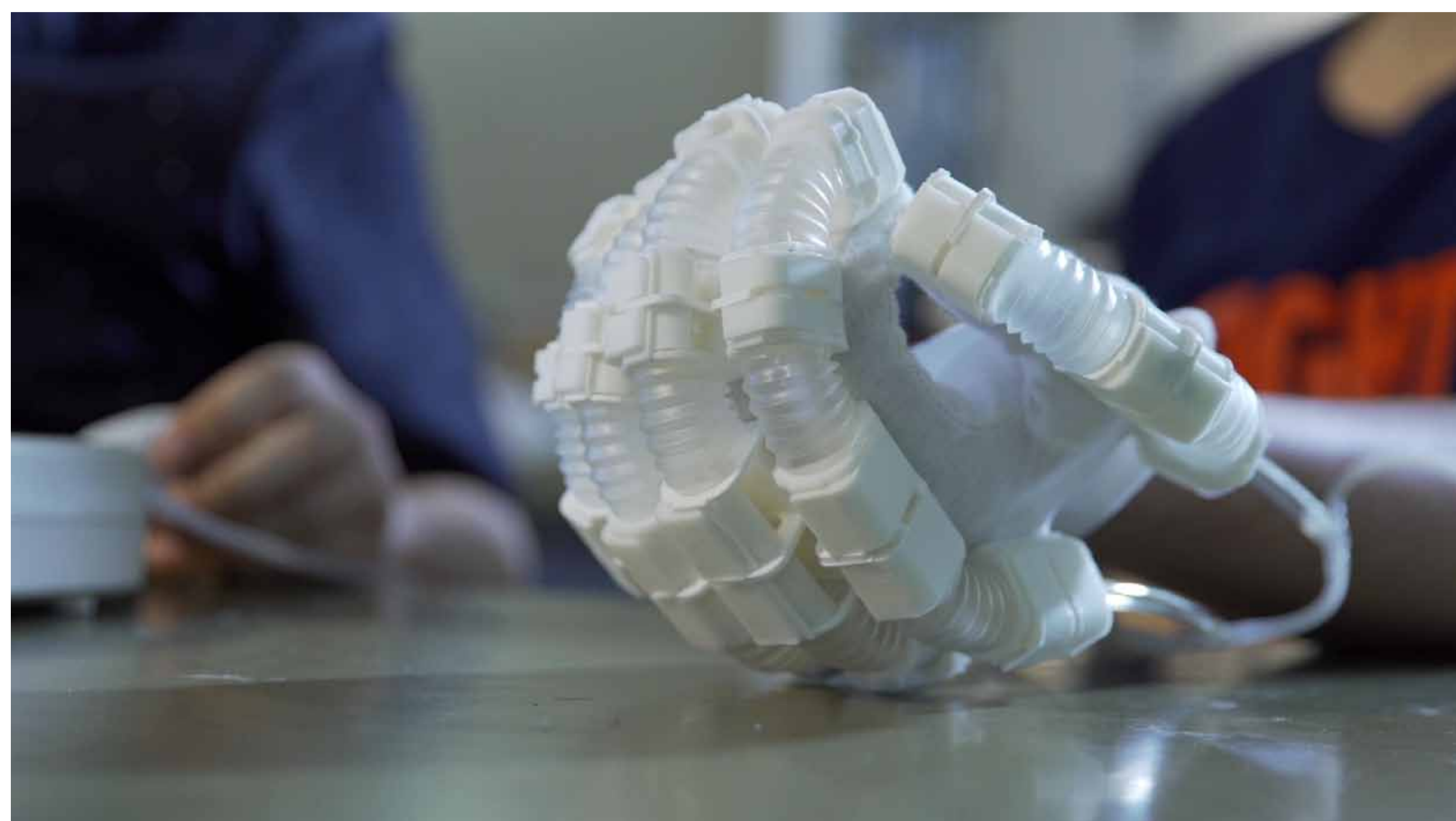




# A Soft Robot Hand for Neural Rehabilitation of Degenerative Neurological Diseases and Strokes



We have developed a soft robotic hand that is designed as a light-weight, wearable glove, which is safe and easy for patients with hand motor impairment to use for rehabilitation.

