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(57) Abstract :

In the current pandemic situation, patients with critical diseases are lacking immediate care which would reduce the mortality rate. This invention focuses on continuous monitoring of patient's EEG signals for occurrence of any seizures in brain signals. This system is designed using machine learning algorithm for resource optimization thereby implemented using VLSI technology. The proposed algorithm provides competitive performance as it requires EEG signals only from front and frontal temporal lobes instead of signals from standard full EEG system. Seizure detection is accurate just by easily mountable headsets of dry electrode without the need of painful through- hair electrodes which is highly uncomfortable and uses adhesive material. Compact VLSI implementation is uploaded on low power FPGA Actel Igloo AGL250 that consumes 110 Watts of dynamic power and required 1237 logical elements, operating at a detection latency of 10.2 seconds provides specificity of 80.2% and sensitivity of detection as 92.6%.

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Abstract:

In the current pandemic situation, patients with critical diseases are lacking immediate care which would reduce the mortality rate. This invention focuses on continuous monitoring of patient's EEG signals for occurrence of any seizures in brain signals. This system is designed using machine learning algorithm for resource optimization the implemented using VLSI technology. The proposed algorithm provides competitive performance as it requires EEG signals only from front and frontal temporal lobes inste signals from standard full EEG system. Seizure detection is accurate just by easily mountable headsets of dry electrode without the need of painful through- hair electrode is highly uncomfortable and uses adhesive material. Compact VLSI implementation is uploaded on low power FPGA Actel Igloo AGL250 that consumes 110 Watts of dynar power and required 1237 logical elements, operating at a detection latency of 10.2 seconds provides specificity of 80.2% and sensitivity of detection as 92.6%.

Complete Specification

Claims:1. EEG based seizure detection is done by resource optimized VLSI architecture for smart patient monitoring.
2. EEG signal collection is painless as dry electrode EEG headset is used for frontal and front temporal lobe EEG signals.
3. Dry electrodes are quickly mountable providing reliable EEG signals even from head part covered with hair with low signal quality.
4. Machine algorithm is developed for EEG signal analysis for detection of any epilepsy seizures in EEG signals.
5. Actel Igloo AGL250 low power FPGA is utilized for implementing the algorithm with power consumption of 110 watts and latency of 10 seconds.
6. Sensitivity of seizure detection is about 93% and specificity of about 80%. , Description: In this invention different sets of FIR coefficients specific for channel are retrie with a constant range of input address of Flash ROM with 0-30 channel specific address offset can be added selectively to each of the input address by using offset multiplexer for facilitating retrieval of coefficient in shared structure of FIR.
? Same concept can be used for storage of FIR input data and retrieval inside RAM of the system.
? Signals from FIR filter has to be processed using 8 channels only which involves 32 input data from each of the channel which has to be stored and accessed in an efficient way in one of the RAM block on FPGA.
? Data storage and retrieval for different sets of channel specific input data of FIR filter involves only constant value of RAM input address of 0-30 values which is specific each channel RAM offset address.
? As a result, with minimal additional LE cost, this address offset methods easily converts a single channel FIR to a configurable multichannel FIR filter using multiplexers.
? The resource-optimized VLSI implementation was uploaded onto a low-power Microsemi FPGA (AGL 250)

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