1. Potential crosstalk misunderstanding with chewing or talking?

We will address this with our signal processing. Potentially take this off while eating. Poojitha notes that we may want to set just night or just day

1. Behind the ear seems like the best place, most people would like their device to as as discreet as possible would hide

Yes reasonable but the EMG is most desired on the jaw muscles so that may be in front of the jaw. We should have a small device or fashionable design so that people are not embarrassed to wear it. No wires in final product

1. Did you check the long term effect of vibrations so close to the brain

See a. This is very low and to the muscles

1. ML: A big enough sample window will probably uniquely identify bruxism. Use: Do people want to advertise that they have bruxism to the public?

This may be where we use RNN or CNN in order to process time series data.

1. Machine learning requires a lot of training and testing data set. Before thinking about the algorithm is there a large data set that can be explored to test/train on?

We don’t need as much as most people because this is likely SML and therefore we are able to ask many close people to simulate the data. Again this is more for proof of concept so we do not need the most representative dataset to show detection ability.

1. I think ML would be important for detecting it, but you have to train on diverse dataset (different person to person)

See #5

1. The largest challenge is using ML is always adequate and representative training data. Where does this come from?

See #5

1. How much danger is this than other anti-bruxism devices? I.e. mouthguard, botox
   1. Detection itself won’t pose threat to the subject

We will design with no danger.

1. One concern I have would be the comfortability of wearing the device when sleeping? Is there a possibility to place it on forehead?

Thank you for the concern! We will take into account designing for comfort while sleeping

1. Consider that the vibration motor levels might be different from user to user? How will you balance that?

This will be controlled by the user themself. They will be able to change their vibration settings and maybe even have day/night settings.

1. Helpful idea! Simple application and easy to use it looks like

Thank you!

1. How is this different / (what is the potential efficacy) / than wearing mouthguards that fit proper?

While mouth guards are an existing recommendation against this, they do not have as much active prevention and are just to lessen the impacts of grinding. Our product is easily worn during the day where some users do most of their teeth grinding adding to the breaking of a habit which the mouth guard does not.

1. Would this wake someone up/disturb their sleep? It might make someone less likely to use it

We would have gentle vibrations that

1. Are the vibrations used to directly relax the muscles or just to alert the user? Uses might want to control the vibration intensity

Both; our first priority is to relax the muscles because this is a nighttime device. We will do literature review to figure out that vibrations do prevent bruxism

1. How many people does this affect? What are current recommendations from dentists (medical providers)?

Dentists recommend stiff mouthguards that just protect the teeth but do not stop teeth grinding. There are also other remedies that are more permanent like botox. This is all because teeth grinding can lead to bad headaches and poor dental care. This affects a lot of people.

1. How will vibration help people during sleep? Should you narrow your focus just to daytime user?

Can help patients stop grinding, and improve their sleep, we first focus on the night time user.

1. For ML - you need large and diverse datasets to poll from. EMG from these muscles will be very hard to come by - you should look at open source data or plan to generate your own + labeling

See #5. We will create our own.

1. How will vibrations/alert work when person is asleep? Will the device stay on when rolling? Jaw clenching is a very real problem for me when sleeping?

Seems like we might be leaning towards this.

1. How comfortable is this to sleep with?

We decide to design as a earphones, and try to make it comfortable.

1. Would wearing retainers reduce most of the side effects of Bruxism? Would this be used during sleep?

I would say wearing retainers would be more uncomfortable. Plan to use at night only.

1. For sleep, could this application be used to give info for how often you grind teeth in sleep? For medical professionals

We will build an app to trace the grinding behavior.

1. How would you decoder identify differences between normal jaw activity (talking, eating) with Bxurism in finer detail?

The signal is totally different between these actions.

1. Would this make me save money? How is this better than dental guards or botox?

Damage is very expensive to repair.

