Identifying a correlation between IMU and microphone data in earable computing with regards to chewing

TU Delft

Background

Earable: *a computing device worn in the ear*
IMU: *a sensor that measures the accelaration and rotation*
Why?
Earables have the capability to detect chewing due to the proximity of the sensors to the mouth.

1

Research Question

What is the correlation between IMU and microphone data in earable computing with regards to chewing?

2

Method

1. *Record samples of chewing and non-chewing activities*
2. *Extract different features from sensor data*
3. *Calculate correlations between features from samples*

3

Results

- *Sum of sound energy and root mean square (RMS) showed promosing results*
- *Chewing events generated more zero crossings for the accelerometer, potentially indicating the start of a chewing event.*
- *Food texture and density are crucial factors for correlation*
- *Difference between talking and chewing is detectible*
- *Sliding window approach yielded solid correlation between sum of audio energy and sum of gyro data.*
- *Correlation peak for differentiating between talking and chewing varied across participants.*
- *Fourier transform analysis of frequency bins did not significantly alter findings.*

4

Future Research

- *Correlations and identifying more foods*
- *Cause of different sliding window size for different participants?*

5

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