

## 機器人靈巧操作終端 Agile Executive Terminal for Robots

### 摘要 Summary

- 本項目以具備「高度精度、360度、低成本」三大優勢的**柔性觸覺傳感方案**為基礎，全方位商品化並推出產品。目前，項目團隊除了獲得政府和投資者支持外，經已與香港各研究院、工業自動化生產線、醫療健康中心、機械人等相關行業展開合作。
- 在人工神經網絡的**力解算方法**和擁有**專利硬件設計**的基礎上，本項目提供**超精細觸覺數據化解決方案**。相關方案提高用家在各種應用上控制的準繩度，並解決與觸覺傳感相關的複雜問題，為用家提高效率和價值。此項目順利實行，可以為香港「再工業化」策略提供動力，促進香港產業升級，提高產品競爭力。
- The project is based on a high-precision, multi-dimensional and low-cost **flexible tactile sensing solution**, to commercialize and launch products from multiple dimensions. At present, in addition to receiving government and capital investment, the project team has already been cooperating with research institutes in Hong Kong, industrial automation production lines, medical health centers, and robot-related industries.
- The project provides ultra-fine tactile digital solutions based on **neural network force calculation methods** and **patented hardware design**. Related solutions can improve control accuracy in various applications and solve complex problems related to tactile sensing, thereby improving efficiency and value for users. The successful implementation of this project can provide impetus for Hong Kong's "re-industrialization" strategy, promote Hong Kong's industrial upgrading, and improve product competitiveness.

### 簡歷 Biography

#### 首席研究員 Principal Investigator



申亞京教授現為香港科技大學電子與計算機工程學系副教授、香港科技大學智能製造中心主任。目前，申亞京教授團隊著眼於用於「機器人的靈巧終端」研發與技術轉化，包含類指尖感測、仿生操作、人機交互等多項關鍵技術。

**Prof. SHEN Yajing** is currently an Associate Professor in the Department of Electronic & Computer Engineering and the Director of the Center for Smart Manufacturing at The Hong Kong University of Science and Technology. His main research interest is robotics.

#### 負責人 Person-in-charge



楊雄博士現為香港科技大學電子與計算機工程系研究助理教授，他的研究興趣包括從微觀到宏觀的機器人技術，特別是機器人操作中的設計、製造、建模和控制，以及人機互動中的智慧感測單元。

**Dr. Xiong YANG** is currently a Research Assistant Professor at the Department of Electronic & Computer Engineering, The Hong Kong University of Science and Technology. His research interests include robotics from micro to macro, especially the design, fabrication, modeling, and control of robots in manipulation, and intelligent sensing units in human-robot interactions.

## 商品化進度 / 成熟程度 Commercialization Progress / Maturity

### 靈犀機器人 AgileReach Robotics

靈犀機器人傳達了敏捷性、擴展性、連接性和無障礙設計的含義。它凸顯了我們公司致力於開發靈活、高效、廣泛適用的敏捷終端，這些終端可以應用於各個領域，同時促進互聯互通。

- 「機器人靈巧操作終端」應用廣泛，包括工業自動化、醫療護理、人型機器人等各方面。
- 在這個研究項目框架下，團隊的目標是實現產品的產業化。
- 申亞京教授為靈犀機器人之聯合創辦人，同時兼任首席科學家。

### 觸覺傳感器系列

項目在應用方面提供的觸覺傳感器系列有三個傳感器，能精準地計算出人形機械人指尖於各方向的接觸力度，賦予類似人類的觸覺，包括：

- （一）把觸覺數據化並加以分析的 *AgileReach© F3-D-S12* 傳感器；
- （二）應用於工業上進行夾爪動作的 *AgileReach© F3-P-S15* 傳感器；
- （三）安裝在仿生靈巧手上準繩地抓取和操縱物件的 *AgileReach© F3-R-R4* 傳感器。

項目現已具備可以量產的基礎，並已申請多項專利保護。

### AgileReach Robotics

"AgileReach" conveys the implications of agility, expansion, accessibility, and connection. It highlights our company's commitment to developing flexible, efficient, and widely applicable agile terminals that can reach various areas while fostering connectivity.

- Agile Executive Terminal for Robots can be widely applied in many areas such as industrial automation, healthcare and humanoid robots etc.
- Under this project framework, the project team aims to commercialize the product.
- Prof. SHEN Yajing is Co-Founder and Chief Scientist of AgileReach.

### Tactile sensors series

The project presents three transformative tactile sensors that could accurately measure the intensity of touch from multiple directions, thus empowering robots with artificial tactile senses to perform precise operations. The three sensors are:

- *AgileReach© F3-P-S15*: to achieve precise gripping and manipulation
- *AgileReach© F3-D-S12*: to measure and analyze tactile sensory data
- *AgileReach© F3-R-R4*: to simulate the human touch.

The project now has a foundation for industrialization and has applied for multiple patent protections.