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POCKET HELD FETAL MONITORING SYSTEM

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ABSTRACT :

Inadequacies in traditional prenatal care underscore the critical need for continuous monitoring to detect complications early. Despite advancements, existing methods often miss crucial signs, risking maternal and fetal health. To address this gap, we introduce the Pocket-Held Fetal Monitoring system, a groundbreaking solution poised to revolutionize prenatal care.Our project integrates advanced sensors, including Max30100 for fetal heart rate and SPO2 for oxygen saturation, strategically placed on the mother's abdomen for real-time, non-invasive monitoring throughout pregnancy. Additionally, our system incorporates sensors for detecting amniotic fluid leakage and predicting delivery onset. Leveraging state-of-the-art machine learning algorithms, it enables early prediction of labor and facilitates timely identification of complications.With an intuitive IoT interface, healthcare providers gain access to real-time data, empowering proactive interventions and personalized care plans..

Keywords - AI Integration, non-invasive monitoring Techniques, Early Intervention, Contraction Detection, Deep Learning,

INTRODUCTION

Prenatal care is a cornerstone of maternal and fetal health, aimed at ensuring the well-being of both mother and baby throughout pregnancy. However, despite advancements in medical technology, traditional prenatal care methods often struggle to provide comprehensive and timely monitoring, leaving gaps in the detection of potential complications. These inadequacies underscore the critical need for continuous monitoring solutions that can identify issues early and enable proactive interventions. response to this pressing need, we present the Pocket-Held Fetal Monitoring system, a portable and innovative solution designed to revolutionize prenatal care. This system integrates advanced sensors, including the Max30100 for fetal heart rate and SPO2 for oxygen saturation, strategically positioned on the mother's abdomen for real-time, non-invasive monitoring throughout pregnancy. By leveraging cutting-edge technology, such as machine learning algorithms, the Pocket-Held Fetal Monitoring system not only detects vital signs but also predicts labor onset and identifies potential complications before they escalate .This introduction sets the stage for understanding the significance of the Pocket-Held Fetal Monitoring system in addressing the shortcomings of traditional prenatal care and highlights its potential to improve maternal and fetal health outcomes through continuous monitoring and early intervention.

OBJECTIVE

Develop a portable monitoring system integrating advanced sensors, including Max30100 for fetal heart rate and SPO2 for oxygen saturation, for real-time, non-invasive monitoring throughout pregnancy. Incorporate sensors for detecting amniotic fluid leakage and predicting delivery onset, utilizing machine learning algorithms to enable early prediction of labor and timely identification of complications

Design an intuitive IoT interface for healthcare providers to access real-time data, empowering them to make proactive interventions and develop personalized care plans based on the continuous monitoring provided by the Pocket-Held Fetal Monitoring system.

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LITERATURE SURVEY

1. Yuliya A. Zhivolupova et al “Remote Monitoring System for Preeclampsia Detection and Control” – IEEE, 2019
2. They have approached standard diagnostic basis; specific data analysis in accordance with its type; an integrated approach to the mother state estimation and the possibility of an emergency communication with a physician. Such a system will find wide application in clinical obstetric practice

Malcolm Clarke et al proposed "Interoperable End-to-End Remote Patient Monitoring Platform based on IEEE 11073 PHD and ZigBee Health Care Profile" - IEEE Transactions on Biomedical Engineering – 2018

- This existing paper described the implementation of an end to-end remote monitoring platform based on the IEEE 11073 standards for Personal Health Devices (PHD).
- It provides an overview of the concepts and approaches and describes how the standard has been optimized for small devices with limited resources of processor, memory and power and that use short range wireless technology.
- It explains aspects of IEEE 11073, including the Domain Information Model, state model and nomenclature, and how these support its plug-and-play architecture