## THE NEED

Degenerative neurological diseases and strokes affect the patients' motor function, bringing a great psychological and economic burden to patients and their families. In many such cases, patients may lose their **hand motor ability**, and whether partial or total, this can greatly inhibit activities of daily living.

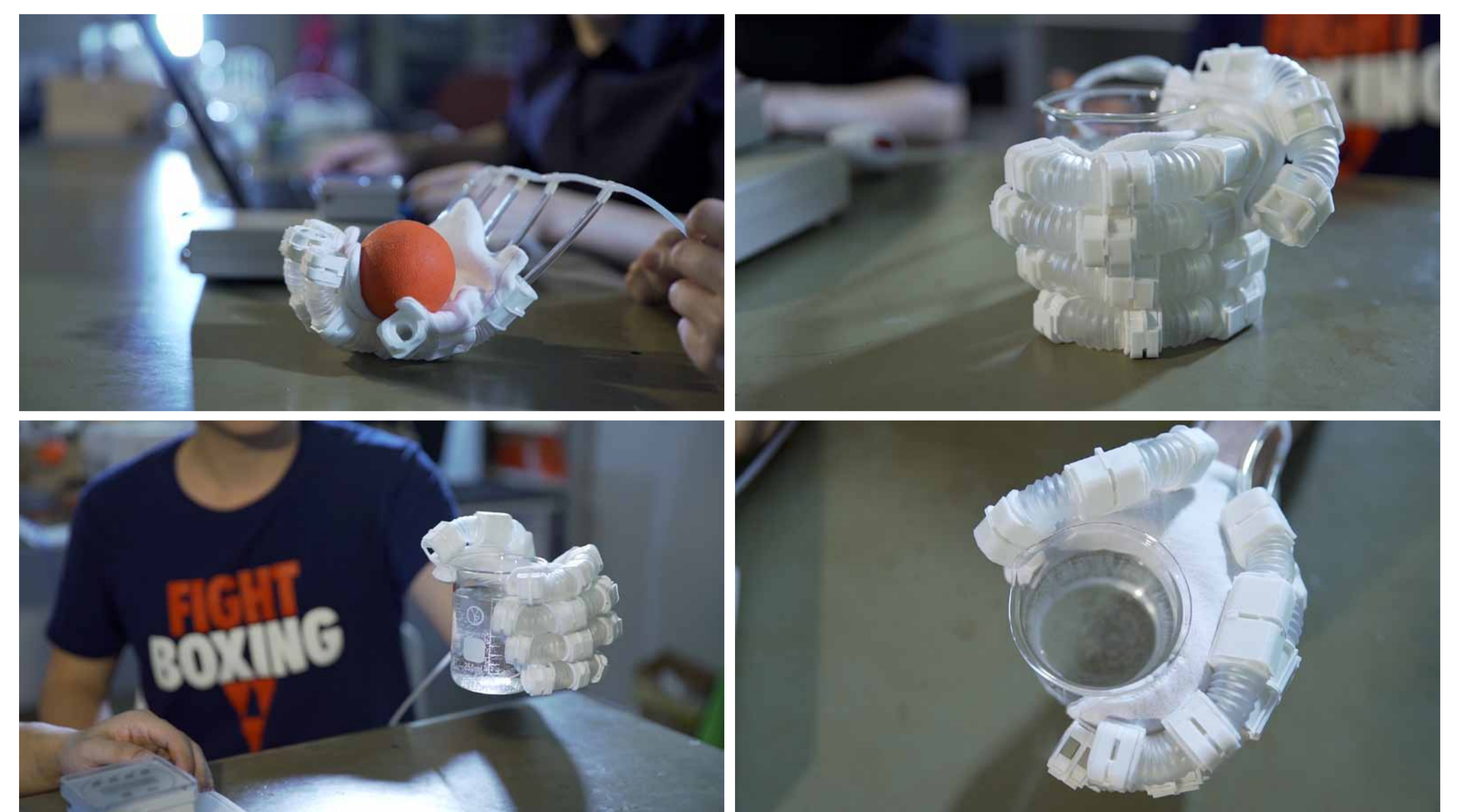
Improving hand function requires repetitive task practice rehabilitation, which involves breaking a task down into individual movements and practicing these exercises (typically with an occupational therapist) to improve hand strength, accuracy, and range of motion. Clinical studies have shown that stroke patients who have robotic assistance when performing intense repetitive movements demonstrate significant improvement in hand motor functions. However, existing robotic rehabilitation systems are typically expensive and are designed for in-clinic use as they are generally not portable. Moreover, the majority of these robotic devices require experienced oversight for patient safety.

