

RHex-T3: a Transformable Hexapod Robot with Ladder Climbing Function

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Abstract—To realize a wide range of functions in a complex environment, it is necessary to transition between various motions suited to each environment. This article presents a transformable hexapod robot, RHex-T3, which is capable of switching to leg, wheel and RHex mobile modes to improve its flexibility, and climbing the ladders with the Hook-mode. The mechanical design and the implementation of the RHex-T3 are introduced, especially the coaxial transmission mechanism and the innovative 2-degree-of-freedom transformable leg. As the result, experiments are conducted to demonstrate the feasibility and successful performance of the proposed coaxial transformable mechanism. The locomotion performance under three basic mobile modes is evaluated through a series of indoor and outdoor experiments. Furthermore, the ladder climbing function is also verified and its boundary conditions are discussed.

Index Terms—Hexapod, Transformable, Hybrid locomotion, Ladder climbing.

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