

## **A Bio-inspired Locomotive Module of a Snake-like Robot Driven by a Pair of High Performance Miniature LIPCA's**

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### **Summary**

In this paper, a novel design for locomotive modules of a snake-like robot has been proposed. The design is fascinated by its simplicity and its flexibility in locomotion control of the link. Then, a series of interconnected modules which end up with a multi-degree of freedom (MDOF) bio-inspired snake-like robot is able to demonstrate the proposed design. Unlike those bulky and complicated snake-inspired prototypes found in the literature in which DC motors, gears, joints were mostly employed, our design seems quite close to natural inspiration since only a pair of miniature LIPCA's is needed as driving muscles in a module. The LIPCA is known as an advanced layered piezo-composite unimorph actuator in which an active piezoelectric ceramic layer is sandwiched by several fiber composite layers. In order to figure out the configuration of the high performance miniature LIPCA employed for this modular design, several steps had been done. That is, among several designs for likely high performance miniature LIPCA's, the best configuration had been determined through analytical and practical verification processes. Eventually, a series of interconnected modules had been fabricated and demonstrated. As a result, promising ways for future developing of a bio-inspired snake-like robot using miniature LIPCA and proposed modular design have been discussed.

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