

◇ 電子科学研究所学術講演会 ◇

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タイトル:

Mobile and Wearable Devices for Neurosensing and Neuromodulation

Advances in electronic and information technologies support the development of many new diagnostics and treatments to the healthcare. In this talk, the mobile and wearable devices for neurosensing and neuromodulation are presented. For sleep monitoring, the polysomnography (PSG) is a clinically approved device. However, its excessive and cumbersome wired connections often cause sleep disturbance and may bias measurement of sleep quality. To make it easy to perform sleep tracking at home, an innovative eye mask integrating dry fabric sensors and the electrooculogram (EOG) recording module is developed. The eye mask can record the EOG signals comfortably during sleep and the recordings can be used for five-stage sleep scoring through the analysis of an automatic staging program. In addition to monitoring, a closed-loop responsive neuromodulation system for seizure control will also be introduced. The worldwide prevalence of epilepsy is approximately 1%, and 25% of epilepsy patients cannot be treated sufficiently by any available therapy. Alternative techniques, such as vagus nerve stimulation and deep brain stimulation have been proposed for open-loop seizure control. However, the efficacy of intermittent stimulation may decrease due to neuron acclimation. A closed-loop device that can perform on-line seizure detection and real-time electrical stimulation for seizure elimination is presented. All of the components have been further integrated in the chip-on-board and the system-on-chip platforms. For implantable or wearable devices, the battery life of such a detection and stimulation system becomes important. A two-stage seizure detection method of energy saving will also be introduced.