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A Multimodal Adaptive Wireless Control Interface for People with Upper-Body Disabilities

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Abstract: Assistive Technologies (ATs) also called extrinsic enablers are useful tools for people living with various disabilities. The key points when designing such useful devices not only concern their intended goal, but also the most suitable human-machine interface (HMI) that should be provided to users. This paper is based on a wearable wireless sensor network which presents several new modes of control interface for people with upper-body disabilities. This body machine control interface consists of modules and can be easily adapted to the residual functional capacities (RFCs) of different users. An algorithm has been developed for emulating a joystick control (JACKO arm-assistive technology) using head motion. In wearable sensor network up to six modular (modules) sensor nodes can be used simultaneously to read different RFCs including head gesture and muscular activity, and translate them into commands. Head motion is measured with a lightweight wireless inertial sensor enclosed in a headset and muscular, shoulder motion by patch sensor. Data collected from sensor are gathered (fused) in sensors itself to decrease power consumption by wireless link and the base station. Such an interface network is required for people using powered-wheelchairs and with weak or unexacting control of their arms, hands and fingers, but who have remaining abilities to control their head and shoulder motions, as well as residual muscular activity. This system is implemented and used to control a robotic arm for performing several tasks. At last comparison is made with joystick controller in which existing system works good over joystick controller.

Keywords: Wireless Technology, IoT, Embedded, Human Machine Interface.

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