Dear Editors and Reviewers,

Thank you for considering our paper for publication in EGUsphere. We are especially thankful for the depth of the reviewer's comments. We have done our best to address these comments in our reply as well as in the updated manuscript.

In this reply, you can find your comments in paragraphs starting with "[COMMENT]" as well as our reply paragraph starting with "[REPLY]" below. If the manuscript was modified to address the comment, there will be a direct indication of the location(s) of the modification.

We thank you once more for your comments and for considering our paper for publication in EGUsphere. We look forward to your response.

Sincerely,
Felix St-Amour on behalf of the BRACHIOSAURUS team

Reply to reviewer #2

[COMMENT] Page 2: I suggest adding the Zenodo link as a reference in the manuscript and citing it in the introduction to section 2. This will make it immediately apparent to the reader where the material can be found.

[REPLY] We have modified a sentence in section 2: "The hardware design files, control code, analysis software, and data used for this paper are all open source and available online at the following DOI: 10.5281/zenodo.18292185."

[COMMENT] Page 2: Please add the manufacturer name to the LSM6DS0X and HC-SR04 units

[REPLY] This has been added for LSM6DS0X (STMicroelectronics) in section 2.1. HC-SR04 is an open-source distance sensor, so it is produced by multiple manufacturers. The ones used in this experiment were bought from a local electronics shop, and the HC-SR04 do not contain an indication of the manufacturer.

[COMMENT] Page 4, batteries. I find it a little bit odd that the power draw is only "estimated" and that the authors "expect" a minimum lifetime. Surely, given the intended use case of the instrument in remote areas, some measurements of power draw and (accelerated) lifetime tests must have been done. I suggest that this issue is discussed

in greater depth than just the sporadic comment on power drained by repeated wireless access attempts.

[REPLY] The battery section now references a new Appendix A where a detailed calculation of the battery life is presented. The lifetime is an estimated quantity because of uncertainty in some parameters like temperature. (For a particularly cold winter, the expected battery life would be reduced.) The Appendix A text is as follows:
“BRACHI's energy consumption can be estimated by the sum of its passive and active energy usage. When BRACHI is in low-power mode between data recording sessions, it consumes a constant 30μA. While taking data, BRACHI consumes a maximum of 70~mA for a time period of}
\begin{equation*}
t = N_{\text{chunks}} \left(\frac{N_{\text{samples}} }{f_{\text{sampling}}} +2\right)
\end{equation*}
\br{in units of seconds, where N_{chunks} is the number of data chunks requested from the accelerometer (typically 10), N_{samples} is the number of accelerometer samples per data chunk (typically 2048), f_{sampling} is the accelerometer sampling frequency (typically 200~Hz), and the added 2~seconds represents the measured time that BRACHI requires for computations and saving the data. Assuming that BRACHI records data every 4~hours and uses nominal sampling parameters, the resulting daily energy consumption is 14.3~mAh while active and 0.7~mAh while passive, yielding a total of 15~mAh. Using 6 Energizer L91 AA lithium batteries, each with a specified capacity of 3000~mAh at -30°C, BRACHI can operate for 3.3~years.”

[COMMENT] Page 6, figure 3. The spectrum shown is a good example of the acquired data. However, it is not clear to me whether this represents a typical data set or if this is data of outstanding quality. I suggest that the authors enrich the manuscript with a discussion of good, common, and bad data and signal-to-noise ratio.

[REPLY] The second-to-last paragraph of section 4 now contains a discussion of the likelihood of different peaks being present. The expected signal-to-noise ratio is also discussed. The paragraph reads:
“The peak at F_1 is usually present for nearly all accelerometer spectra, and the F_2 peak typically appears for longer stakes and stronger wind conditions. The signal to noise ratio (SNR) of the peaks is determined by the wind speed and the stake geometry, with stiffer stakes requiring stronger winds to achieve a good SNR. As a rough benchmark, the field tests presented in \S\ref{sec:outdoors} employ a 2-m stake that recorded data over a week. The F_2 peak is present during approximately 25\%

of the measurements, and roughly 70\% of the measurements (both F_1 and F_2) have SNR greater than three."

[COMMENT] Page 6, figure 3. The spectrum contains two "spurious" peaks. Are these due to motion of the sensor or artefacts from the electronic system? Please add a line to the manuscript on this.

[REPLY] The second paragraph of section 4 now contains a discussion of the two spurious peaks. The first one is an inharmonic 3 F1 that is now labeled as such, and the second peak is an artifact of the accelerometer. Remarks on these peaks are now included in section 4:
"The spurious peak at 25.49 Hz in Figure 3 is caused by electronic noise of the accelerometer."

[COMMENT] Page 6: I understand the need for publishing intermediate results, but I can't help feeling a little cheated in the analysis of the sensor data. It would have been great with an analysis of the individual x, y, and z components. I look forward to a follow-up paper with this analysis.

[REPLY] We saved the squared and summed acceleration measurements to reduce data volume for the initial BRACHI prototypes, but we do plan on saving individual x, y, z components in the next version (this work is already in progress). We have updated section 4 with a new sentence: "Future BRACHI instruments will employ larger micro SD cards that can store data from all accelerometer axes; treating each axis separately, rather than using the squared magnitude, will simplify the spectral structure and the associated analysis."

[COMMENT] Page 6. The sentence on locating F1 in the spectrum seems a bit circular to me. Surely, if F1 is unknown, the range 0 to 2F1 is undefined.

[REPLY] The sentence in the last paragraph of section 4 has been changed to "The process of finding F_1 begins with identifying all peaks in the spectrum, defined as local maxima that are at least five times the global noise level and at least three times the local noise level. From this list of candidate peak frequencies f, the location of F_1 is determined by finding the lowest-frequency peak f_i for which the corresponding amplitude is the highest between 0 and $2f_i$."

[COMMENT] Page 13: The formatting of the references is a little inconsistent with some references containing DOI while others do not.

[REPLY] Nearly all references now contain a DOI. "Vibration of Systems Having Distributed Mass and Elasticity" by Stokey could not be associated with a DOI.