## OUR NEW TECHNOLOGY

A research team in HKU led by **Dr Yong Hu**, Associate Professor of the Department of Orthopaedics and Traumatology, has developed a **soft robot hand** for patients suffering from degenerative neurological diseases or strokes. It is a user-friendly rehabilitation tool, which is safe and adaptively fitting for human hand function rehabilitation.

Characteristics:

- Bionics design concept, using the mechanical structure imitation of muscles, tendons and other biological tissue
- Lightweight glove, no obvious load on user's hand
- Compact system, portability
- Easy to wear and use, high comfortability
- Using pneumatic driver with high security, avoiding secondary damage
- Multiple exercise patterns available, allowing an appropriate pattern according to the patient's condition (motion amplitude and intensity adjustable)



## ADVANTAGES OVER EXISTING TECHNOLOGIES

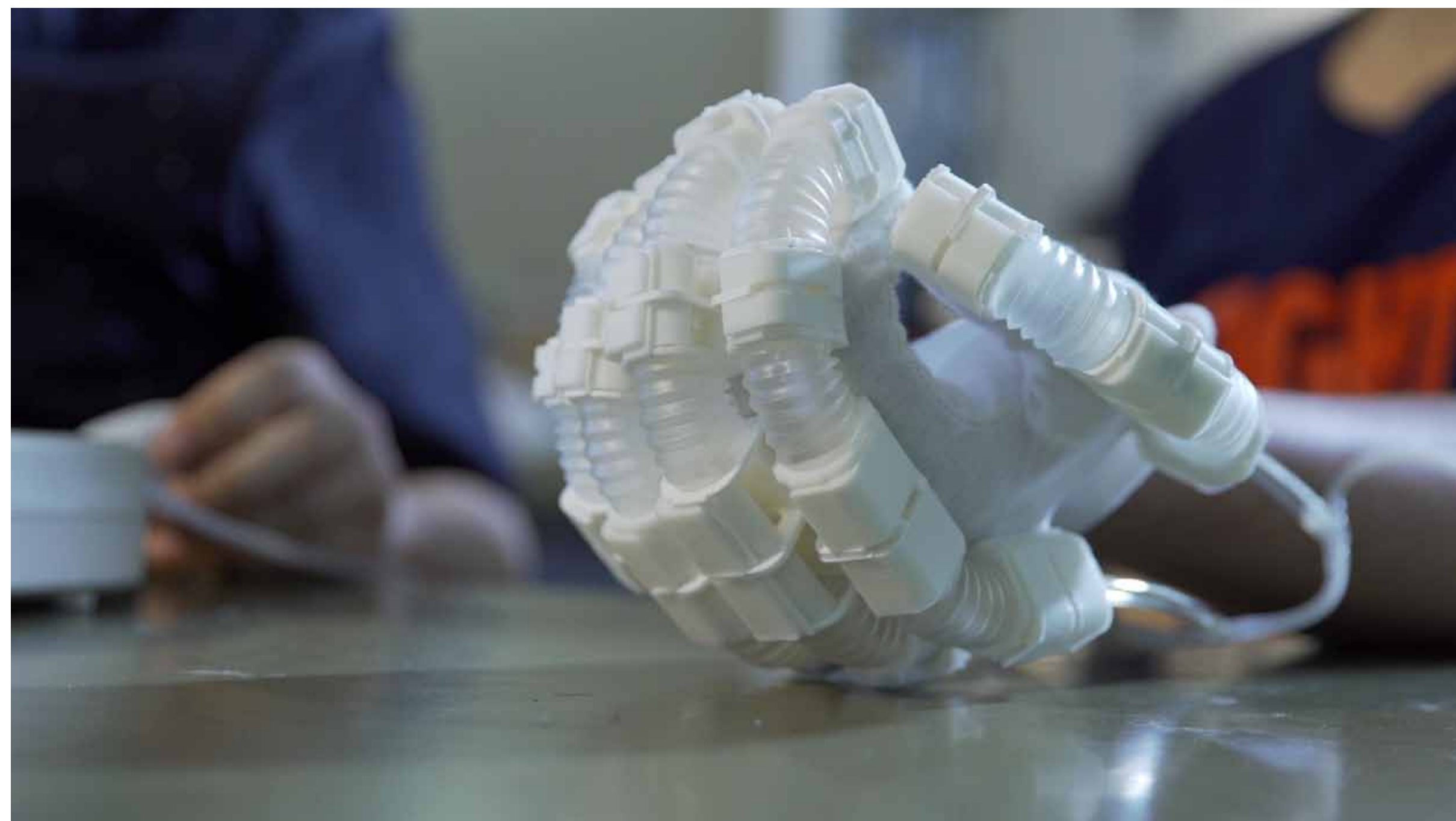
Our new soft robot hand has been designed as an extra light-weight wearable robotic glove that allows **motion smoothness** and **user safety**, compared to the existing robotic glove. Patients can use it to **carry out rehabilitation exercises at home**. This would make physical therapy more accessible and affordable, reducing challenges with patient compliance.

