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6.101 Final Project Abstract

Portable Electroencephalogram (EEG)

This project aims to create a portable electroencephalogram (EEG) that can be used without preparation time. EEGs are most commonly found in medical settings where neither portability or low power use is a concern. However, our design is primarily guided by these features in order to appeal to a consumer market. To reduce power consumption and increase portability, we will physically separate the signal collection and processing modules of the device which will communicate via radio frequency.

Passive EEG sensors use a conductive gel to provide a low impedance connection from the scalp to amplifiers. This requires a shaved head, and cleaning of the electrodes. Active probes do not need this gel and touch the scalp through hair at the expense of more complex amplification electronics. Active probes are the clear choice in this application and will provide much of the challenge in the design. Some information for the EEG signal is encoded in the signals absolute magnitude. Designing the transmitter to preserve signal magnitude independent of operating distance will provide additional challenge.

EEG sensors need to amplify high impedance microvolt scale signals so it is a clear application for low noise analog circuitry. Analog feedback schemes can boost the input impedance of amplifier to improve the quality of the signal acquisition.