

1. Design of a Robotic Brace with Parallel Structure for Spine Deformities Correction

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Abstract: This paper describes the mechatronics design and tests of a robotic brace prototype specially dedicated for the treatment of idiopathic scoliosis. These developments have been motivated by the limitation of the current rigid braces used for this purpose which do not adapt to changes in the skeletal system in response to treatment. This new robotic brace has been designed taking into account the human biomechanics properties and more specifically to be able to exert "three-point pressure" in order to be effective for treatment of scoliosis. Based on a double Stewart-platform, it was produced by rapid prototyping and equipped with 12 linear actuators, 12 linear position sensors and multi-axis force/torque sensors. Position and force controls approaches are implemented on a dedicated control device. This robotics brace has been used on healthy persons to test its motion range and its acceptability. The prototype version allows the force applied on the human body to be adjusted to correct the scoliosis, then the mechanical concept was validated. © 2021, The Author(s), under exclusive license to Springer Nature Switzerland AG.

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