Course admin

Monday, January 24, 2022 2:58 PM

MW 3:05 - 4:20pm
https://calstatela.zoom.us/j/83424496418

Weekly Pset.

Q&A hours
TUE 14:00 – 15:30, WED 11:30 – 13:00

What are some biomedical technologies you know of that require signal processing?

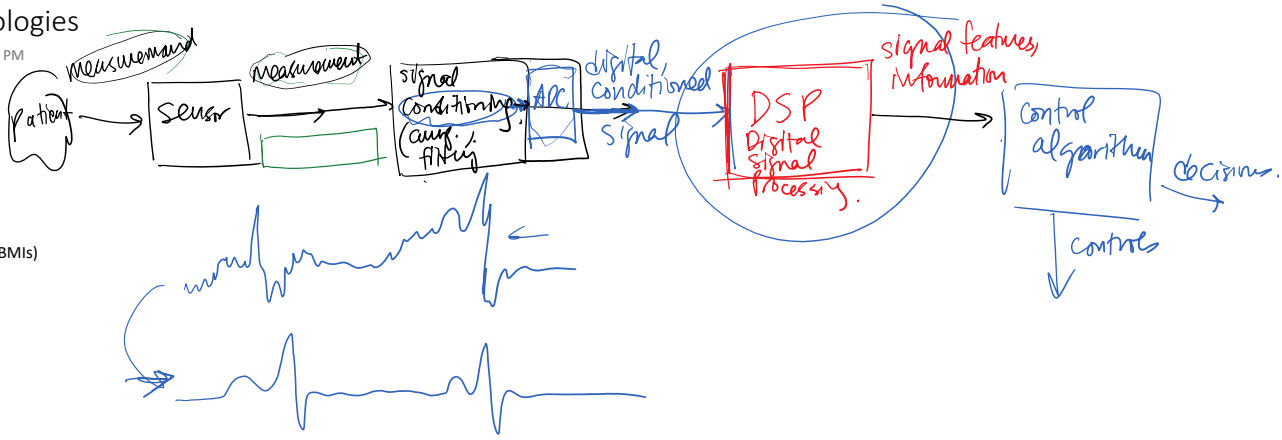
Monday, January 24, 2022 2:58 PM

Apple watch
Pulse oximeter -
Fitbit
ECG
Infrared thermometers
FSR - Force Sensing Resistor

Biomedical technologies

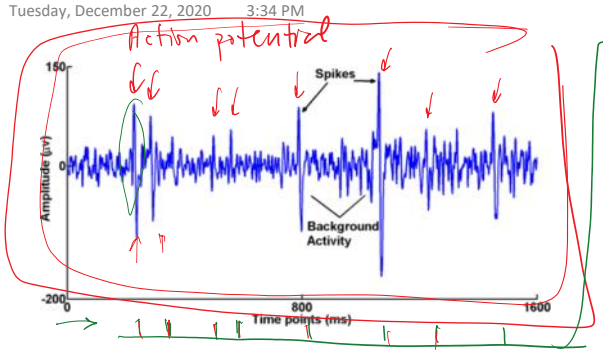
Monday, January 25, 2021 3:37 PM

a. Glucose monitors
b. Limb Prosthesis
c. Retinal prosthesis
d. Cochlear prosthesis
e. Deep brain stimulation
f. Pacemakers
g. Brain machine interfaces (BMIs)