1. Would the vibrations wake up the user? How feasible is it to sleep/ go about your day with this attached? Finding data for validation, testing and training for ML might be difficult. I think its a good idea and something I would potential use

See #5. Vibrations will be designed to not wake up the user

1. Is this only worn while awake? How will successful interventions be measured?

Sleeping is what we are leaning towards. Success will be measured by dentists and the patient’s own QOL

1. Are the vibrations to alert user or calm muscles down? Haptic or Tens?

Both, they will be haptic

1. Good idea! Would the interface have a time schedule? How would it differentiate between chewing or closing mouth between grinding teeth? Keep MCU’s close to area you are monitoring -> Have vibration intensity settings

We will have vibration settings. We will be able to determine this.

1. I know a few people (myself included) who grind their teeth at night; My email is [esperr@uw.edu](mailto:esperr@uw.edu)

Thank you! Add to interview list

1. Is there a dataset you could use for machine learning? It might be difficult to collect and train a model if you do it all yourself. Users should be able to control vibration level. Does vibration at night help prevent a bruxism episode? Or is this more just data collection overnight?

See #5.

\*paper about stimuli the muscle

**28 sticky notes**

**ChatGPT Filtering**

1. **Concerns about the device (4):**

- Did you check the long term effect of vibrations so close to the brain?

- One concern I have would be the comfortability of wearing the device when sleeping.

- How comfortable is this to sleep with?

- Would the vibrations wake up the user? How feasible is it to sleep/go about your day with this attached?

2. **Machine learning and data concerns (4):**

- ML: A big enough sample window will probably uniquely identify bruxism.

- Machine learning requires a lot of training and testing dataset.

- The largest challenge is using ML is always adequate and representative training data. Where does this come from?

- For ML - you need large and diverse datasets to pull from.

3. **Comparisons and efficacy (4):**

- How much danger is this than other anti-bruxism devices? I.e. mouthguard, botox.

- How is this different / (what is the potential efficacy) / than wearing mouthguards that fit proper?

- Would wearing retainers reduce most of the side effects of Bruxism? Would this be used during sleep?

- Is this only worn while awake? How will successful interventions be measured?

4. **Functionality and usage (4):**

- How will vibration help people during sleep? Should you narrow your focus just to daytime user?

- How will vibrations/alert work when person is asleep? Will the device stay on when rolling?

- Would this make me save money? How is this better than dental guards or botox?

- Would the interface have a time schedule? How would it differentiate between chewing or closing mouth between grinding teeth? Keep MCU’s close to the area you are monitoring -> Have vibration intensity settings.

5. **Miscellaneous questions and suggestions (6):**

- Behind the ear seems like the best place, most people would like their device to be as discreet as possible would hide.

- We only stimulus the muscle, won’t affect the brain.

- Helpful idea! Simple application and easy to use it looks like.

- How many people does this affect? What are current recommendations from dentists (medical providers)?

- How would you decoder identify differences between normal jaw activity (talking, eating) with Bruxism in finer detail?

- Is there a dataset you could use for machine learning? It might be difficult to collect and train a model if you do it all yourself. Users should be able to control vibration level. Does vibration at night help prevent a bruxism episode? Or is this more just data collection overnight?

6. **Contact information and data sharing (2):**

- I know a few people (myself included) who grind their teeth at night; My email is esperr@uw.edu.

- Finding data for validation, testing, and training for ML might be difficult. I think it's a good idea and something I would potentially use.

**Professor/Class Notes:**

1. We should be getting a reasonable representation from simulated Bruxism episodes. Asking friends or people we know. One important dataset would be needed to separate chewing, talking, sitting with teeth clenched. The simulated dataset will be reasonable as a separate idea. The dataset concerns were raised by \_\_\_ sticky notes.
2. Other comments we saw were about comfortability/sleep/vibration settings. Users should be able to adjust the vibration settings.
   1. One idea is to have changeable settings.
   2. Another idea would be to have day/night settings so vibration does not disturb sleep but still stops bruxism.
3. Work with existing things that one uses already
4. Look at the points people raised today in order to show the judges in the end of the class and predict what questions they may ask