9/8

Hey all,

Just wanted to update everyone on what our group has been working on this past week.

Currently, we are in the middle of contacting individuals in the St. Louis community who might serve as a good client for this year. We are trying to find a client who can help us find a project that can help incorporate our strengths in electrical engineering and computer science. Additionally, we have finished drafting a stock email to send out to potential clients. We have about 15-20 people we are going to be emailing tomorrow and throughout the weekend and plan on adding additional potential clients to that list over the next several days.

If you guys have any suggestions or ideas on additional clients to reach out to or other means of communicating with clients, it would be much appreciated.

Let us know if there is anything else that you need from us.

Best,

Matt, Grace, and Varun

9/16

Hello,

Here is our weekly update on what our group has been working on this past week.

Currently, we are still having troubles finding a client for our project, so we have emailed Dr. Silva for help and set up a meeting for Monday. We have also emailed Dr. Naegle to ask her about a possible project and explained our group's interests so that she could have a better idea of what we want to achieve through senior design. We are starting to get used to SciNote, but there are still some issues and we could not transfer some of the ideas we put in the SciNote made outside the school's VPN.

As of now we do not have any questions, but we will reach out for advice once our client and project has been chosen.

Best,
Matt, Grace, and Varun

9/23

Hey all

This past week we heard back from Professor Naegle who said that due to our computer science and electrical engineering background would be happy for us to work on her project. Professor Naegle is travelling for the week and has limited email access so we haven't received complete details about her project yet but believe it will involve creating an ultrasound device to monitor fetal heart beats. We have arranged a meeting with her on Oct 3, which was her only free time due to her travelling, but have also asked her to provide more details about her project so we can better prepare for the preliminary presentation and report. Nothing new was added to scinote, but after we are given more information about the project, we will split up work within the group and add the relevant information to scinote.

Regards

Matt, Grace and Varun

9/30

Hey all,

Time for the weekly update on what our group has been working on! The biggest update is we have better nailed down our project topic. Professor Naegle has set up a time to meet with us next Tuesday at 9 AM to discuss the plans for the project. In her email, she gave a quick description of the project topic we will be working on, which can be seen below:

Background

Fetal monitoring is a vital and common practice that is used in homes and hospitals worldwide. Every expectant mother who receives treatment in a hospital is exposed to fetal heart monitors. When Dr. Kristen Naegle was pregnant with twins, she became aware of many flaws in current fetal heart monitoring technology. The signal strength was fleeting at best; nurses were constantly coming to reposition the ultrasound probes in a seemingly fruitless attempt to retain accurate heart rate measurements of both of the twins. The straps holding the ultrasound were uncomfortable, and hours of sleep were lost due to the discomforts associated with the heart rate monitor. Dr. Naegle believes that there must be a more efficient way to measure fetal heart rate that is also less of a nuisance to the patient.

The constant need for probe repositioning in Doppler heart rate monitors is a problem well known to nurses and patients in maternity wards. A mother at Barnes Jewish Hospital in St. Louis, MO estimated that during some periods, nurses needed to reposition the ultrasound probes strapped to her abdomen every 20 minutes. Dr. Ebony Carter, an OB/GYN specialist at Barnes Hospital agrees that problems with fetal heart rate monitors can often be a source of frustration, and there is lots of room for the technology to improve. Dr. Naegle decided to enlist a group of seniors in the biomedical engineering department at Washington University to design a Multipoint Fetal Heart Rate Monitor that meets the needs and concerns of patients and medical professionals.

Exact Need

The Multipoint Fetal Heart Rate Monitoring system must accurately sense and differentiate heartbeats in twin fetuses, and display the heart rates of each fetus on a screen easily accessed by doctors and nurses. The system must maximize the comfort of the patient; the number of repositioning events must be kept as low as possible, and sensors must be fixed to the mother’s abdomen in a comfortable manner. In the event of abnormal fetal heart rate behavior, the system must notify healthcare professionals about a possible problem with the pregnancy.

We will begin preliminary research on fetal heart rate devices this weekend and couple that with the information gathered at our meeting with Professor Naegle to be able to meet the deadline of the first paper at the end of next week. We are confident that we will be able to do a thorough enough job and create a successful paper.  As a result, we still do not have anything new on SciNote. After this weekend, we expect to have a lot of information and ideas for the design all detailed on SciNote.

Let us know if you have any questions!