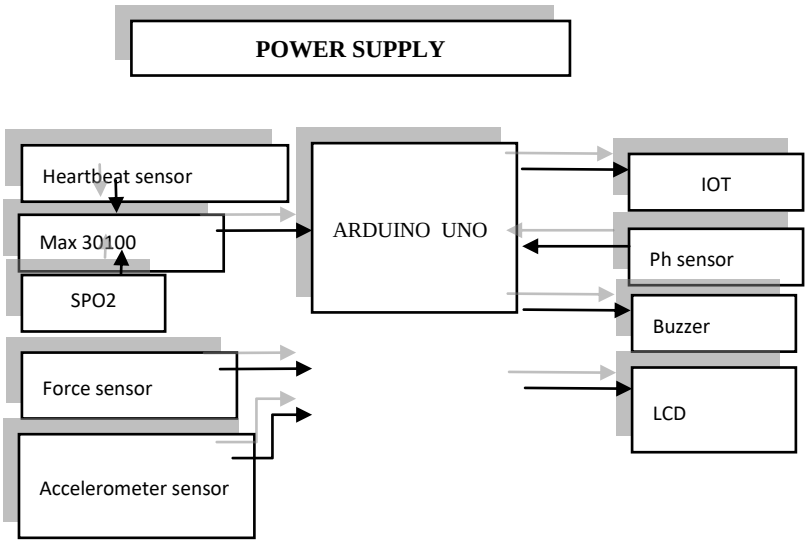
3. Haibin Zhang et al proposed "Connecting Intelligent Things in Smart Hospitals using NB-IoT" IEEE Internet of Things Journal - 2018
They have implemented use of Internet of Things (IoT), especially smart wearables will play an important role in improving the quality of medical care, bringing convenience for patients and improving the management level of hospitals. However, due to the limitation of communication protocols, there exists non unified architecture that can connect all intelligent things in smart hospitals, which is made possible by the emergence of the Narrowband IoT (NB-IoT). In light of this, we propose an architecture to connect intelligent things in smart hospitals based on NB-IoT, and introduce edge computing to deal with the requirement of latency in medical process. As a case study, we develop an infusion monitoring system to monitor the real time drop rate and the volume of remaining drug during the intravenous infusion. Finally, we discuss the challenges and future directions for building a smart hospital by connecting intelligent things.

EXISTING SYSTEM:

The present study is focusing on proposing an IoT based health assessment framework to capture the blood pressure and other health related parameters of pregnant women continuously.
The captured data is then processed and analyzed by fog nodes. These fog nodes then provide real-time suggestions to the patient for improving health conditions.
Fog nodes also send the processed data to cloud servers for further analysis by healthcare providers.

PROPOSED SYSTEM:

The proposed Pocket-Held Fetal Monitoring system is a portable and innovative solution designed to revolutionize prenatal care by offering continuous monitoring and early detection of potential complications. Integrating advanced sensors such as the Max30100 for fetal heart rate and SPO2 for oxygen saturation, placed on the mother's abdomen, this system provides real-time, non-invasive monitoring throughout pregnancy. Additionally, it incorporates sensors for detecting amniotic fluid leakage and predicting delivery onset, utilizing machine learning algorithms for early prediction of labor and timely identification of complications. With an intuitive IoT interface accessible to healthcare providers, the system facilitates proactive interventions and personalized care plans based on continuous monitoring data. Its portability ensures accessibility for pregnant individuals in various environments, ultimately aiming to improve maternal and fetal health outcomes through continuous monitoring and early intervention.



RESULT AND DISCUSSION

The implementation of the Pocket-Held Fetal Monitoring system demonstrated significant advancements in prenatal care, offering early detection of complications, predictive capabilities, and real-time monitoring to improve maternal and fetal health outcomes. Through continuous monitoring, the system enabled healthcare providers to detect abnormalities in fetal heart rate, oxygen saturation, and amniotic fluid levels, facilitating timely interventions and reducing the risk of adverse outcomes. The predictive algorithms integrated into the system allowed for the anticipation of labor onset

and identification of potential complications, empowering healthcare providers to develop personalized care plans tailored to individual patient needs. Real-time access to data via an intuitive IoT interface empowered healthcare providers to make informed decisions and proactive interventions, ultimately enhancing prenatal care and optimizing maternal and fetal health outcomes. These findings underscore the potential of the Pocket-Held Fetal Monitoring system to revolutionize prenatal care practices and improve healthcare delivery for pregnant individuals.

CONCLUSION

In conclusion, the introduction of the Pocket-Held Fetal Monitoring system marks a significant advancement in the field of prenatal care, addressing the inadequacies of traditional monitoring methods and offering promising solutions to improve maternal and fetal health outcomes. Through its integration of advanced sensors, predictive algorithms, and real-time monitoring capabilities, the system has demonstrated its ability to enable early detection of complications, facilitate timely interventions, and empower healthcare providers with personalized care plans. The results of this study underscore the potential of the Pocket-Held Fetal Monitoring system to revolutionize prenatal care practices.

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