Our soft robot hand can further improve neuroplasticity with a gentle intensity rehabilitation and is effective in managing spasm and improving muscle power. The ultimate goal is to bring patients better quality of life as the research team believes improvement of hand function is a key to help patients' activities of daily living.





# 用於退行性神經疾病及中風後 神經康復的軟體機械手



我們研發的軟體機械手，安全、使用方便、設計如輕便的手套，讓手部活動功能受損的病人可用作復康工具。

## 當前需要

退行性神經疾病和中風影響患者的活動功能，給患者及家人帶來極大的心理和經濟負擔。很多患者可能會失去部分或全部**手部活動功能**，日常生活因此大受影響。

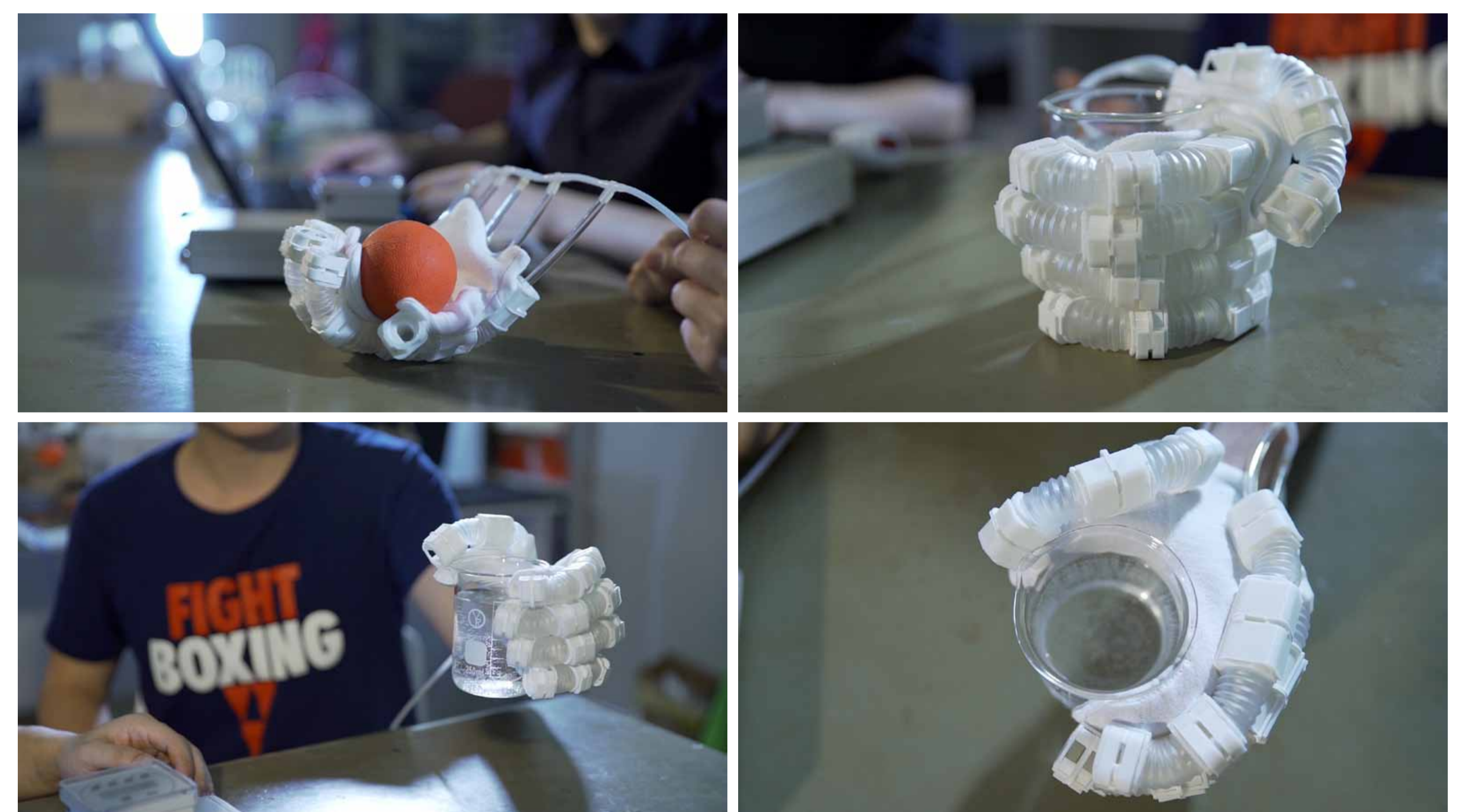
