Towards a cyber physical system for personalised and automatic OSA treatment

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Abstract— Obstructive sleep apnoea (OSA) is a breathing disorder that takes place in the course of the sleep and is produced by a complete or a partial obstruction of the upper airway that manifests itself as frequent breathing stops and starts during the sleep. The real-time evaluation of whether or not a patient is undergoing OSA episode is a very important task in medicine in many scenarios, as for example for making instantaneous pressure adjustments that should take place when Automatic Positive Airway Pressure devices are used during the treatment of OSA. Here, the design of a possible Cyber Physical System (CPS) suited to real-time monitoring of OSA is described, and its software architecture and possible hardware sensing components are detailed. It should be emphasised here that this study does not deal with a full CPS, rather with a software part of it under a set of assumptions on the environment. The study also reports some preliminary experiments about the cognitive and learning capabilities of the designed CPS involving its use on a publicly available sleep apnoea database.

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