



具快速變換能力的輪腳模組

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簡歷：

<http://peichunlin.me.ntu.edu.tw>

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市場及需求：

以本輪腳模組所建構的多模式機器人，可針對不同地形，以輪和腳等不同運動模式來產生對應的最佳移動方式，因而機器人適合作為「各式地形上可運行的移動載台」，提供多類型任務（如偵檢、探勘、救災等）所需要的移動功能。

技術摘要(含成果)：

本發明使用連桿機構來操控輪子變形，使機器人同時具有輪與腳的功能，可以讓機器人不論在平坦地面或是崎嶇地(自然或是人造如樓梯等)均有強大運動能力。

表 1. 新舊輪腳模組參數比較

	輪半徑(m)	重量(g)	最長腳長(m)	跳躍高度(m)
新輪腳模組	0.13	966	0.45	0.6
舊輪腳模組	0.13	1369	0.22	-

如表 1，本發明經原型開發和實驗驗證，確認可達成快速輪腳轉換和跳躍的功能。

優勢：

本發明機構輕量化、腳長大幅增加，使切換成腳模式後更加敏捷。

競爭產品：無

專利現況：

- (1) 本技術已申請美國 Provisional Patent
P. C. Lin, H. Y. Chen, and T. H. Wang, "Novel Leg-wheel module with fast transformation and leaping capability," US Provisional Patent, Apr. 29, 2020 (U.S. Application No: 63/016,992)
- (2) 實驗室開發輪腳複合機器人多年，第一代機原形完成時即有申請台灣（發明第 I370796 號）和美國專利（US 8,307,923 B2），第二代的設計比第一代優異，但仍在專利的保護範疇內。目前所申請為第三代的設計，比前兩代能展現出更強大和動態的變換能力，後續可讓機器人足運動的功能更強大，也輕易可以產生跳躍的功能。

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Title of Invention

PI : Prof. Pei-Chun Lin

Department of Mechanical Engineering, National Taiwan University

Experience:

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<http://biorola.me.ntu.edu.tw/>

Market Needs:

The robot using the novel leg-wheel module is capable of performing agile leg-wheel transformation and generating versatile optimized motion patterns to overcome various complex terrains. Therefore, the robot is well-suited serving as a mobile platform with high traversability, and conducting missions including inspection, exploration, and rescuing.

Our Technology:

We focus on the design and manipulation of the linkages to perform agile and smooth transformation between the leg and wheel configurations. The mechanism enables the robot to move across flat and harsh terrains (natural or artificial one like stairs) with high traversability and efficiency.

Table 2. Comparison of the new/old leg wheel module

	Radius(m)	Weight(g)	Max. length(m)	Height _{jump} (m)
New model	0.13	966	0.45	0.6
Old model	0.13	1369	0.22	-

As shown in table 2, our invention has successfully gone through experimental validation to perform agile leg-wheel transformation and leaping behavior.

Strength:

Our novel mechanism decreased the weight, increased the leg length, and improved the agility while transforming between the leg and wheel configurations.

Competing Products: None.

Intellectual Properties:

- (1) This technology has been applied for the Provisional Patent.
P. C. Lin, H. Y. Chen, and T. H. Wang, "Novel Leg-wheel module with fast transformation and leaping capability," US Provisional Patent, Apr. 29, 2020 (U.S. Application No: 63/016,992)
- (2) The leg-wheel transformable robot has been developed in our lab for years. The first generation had applied for the Patent in Taiwan (Invention No. I370796) and in the US (US 8,307,923 B2). The design of the second generation was improved and is still under the protection of the Patent. The third generation of the novel mechanism and motion pattern we present now demonstrates higher traversability and mobility on legged motion, and can perform leaping behavior with better efficiency.

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