

Mobile Multi-parametric Sensor System for Diagnosis of Epilepsy and Brain Related Disorders

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Abstract. Epilepsy is the commonest serious brain disorder, affecting 1-2% of the general population. Epileptic seizures are usually expressed with a wide range of paroxysmal recurring motor, cognitive, autonomic symptoms and EEG changes. Therefore reliable diagnosis requires state of the art monitoring and communication technologies providing real-time, accurate and continuous brain and body multi-parametric data measurements. The purpose of this paper is to present an adequate mobile system comprising all required sensor types for the everyday life monitoring of patients with epilepsy.

Keywords: epilepsy monitoring, biosensors, security and privacy

1 Introduction

Epilepsy is one of the most common and devastating of the incurable neurological disorders, affecting about 1-2% of the general population. Due to its multifactorial causes and paroxysmal nature, epilepsy needs multi-parametric monitoring for purposes of accurate diagnosis, alerting, prevention, treatment follow-up and pre-surgical evaluation.

State of the art for the monitoring of epilepsy includes a series of laboratory tests. These tests can only be done in a specific unit of a specialized hospital, they are rather expensive (about 1,500 euros per day) and their diagnostic yield depends on whether the clinical event of interest occurs during the period of the monitoring (typically less than a week). Current diagnosis relies either on video EEG that records the habitual suspected event or ambulatory EEG without video. Recent research has shown that while ECG monitoring is used for real-time epileptic seizure detection [2], activity monitoring via accelerometry and GSR monitoring can also be used as extra context parameters [7-8], while monitoring epileptic patients.