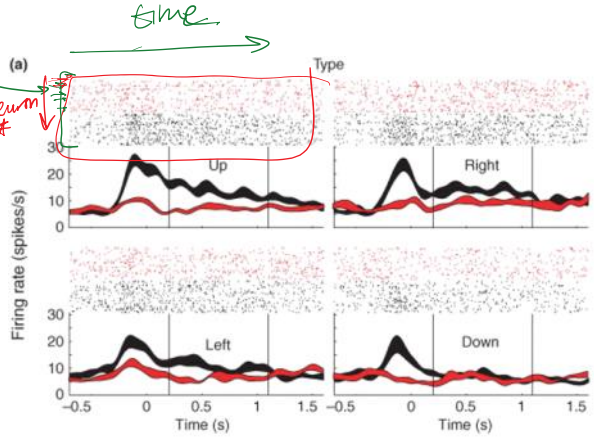


Biomedical applications

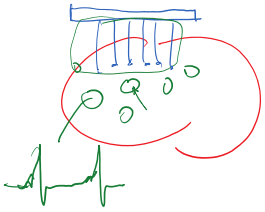
Tuesday, December 22, 2020 3:34 PM

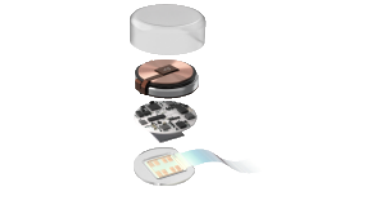


N. Koirala et al. 2020



R.A. Andersen et al. 2004



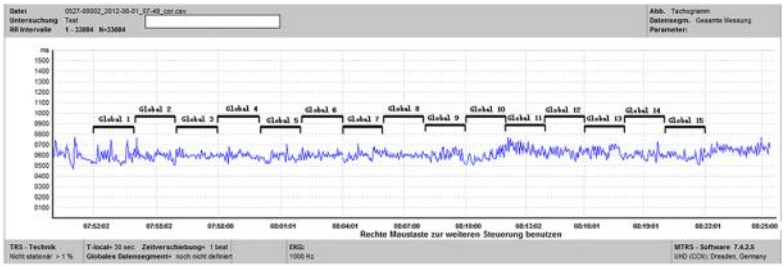


www.neuralink.com

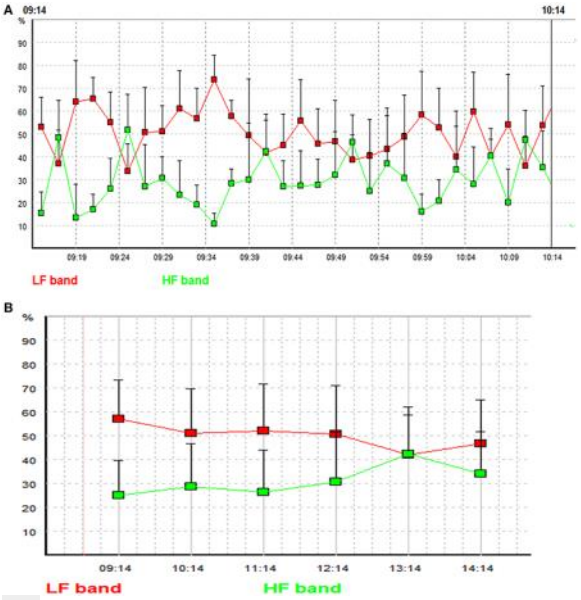
www.ottobockus.com

More biomedical applications

Tuesday, December 22, 2020 4:13 PM



K Li et al 2019

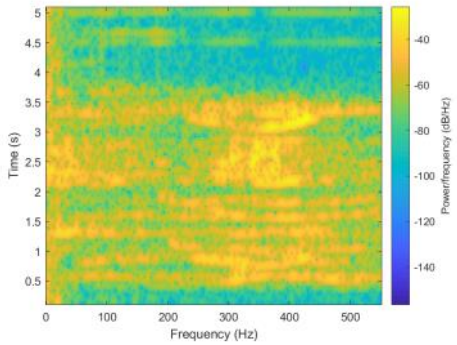


(A) LF and HF powers of the 30 2-min global segments within an hour (from 9:14 to 10:14 in the morning) in a patient with multiple sclerosis. Each square indicates the LF or the HF power of an individual 2-min global segment. Red line represents low frequency band, and green line represents high frequency band. The x-axis represents time and the y axis represents the relative LF and HF powers (the proportions (in percent) of LF and HF powers in the total power). **(B)** Mean LF and HF powers of the 6 h after fingolimod intake in a patient with multiple sclerosis. Each square indicates the mean value of LF or HF power of a targeted 1 h time window. Red line represents low frequency band, and green line represents high frequency band. The x-axis represents time and the y axis represents the relative LF and HF powers [the proportions (in percent) of LF and HF powers in the total power].

