SIMULINK BASED REAL TIME BLOOD PRESSURE AND BODY TEMPRAURE MONITRING SYSTEM

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Abstract - *This paper describes the real time working of a Simulink based blood pressure and body temperature monitoring system based on ATMEGA 328 (Arduino uno).The major monitoring system in use give the output on a liquid crystal display, even if it is a digital circuit it is prone to noise and distortions. So, we are using a new technique to make this health monitoring system more accurate. We are adding Simulink model to this project and we will read and transmit data through serial communication. The readings are displayed on LCD monitor and MATLAB Simulink serial monitor. The readings are displayed on liquid crystal display monitor and MATLAB Simulink serial monitor. For taking the beats per minute input of heart beat we are using a BPM sensor module. And for temperature value intake we are using a LM35 temperature sensor module. The input information is converted to analog to digital form and then sent to processor for processing. In the end, data is displayed on the LCD and Simulink model. The system is quite cheap and efficient.*

Key Words: Arduino Uno R3, LM35 temperature sensor, BPM Sensor, Simulink Model, Result

1. INTRODUCTION

In todays world each and every person is stressed, to be frank some have stress due to economic crisis, some have relationship issues and a lot of them have career issues. All these stresses are making people more and more vulnerable to heart attack and blood pressure disease. And some of them pay a very large price of this stressful life even by giving their life due to stroke or heart attack. Hence, we are designing this project so that we can contribute in saving lives of as many people as we can by detecting stroke or heart attack before its occurring. For our project, we are designing a prototype of a health monitoring system using the two sensors, microcontroller and Simulink. The first sensor is the beats per minute sensor and the second one is the body temperature sensor module. Basically, we are going to sample out the data from the two sensors. The body temperature sensor will take the input of the subject's body temperature by the help of a wrist band .Secondly, the other sensor is the beat per minute sensor which will measure blood pressure level of the subject and then it is displayed on the liquid crystal display and on the serial monitor Simulink model. The data will be collected using sensors. The hardware shows the result on the liquid crystal display and when the body temperature and BPM exceeds the assigned level the buzzer and LED powers up. Now using USB serial communication, we will interface the Arduino with MATLAB Simulink, Simulink takes input from the sensors after every 5 seconds making our project a real time project and we can get the results on the software as well as hardware. A real time plot can be observed at the serial monitor of the Arduino IDE. MATLAB (network research facility) is a registering numerical condition and fourth era programming language. Created by Math works, MATLAB permits network controls, plotting of capacities and information, execution of calculations, making of UIs, and interfacing with programs written in different dialects, including C, C++, Java, and FORTRAN.MATLAB stands for framework research center. MATLAB (lattice research facility) is a numerical processing condition and fourth-age programming language. Created by Math Works, MATLAB permits lattice controls, plotting of capacities and information, usage of calculations, creation of UIs, and interfacing with programs composed in different dialects, including C, C++, Java, and Fortran. MATLAB can be utilized in a wide scope of uses, counting sign and picture handling, interchanges, control configuration, test and estimation, money related displaying also, examination, and computational science. For a million specialists and researchers in industry and the scholarly world, MATLAB is the language of specialized registering.

2. PROPOSED METHODOLOGY

The proposed methodology is as follows, we will use two sensors one is Beat per minute sensor and other is body temprature sensor. The BPM sensor will be contacted to body using the finger and the temperature sensor will be mounted on the wrist band and hence using wrist contact we can take its reading. The output from the sensors are in analog form and are amplified for noise reduction purpose .Now this analog output signal from the sensors are fed into the analog pins of the arduino board. The digital to analog converter in the ATMEGA328 converts the analog signal to digital form. The digital pins of the arduino are connected to a liquid crystal display. The temperature and beat per minute sensor has a fixed value of thresold whenever the input value crosses the thresold the buzzer and light emitting diode powers up.