Best,

Matt, Grace and Varun

10/7

Hey all,

This week we met with Professor Naegle and addressed the need and specifications of the fetal heart rate monitor. Once we met with Professor Naegle, we began to write our Preliminary report and do a background research on fetal monitors. We also plan to shadow Dr. Ebony Carter (OB-GYN) on Oct 25th to learn how the fetal monitor is used and be aware of what dangers pregnant mothers may be in. We have also created a Weebly website (<http://fhrmonitor.weebly.com/>) to document our design progress.

Let us know if you have any questions!

Best,

Matt, Grace and Varun

10/14

Hey all

After getting feedback from our preliminary presentation, we felt that we needed to solidify our design specifications before moving forwards. We determined our 5 most important design specifications and updated the design metrics table to show the same. We feel that these specifications are concrete and we can get our deliverables to meet these specs. You may notice that some of these specifications seem to set the bar pretty low, but this was done so we could meet the specifications on the timeline given even though we anticipate going above and beyond these requirements. Let us know if you have any questions.

|  |  |
| --- | --- |
| **Client Requirements** | **Design Specification** |
| Ability to detect maternal and fetal heart rate | Detect and differentiate maternal and fetal signals |
| Ability to Detect Multiple fetal heart rate | Detect and differentiate multiple FHR |
| Remove constant provider monitoring | Short initial calibration period (< 20 minutes performed by medical professionals) and automated monitoring system |
| Sophisticated Alarm System | Must output FHR on GUI and have alert status when FHR is abnormal (<100 bpm is the industry guideline although there is high variability) |
| High Accuracy | FHR accuracy >95% (cannot deviate by more than 10 bpm) |

Best

Matt, Grace, Varun

10/21

Hey all,

This week our group's biggest accomplishment was the development of our website. The link for our website can be found [here](http://fhrmonitor.weebly.com/). We will be updating our website throughout the course to make sure that it is up to date and follows our project as it develops. Additionally, we are meeting next week on Tuesday night with Dr. Ebony Carter to see how fetal heart rate monitoring is done in its current form. We're excited to take this experience and use it to better develop a new method of fetal heart rate monitoring.

That's all for now!

Best,

Matt, Grace and Varun

10/28

Hey all,

On Tuesday (the 25th) our group shadowed Dr. Ebony Carter from the Labor and Delivery at the BJC. Notes from shadowing are posted in our SciNote.

Our group switched our meeting time to Fridays; we will be reviewing our report and setting up a time to meet with Dr. Yin to discuss improvements we can make in our project.

We hope to gain more insight from the meeting and a head start on the Progress Report, which is due in about 4 weeks.

Best,

Matt, Grace and Varun

11/4

Hey all

This past week we met with Professor Yin and Professor Naegle to get feedback on our preliminary report. We discussed improving our design metrics by making them more focused and specifics. Our initial thoughts on preliminary notes feedback and notes from our meeting were added to scinote. The notes are attached below. Furthermore, we plan on contacting Dr. Carter to ask questions about narrowing down our design metrics and also plan to research new potential solutions so we are not limited when selecting one for our prototype.

Matt, Grace and Varun

11/11

Hey all,

Our group continued exploring new concept solutions this week that would be feasible for the final fetal heart rate monitoring device. When focusing specifically on solutions involving ECG, our group met with Yoram Rudy, the director of the CBAC at Wash U, who helped us understand the feasibility of developing an ECG array system to capture fetal heart rate signals as well as the maternal heart rate signal.  While he believed this to be possible in the concept we discussed, he suggested we talk to a former student of his, Yong Wang, who has been using ECG arrays to capture electrical activity in the uterus and see how well that could apply to fetal heart rate signals. We will be reaching out to Yong soon to set up a time to ask questions about our potential solutions.

Best,

Matt, Varun and Grace

11/18

Hey all,

Sorry for the late weekly report. This week, our group started working on the progress report. We will also meet on Saturday and Sunday to update our webpage and finalize the time to meet Yong Wang.

Best,

Matt, Grace, and Varun

12/2

Hey all,

The main thing from this week was that we completed our Progress Report. Over the weekend, we will be helping Varun finalize his Progress Report Presentation and making sure that we cover all of the important aspects during the presentation next week. We are excited to be about halfway done with the course and are looking forward to developing the prototype next semester.

Best,

Matt, Grace and Varun