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Fetal ECG Monitoring System Based on the Android Smartphone

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Abstract: ***Fetal movement (FM) monitoring is considered an important part of fetal well-being assessment due to its association with several fetal health conditions. Present methods of frequency modulation quantification, e.g., ultrasonography, MRI, and cardiotocography are limited to their use in the clinical setting. In this proposed system, he evaluates the performance of a low-cost, wearable FM monitor based on an acoustic sensor that pregnant women can use at home. A thresholding-based signal processing algorithm is developed for data analysis, which combines the outputs from all sensors and automatically detects FM. Finally, the spike morphology of the acoustic signals corresponding to the actual detected motions is found in the time-frequency domain through spectrogram analysis, which is expected to be useful for developing a more advanced signal processing algorithm to further improve the detection accuracy.***
Keywords: Acoustic sensor, spectrogram analysis, accuracy of detection, FM methods, fetal condtions.

I. INTRODUCTION

Checking the heart rate of an unborn baby. Doctors usually perform fetal monitoring during labor, but may also need it during late pregnancy. The heartbeat of baby can help the doctors to compute the progress of the fetal and mother. Deviation in the baby's heart rate can be a sign of a potential problem of baby. The mean heartbeat rate of an fetal ranges from 110 to 160 beats per minute. This rate can normally vary from 5 to 25 beats per minute. Changes outside of this range may mean your baby has a problem, such as a lack of oxygen.

Fetal is monitored during labour especially in high-risk pregnancies. It can help your doctor decide if there is a treatable problem or if a C-section is necessary for safety reasons. Heartrate and rhythm of the fetal is monitored by the fetal heart monitors. Doctors may recommend fetal heart rate monitoring during late pregnancy or labor to monitor fetal health.

II. OBJECTIVES

The goal of the Fetal Monitoring System is to empower mothers in remote locations with an opportunity to regularly screen fetal well-being and calculate fetal risk. This will help decrease maternal and fetal complications and deaths.

III. EXISTING SYSTEM

This represents a new method to monitor heart rate of fetal using maternal parameters such as movement and heart rate. It is a complex and inexpensive doppler device for monitoring a healthy fetal The Doppler system must be placed on the mother's abdominal wall to monitor and obtain a graphic representation.

Depending on the analog signals, it calculates the value and then transforms into the result. If the fetal heart rate increases beyond the average value (increases or decreases) or when pregnant women move on the accelerometer1, they sense as the fetal movement they sent the picture on the accelerometer 2, no movement is detected by the accelerometer 2 sensors, a yellow signal is displayed, which immediately indicates momentum with IoT and UART based PC.

The sensed data is gathered, processed by the arduino microcontroller and the data are stored in the cloud. The system is a fetal heart rate monitoring system that is operated using a software application that can be installed on a mobile

IV. PROPOSED SYSTEM

The proposed system introduces a new approach to monitor fetal heart rate with maternal parameters such as movement and heart rate. It is a comprehensive and inexpensive device for monitoring a healthy fetal. This system must be placed on the mother's abdominal wall to monitor and obtain a graphic representation.

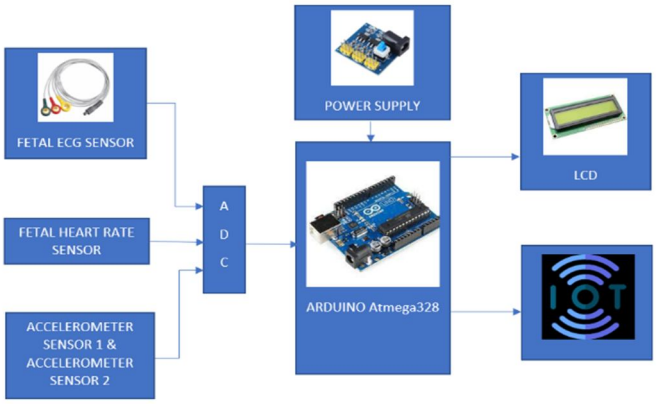


Fig 1. Block diagram of Fetal Monitoring System

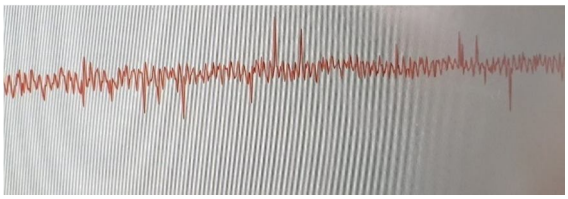


Fig 2. ECG Waveform

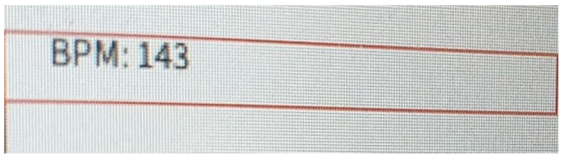


Fig 3. Heart Rate Monitoring

Depending on the analog signals, it calculates the value and then transforms into the result.