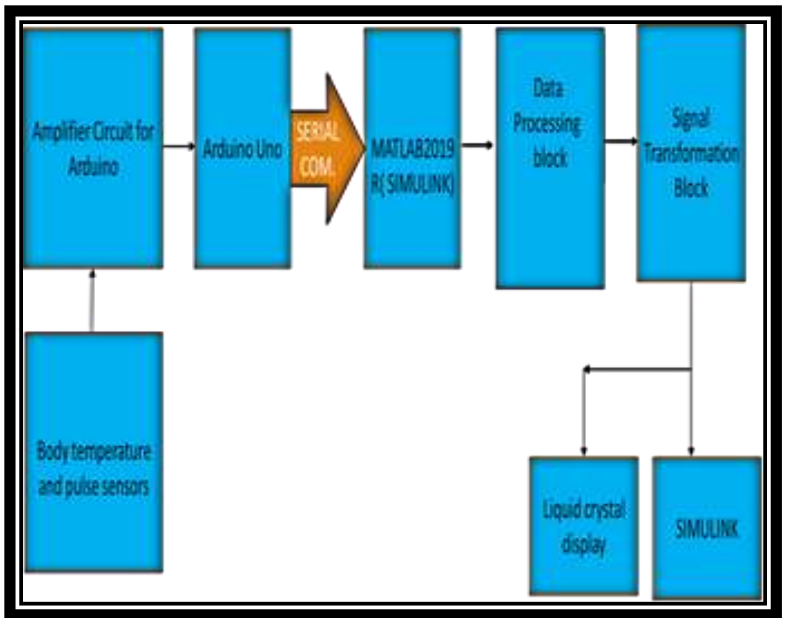

Figure 1: System Methodology Block diagram

The Arduino is connected to MATLAB Simulink through serial communication and the Simulink takes the input from the sensors every five second to make the device more accurate .The device's output are of two category one is hardware output visible at the Liquid crystal display and other is the software output visible at serial monitor of the Simulink model.

3. EXPERIMENT

For hardware and software implementation, we will need to learn about some basic parts of the device. First is LM35, LM35 is a sensor which senses body temperature. The output of LM35 sensor is linear and is operative at 4V to 30V.It has no need of any external calibration. For every 10mv – 1-degree Celsius temperature increases. Second is BMP sensor which measures beats per minute and using optical method. The sensor is mounted upon on the finger and due to change in vascular blood level. It gives analog signal as output. It is also a linear sensor and uses infrared catching to catch beats per minute. The sensors take the physical input and give us the electrical output so basically, they are transducers. The analog electrical output is provided to the analog pins of Arduino UNO. Arduino UNO consist of 6 analog pins (A0 – A5). The analog to digital converter of ATMEGA 328 converts analog signal to digital signal. The Arduino UNO has 14 digital pins (D0 – D13) and digital pins are connected to the LCD. The Arduino is programmed in embedded c language. The Arduino uno is connected to the laptop and is interfaced using MATLAB. The Simulink model is taking input data from the device using serial communication. The data is read by Simulink model every five second and plotted on the serial plotter. We programmed the Arduino in such a way that if the value of temperature or BPM rises from the fixed value then the buzzer will make sound and LED will glow.

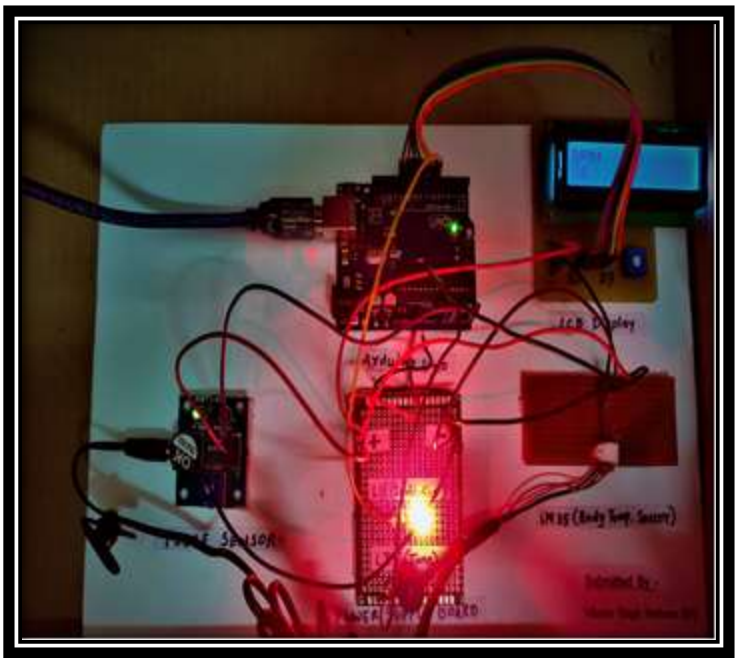

Figure 2: Implantation of Hardware

The software implementation is done using MATLAB Simulink model. We are simulating both body temperature sensing and pulse rate detection. The output is observed at CRO and an individual graph for each sensor is observed at the CRO.

