAL DIAGRAM OF MSP430F4619



PROJECT EXECUTION PLANS:

Proposal to prototype:

We are first trying to design the project in such a way that it is handy. So we are going to make the prototype as small as we can so that if we find any error in the device we can rectify it and we can change the dimensions if necessary. In the prototype version of the project the main things to be considered are the size and the portability of the device

Prototype to product:

In the second phase the main thing that is to be considered is the look and the dimensions which make the product to look compact and attract everyone to use it. And the main thing to be considered in the product phase is to make the product in such a way that it can be used anywhere and everywhere so that the individual uses it regular to monitor his bio parameters. The cost of the product should also be noted since one will buy the product only if the product has a reasonable tag.

TI Content

TI Part (link all the parts to their respective product page on the TI website)	Usage/Advantage
<i>ADS2193</i>	This sensor is used to get ECG values / the short circuited input electrode is an added advantage
<i>TMP007</i>	Sensor used to monitor temperature / it has inbuilt ADC in it
MSP430F4619	This microcontroller is used to accumulate data/ it has a inbuilt temperture sensor

Bill of Materials

Part	Function	Estimated Quantity	Estimated cost
stethoscope	Matching layer for sonogram	2000	2000

Conclusion

This product can reduce the work load of doctors and can make work easier. If this product is used it can bring out a change in the person's life style