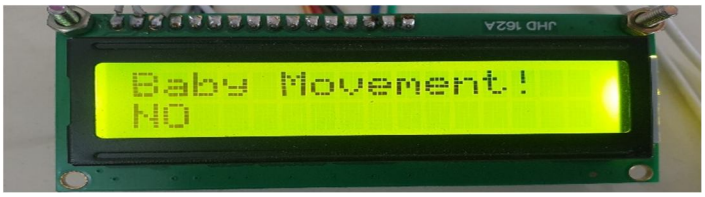


Fig 4. Movement Detection

If the fetal heart rate increases beyond the average value (increases or decreases) or when pregnant women move on the accelerometer1, they sense as the fetal movement they sent the picture on the accelerometer 2, no movement is detected by the accelerometer 2 sensors, a yellow signal is displayed, which immediately indicates momentum with IoT and UART based PC.

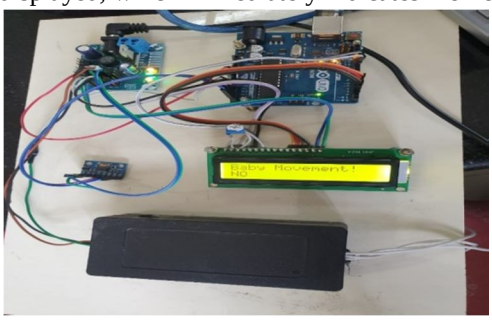


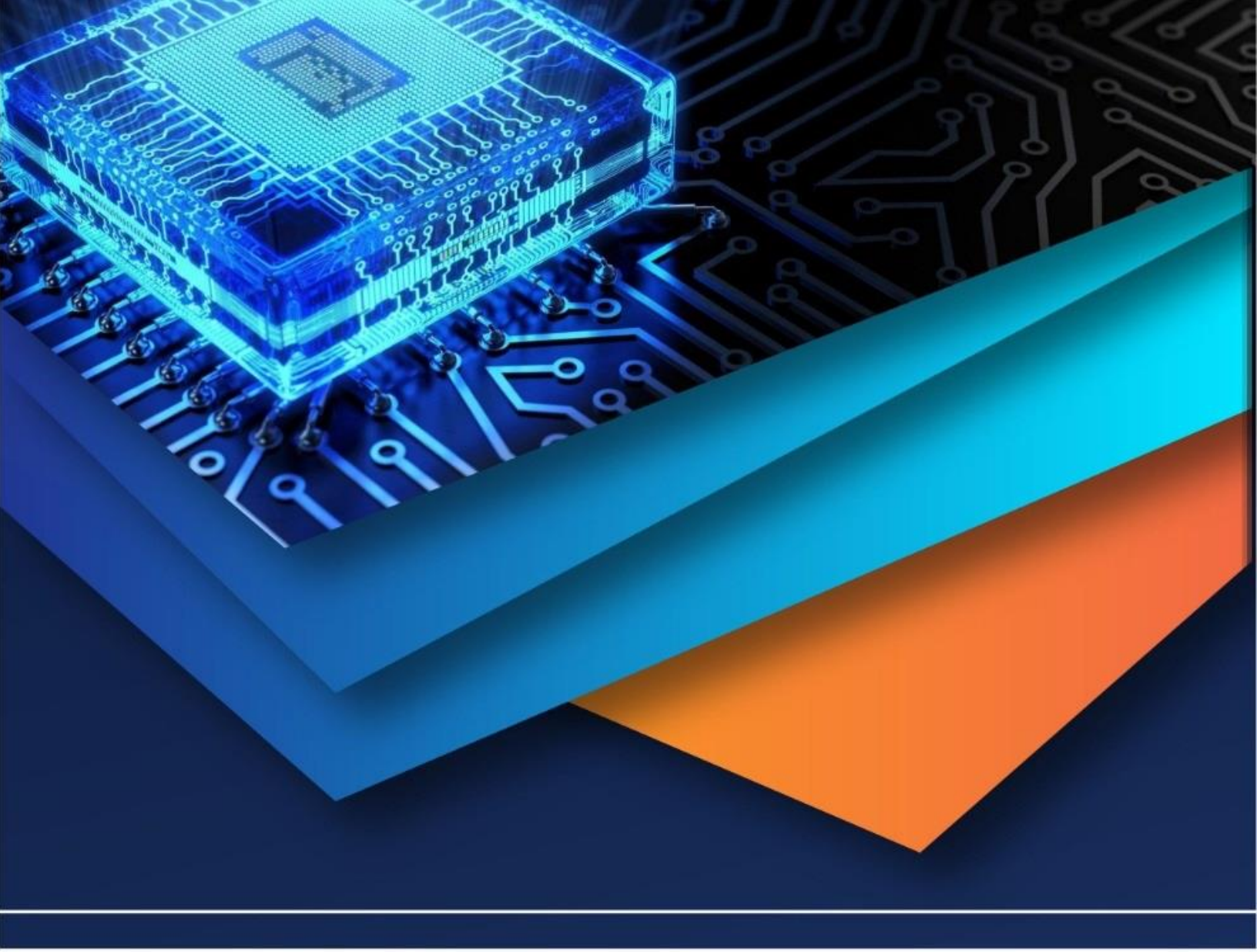
Fig 5. Fetal Monitoring System

V. CONCLUSION AND FUTURE SCOPE OF STUDY

Future work will focus on monitoring changes in the normal fetal heart rate and controlling fetal movement accordingly. Although captured by very different methods, FHR outputs were obtained wirelessly by this system through passive methods that were very similar to those obtained by the current standard of care. The limits of agreement for FHR measured by this system were within a clinically acceptable ± 8 bpm cardiotocographic FHR. This device uses passive technology that enables safe, non-invasive and convenient monitoring of patients in the clinic and remotely. Further work should explore how remote prenatal monitoring might best address some of the recent issues that have emerged in prenatal care and fetal outcomes.

REFERENCES

[1] Kahankova, R. et al. A review of signal processing techniques for non-invasive fetal electrocardiography. IEEE Rev. Biomed. Eng. **13**, 51–73 (2019).
[2] Castillo, E. et al. A clustering-based method for single-channel fetal heart rate monitoring. PLoS ONE **13**(6), e0199308 (2018).
[3] Jaros, R., Martinek, R., Kahankova, R. & Koziorek, J. Novel hybrid extraction systems for fetal heart rate variability monitoring based on non-invasive fetal electrocardiogram. IEEE Access. **7**, 131758–131784 (2019).