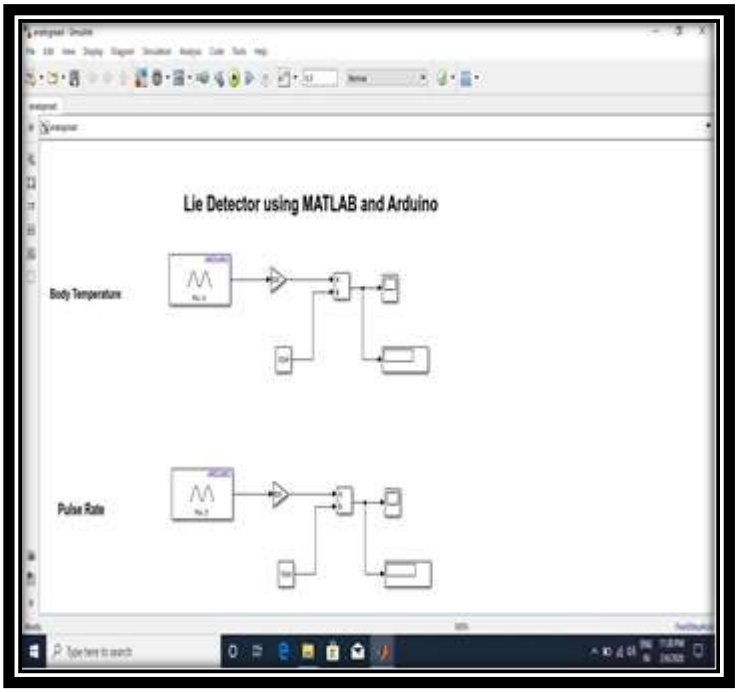

Figure 3: Implantation of Software

The hardware result is displayed at the liquid crystal display in terms of BPM and body temperature. The buzzer makes a buzzing noise when the output voltage crosses the threshold value.

4. RESULT

The hardware result is displayed at the liquid crystal display in terms of BPM and body temperature. The buzzer makes a buzzing noise when the output voltage crosses the threshold value.

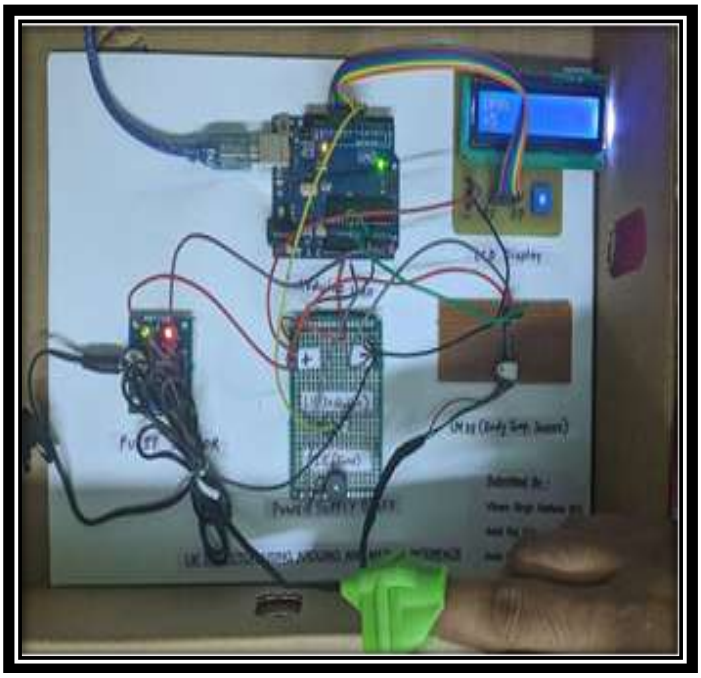

Figure 4: Hardware Result

The software result is displayed at the CRO by clicking twice at the CRO.