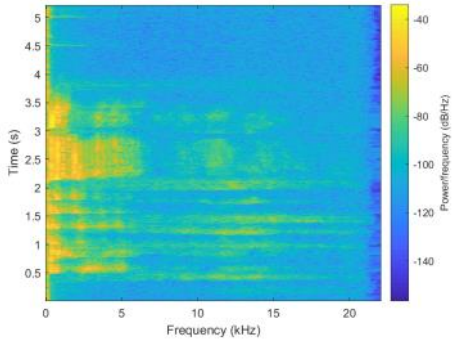
From <https://www.frontiersin.org/articles/10.3389/fneur.2019.00545/full>

What can you do with biomedical signal processing?

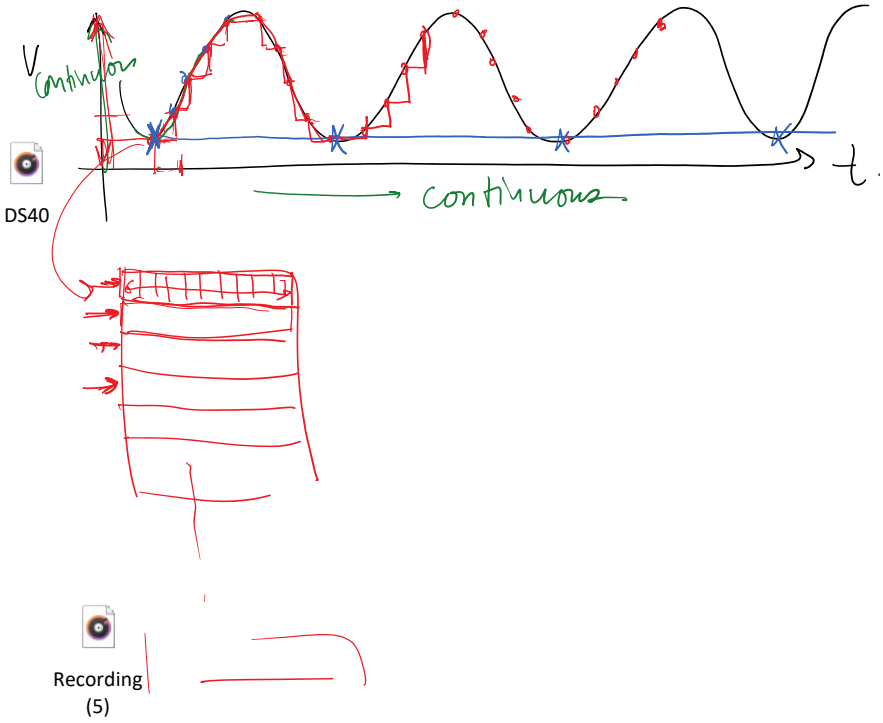
Wednesday, December 23, 2020 9:43 AM



Fs ~ 1,100Hz (downsampled 40x)

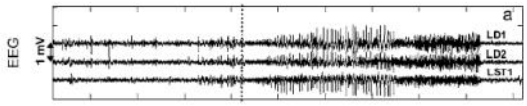


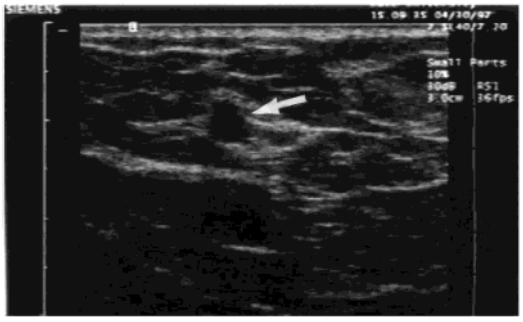
Fs = 44,100 Hz (original)



Summary of applications

Friday, January 8, 2021 10:01 AM





- diagnostics
- tumor detection
- speech processing
- visual processing
- neural signal processing

Signal processing in the context of BMIs

- utilizing brain signals for external control
- interpreting brain signals
- characterizing neural signals
- extracting information from neural signals