要改善手部功能，病人需要進行重複的工序練習，將一項工序細分成各種動作，反復練習(通常由職業治療師指導)，以改善手部的力量，動作的準繩度和範圍。臨床研究顯示，在進行密集的重複動作時，有機械輔助的中風患者手部功能有明顯改善。然而，現時的機械復康系統通常昂貴，而且不便攜帶，只可於診所使用。此外，為了病人安全，大多數這些機械設備均需在富經驗的護理員監督下使用。

## 港大研發的新技術

由香港大學矯形及創傷外科學系副教授**胡勇博士**領導的研究組，為退行性神經疾病和中風病人研發了一套**軟體機械手**，這套復康工具安全易用，並可調整至合適模式以助病人恢復手部功能。

### 產品特性:

- 採用仿生學設計理念，機械結構模仿肌肉、肌腱等生物組織
- 手套質量輕，不會為使用者帶來明顯的負擔
- 系統精巧，方便攜帶
- 佩戴簡單，使用方便，提供良好的舒適感
- 採用氣動裝置驅動，安全性高，避免手部再次受傷
- 提供多種活動模式，可根據病人情況選擇合適的模式(可調節運動幅度和強度)



## 相對優勢

與現有的機械手套相比，我們這新型軟體機械手的設計為非常輕便的手套，讓病人可以**平穩和安全使用**，並可以在家進行**復康練習**，他們便可以更容易進行和負擔物理治療，亦可減少病人不依從治療安排的情況。

軟體機械手以溫和的強度應用可以進一步改善神經可塑性，並有效地控制痙攣和增強肌肉力量。研究團隊希望透過改善患者的手部功能，幫助他們的日常生活活動，從而改善他們的生活質素。