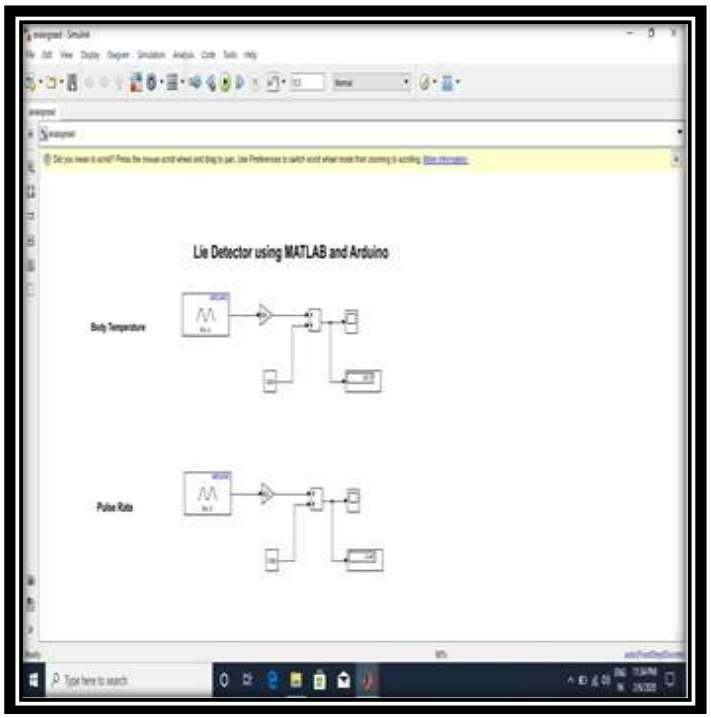

Figure 5: software Result A

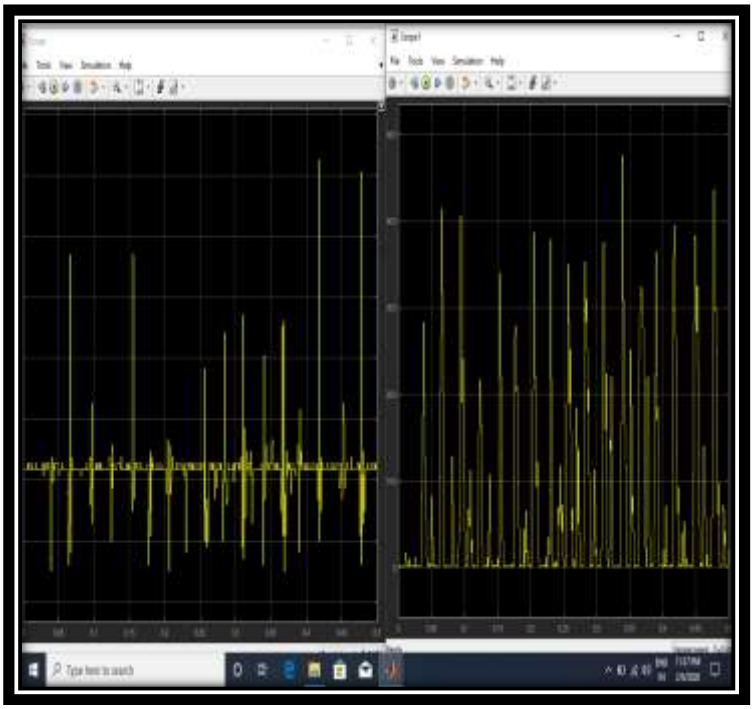

Figure 6: software Result B

Table -1 Experiment Result LM35

Subjects	Hardware Output	Software Output
SUB 1	98.6	98.2
SUB 2	99.5	99.1
SUB 3	97.2	97
SUB 4	100.4	100.1

Table 1 show the peak value of body temperature sensed by LM35 temperature sensor, our methodology gives both hardware output and software output of LM35 temperature sensor.

Table -2 Experiment Result BPM

Subjects	Hardware Output	Software Output
SUB 1	76	72
SUB 2	98	95
SUB 3	123	120
SUB 4	144	142

Table 2 show the peak value of body temperature sensed by LM35 temperature sensor, our methodology gives both hardware output and software output of LM35 temperature sensor.

5. CONCLUSION

Hence, we conclude that our MATLAB based health monitoring system is an effortful approach toward human health welfare, we accept that our project is not that efficient but by some further more modifications we can make it even better. We would like to thank **Ms . Ankita Garima** for her help in gathering data and providing us with subjects for testing.

6. ACKNOWLEDGEMENT

We would like to thank **Miss Ankita Garima** for helping us in testing the device and for providing us with the test subjects.

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