[4] Matonia, A. et al. Fetal electrocardiograms, direct and abdominal with reference heart beats annotations. Figshare https://doi.org/10.6084/m9.figshare.c.4740794 (2020).
[5] D. A. S. Pitts, M. C. Treadwell, and L. M. O'Brien, "Fetal heart rate decelerations in women with sleep-disordered breathing," Reproductive Sciences, vol. 28, no. 9, pp. 2602–2609, 2021
[6] Duygu Ã‡elik Erturul, Hakan Kanmaz, Mehmet Uur YÃ¼ksel, Atilla ElÃ§i, Mehmet Erturul Fetal Heart Rate Monitoring System (FHRMS) 2016 IEEE 40th Annual Computer Software and Applications Conference
[7] Pawel narczyk, Krzysztof Siwiec, Witold A. Pleskacz Precision human body temperature measurement based on thermistor sensor 02 June 2016, IEEE
[8] Z. Zhang, T.-P. Jung, S. Makeig, and B. Rao, Compressed sensing for energy-efficient wireless telemonitoring of noninvasive fetal ECG via block sparse bayesian learning, IEEE Trans. Biomedical Engineering, vol. 60, no. 2, pp. 300309, 2013.
[9] T. Gruber, Ontology, Encyclopedia of Database Systems (Springer- Verlag). Liu, Ling; Ozsu, M. Tamer, eds. ISBN 978-0-387-49616-0.http://tomgruber.org/writing/ontology-definition- 2007.htm.2008.Lastvisited: February 2016.
[10] Enas W. Abdulhay, Rami J. et.al,Review Article: Non-Invasive Fetal Heart Rate Monitoring Techniques, Biomedical Science and Engineering, 2014, pp- 53-67.
[11] S. Song, M. Rooijakkers, P. Harpe, C. Rabotti, M. Mischi, A. H. M. van Roermund, and E. Cantatore, A low-voltage chopper-stabilized amplifier for fetal ECG monitoring with a 1.41 power efficiency factor, IEEE Trans. Biomedical Circuits and Systems, vol. 9, no. 2, pp. 237247, April 2015.
[12] Andrea Fanelli, Manuela Ferrario, Luca Piccini, Giuseppe Andreoni, Giulia Matrone, Giovanni Magenes, Maria G. Signorini, Prototype of a wearable system for remote fetal monitoring during pregnancy 32nd Annual International Conference of the IEEE August 31 –September 4, 2010



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