

ESD Protection

The wireless EEG monitoring system is to be worn by a human user and thus needs to adhere to strict safety regulations. The ESD protection circuit has to be able to safely isolate the electronic circuitry from the user. It can be a major challenge to implement as it has to protect the user and circuit in any type of failure scenario. All the aspects of the design have to be critically analyzed to build a failure-proof protection circuit.

Amplification of Analog Signals

The design aims at implementing active electrodes. Unlike passive electrodes, this design does not have the assistance of gels to improve the conductivity of the signal through the human skin. Thus, a rather weak input signal is expected, and it will be challenging to amplify a very weak input. Moreover, the low power constraints require a design that is capable of significant amplification without too much power consumption or wastage. The team will have to identify op-amps that can provide significant gain and utilize very low power.

Filtering Analog Signals

Efficient noise filtering is a key element of an EEG monitoring system. This design allows the user to have some degree of mobility. In case of a mobile user, the noise is expected to be significantly greater. The task of designing a filtering circuit that is capable of accounting for the noise caused by the subject's motion will be challenging.

Supply Power for the System

The system has to be ergonomically designed so that someone can wear it for extended periods of time. Moreover, it has to be designed such that it requires low power. Designing a power supply capable of performing all the required tasks in addition to being ergonomic and long lasting will be a major challenge.

Reconstruction of EEG signals at the Base

Digital signals will be transmitted from the DSP board to the base computer. These signals will have to be reconstructed at the base computer to re-obtain an EEG waveform. Due to the limited experience within the group with sampling, this sub-function is expected to be a challenge.

Developing a Visual Feedback for the EEG Signals

At the base computer, once the transmitted signals have been reconstructed, they will have to be outputted in a presentable fashion to the user. This would require the team to design a GUI/software that would show the transmitted signal as an EEG waveform to the end user.