C.S. FIELD SESSION
Advanced Software Engineering

SomnoHealth Incorporated, a Golden-based consumer health startup, wants *your* help with an interesting "big data" project!

Start here:

www.GetEverSleep.com
https://www.youtube.com/watch?v=rMwPv2g1YFs

EverSleep brings advanced sleep technologies and customized coaching directly to the consumer - to monitor and improve sleep.

Sleep measurement happens in our new sleep wearable, and that data is BTLE transmitted to our mobile phone app. Inside the app we perform complicated analyses and deliver customized sleep improvement coaching directly to the user.

We need you to build & code a new algorithm for audio breath rate analysis

Breath Rate Analysis During Sleep

We have a good app, but our new, SECRET second generation device (SHHHHHH!!!) is going include a new feature... analysis of breath rate, airflow volume, and snoring sounds.

We need you to take recorded breath sounds in .WAV file format produce a real-time "flow rate envelope" and "snore flag" that outputs to a report.

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USE CASE:

Our current device does not record airflow or snoring, and both of these are required for a true medical sleep apnea diagnosis.

We have recordings of airflow, and some snoring. We'll make more as the project progresses.

We'd like you to read in the .wav file, and produce a 25 Hz, 1 byte "envelope" of the realtime airflow. There are some tricky requirements, like determining inhalation vs exhalation. We also need to set a flag when the sound amplitude gets above a preset threshold.

The output will be a somewhat sinusoidal waveform, plotting the real-time airflow as the user sleeps.

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Tasks:

• Read in .Wav files.
• Work on max / min determination, convert to streaming 1 byte data.
• Work on a simple graphical output of the waveform.
• Do some advanced analysis, like determining inhalation vs exhalation.
• Stretch Goal - Hopefully we can get hardware, so you can make LIVE demos!

Schedule:

Sprint 1: Intro, definitions, access to tools, pick a Project Manager
Sprint 2: Specific requirements, begin work
Sprint 3: Implementation, Check-in
Sprint 4: Implementation, Check-in, Course Correct
Sprint 5: Implementation, Check-in, Final Update
Sprint 6: Final Tweaks, Presentation

Technologies:

- .Wav files
- Real-time ingestion of sounds data
- Real-time output of acoustic amplitude "envelope" data.
- Real-time output of breath rate.
- GitLab Repository
- Lots of interesting physiologic work!
- ***This work will probably be in Java (not Java Script) or perhaps C#***

Specifics:

- ***One or two meetings on site in North Golden, all others by Zoom***
- We have a simple "work for hire" agreement to give us ownership to your code. (See CPW)
- No required "work hours". We will have a single 1-hour meeting every week.
- Guidance from senior engineers
- Potential Internship after the project is over
- No Dress Code! T-shirt and Flip-Flops are OK
- Team Size 3-6
- *p.s. We're the Fun Team!*

Contact:

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NOTE - WE CAN ONLY HAVE US CITIZENS ON THE TEAM DUE TO SOME OTHER WORK THAT HAPPENS IN THE BUILDING

What's Different About EverSleep?

EverSleep uses advanced **sleep-lab technology** to provide the data and coaching you need at home.

- Snore Analysis
- Respiratory Function
- Heart Rate
- Blood Oxygen
- Movement

- Finger Sensor
- Processor
- Micro USB Charging
- Wrist Strap
- Cable Sensors