

Keeping Labor Safe LLC

The Fetal Reserve Index- Antenatal Bluetooth/Wifi- Fall 2024 Field Session

Mark I Evans MD OB/GYN

Gregory F. Ryan MBA

The Need:

Childbirth should be a time of great joy, but it can also be perilous. Electronic fetal monitoring (EFM) has been used for >50 years to predict and prevent compromised babies who can have neurodevelopmental delays including cerebral palsy. Unfortunately, EFM has performed poorly – missing as much as 50% of problematic cases. As a result, medical liability costs around labor have reached \$40 Billion per year in the USA. Outcomes have been worse in minority populations. We have developed a very disruptive technology called the Fetal Reserve Index (FRI) to provide improved and earlier assessment of clinical risk to prevent damage rather than react to it. We need to move the FRI into a deployable platform for clinical introduction, refinement, and world-wide implementation. We need help to create the app for clinical implementation.

Company Background:

Keeping Labor Safe, LLC (KLS), is a start-up medical technology company, developing technology and software that will make labor and delivery (L&D) and immediate postpartum care (L&D/PC) safer for mother and newborn infant. Our team is primarily comprised of medical professionals who have spent our careers working in maternity hospitals in Detroit, Chicago, Augusta, Dayton, Ohio, Philadelphia and New York City where we have seen firsthand the need to make childbirth safer for all parties involved. We have developed the Fetal Reserve Index (FRI) to identify distressed fetuses earlier in the course of developing compromise and to allow for earlier intervention to help produce better medical outcomes for mother, fetus, and baby. We have multiple papers and patents and have developed the computer algorithm to “read” the tracing and produce a quantitative score.

The Project: Wireless Bluetooth Integration

With this project we are looking to build upon what the Fall 2023 group accomplished, in the transfer of potential EFM Data via a wireless/Bluetooth combination into the KLS FRI Web Application. As part of our goal to make the Fetal Reserve Index an end to end solution for mother’s to be, Doctor’s and hospitals we are developing an antenatal belt that will be intended to measure 4 times per second the Maternal Heart Rate, Fetal Heart Rate and Uterine Activity via a wearable belt, and then have the data transmitted via Bluetooth or Wifi to an accompanying wireless phone or internet connected laptop computer. When completed this data will be incorporated into our FRI system and be available to be read by the patient’s OB/GYN, or another licensed specialist. We would like this to Interface with our custom-built FRI Algorithm Web Application (ideally this task will be completed with another project during the Summer 2024 semester) that will be residing on a Windows laptop, Android or iOS Tablet. A successful result will be to get the integration on one of the 3 previously mentioned operating systems, preferably Windows. When completed this will help reduce the time, cost and effort required by the pregnant mother when needing a non-stress test. By allowing the OB/GYN to review the records remotely, this will help increase hospitals and doctor’s abilities to handle an increase in patient flow

- **Application Requirements:**

- Currently using Python PyBluez to transmit Bluetooth Signals
- Uses a Raspberry Pi 4 Model B, running Raspbian OS and an Analog to digital converter.
- Using a flex sensor to simulate Uterine Activity and a pulse sensor to record heart rates.
- This will be provided to you.

- Have the FRI Web Application directly score the data as it is delivered via the Bluetooth connection.
- And Dynamically update FRI Score as data is received.
- HIPAA compliant

Technologies and Desired Skills:

- Raspberry Pi

- Bluetooth Input/Output v2.1 + EDR, Class 1.5
- Bluetooth Protocol Modified Series 50
- Python (PyBluez, Python Flask, Micro framework)
- WebSocket
- REST API
- JavaScript, TypeScript
- HTML/CSS
- Others as appropriate
- C++
- Cloud Architecture

Preferred Team Size: 4-5 Students

Preferred Work Location: Remote

- Meeting regularly via Zoom

Intellectual Property: All intellectual property developed as part of this project will be owned by Keeping Labor Safe, LLC.

NDA: Signed NDA will be required.