Fetal Monitoring with Body Sensor Networks

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Current Fetal Monitoring Procedure and Cardiotocography Apparatus

- **Uterine activity**
  - Internal
  - Used once water is broken
  - Monitoring through direct contact with fetus
  - Higher precision and consistency

- **Fetal heart rate**
  - External
  - Used intermittently through pregnancy
  - Ultrasound Doppler device, pressure gauge
  - Sensor devices wired to monitor
Common Fetal Monitor Features

- Access right types for: physician, nurse, support staff, patient
- Annotations and time-stamping
- Data as medical record security
- Emotional engagement of patient
- Notification
- Situational awareness for patient
- Real-time charts and plotting of data
- Data retention
- Append only logging
- Monitoring interruption detection
- Slow sampling rate, long monitoring 3 second interval, monitoring time 1-2 hours
• Integration Platform - PIC24 MCU + Android ADK
  Digital Input/Output, PWM, Analog
  Input, I2C, SPI, and UART - Interface with existing medical equipment
Access control. The system needs regulate access to the data by authorized personnel or programs.

Audit control. The system needs to implement a mechanism to record and examine the activities of the system.

Integrity. The system need to incorporate mechanisms to both protect the stored data

Person/Entity authentication. This requires the system to verify that the identity of the entity accessing the data is correct.
Use Case Scenario

Patient uses smartcard to log in to monitoring application

Application uses patient’s information to instruct her to affix sensor belt

Application verifies sensor data to validate the patient is using sensors properly

Are sensors correctly in place?

no

Anomalies Detected?

no

risk

The monitoring process is started, patient is presented with a countdown clock and real time charts

An alert is shown to the patient advising on appropriate course of actions

A summary of the session is displayed, the data is packaged and sent to care provider

Alert is dispatched to care provider

Patient logs out
Thank you

Questions

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