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## An assistive robotic hand based on human computer interface (HCI) and shape memory alloy (SMA) actuator (Conference Paper)

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### Abstract

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Rehabilitation and assistive robotics is an emerging field of research where researchers are trying to develop tailored made robotic devices to address the challenge of disability. This paper presents a study on feedback controlled wearable robotic hand for grasping. The proposed design is compact and sufficiently light to be used as an assistive hand. It is tendon driven and joint-less structure that has the potential to be used as an assistive device for stroke patients. The concept has been implemented for index and thumb fingers as a first prototype to enable grasping. Shape memory alloy (SMA) actuator and bias force mechanism are used for the purpose of hand's flexion and extension. This paper describes the mechatronic design of the wearable hand, simulation, modeling, and development of the actuation unit and sensory system. Experiments of open loop controller were conducted to understand the hand characterization and grip force provided by index finger. A feedback controller (proportional controller) was implemented for this prototype with gripping force as the feedback parameter. It was observed that approximately 2.25 A current caused 4 cm displacement for SMA actuator. The maximum temperature of the SMA actuator was achieved to be 100 °C. The attainable gripping force was around 2 N for a load free finger. The conducted experiments showed promising results that encourages further development on this. © Springer Science+Business Media Singapore 2017.

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