

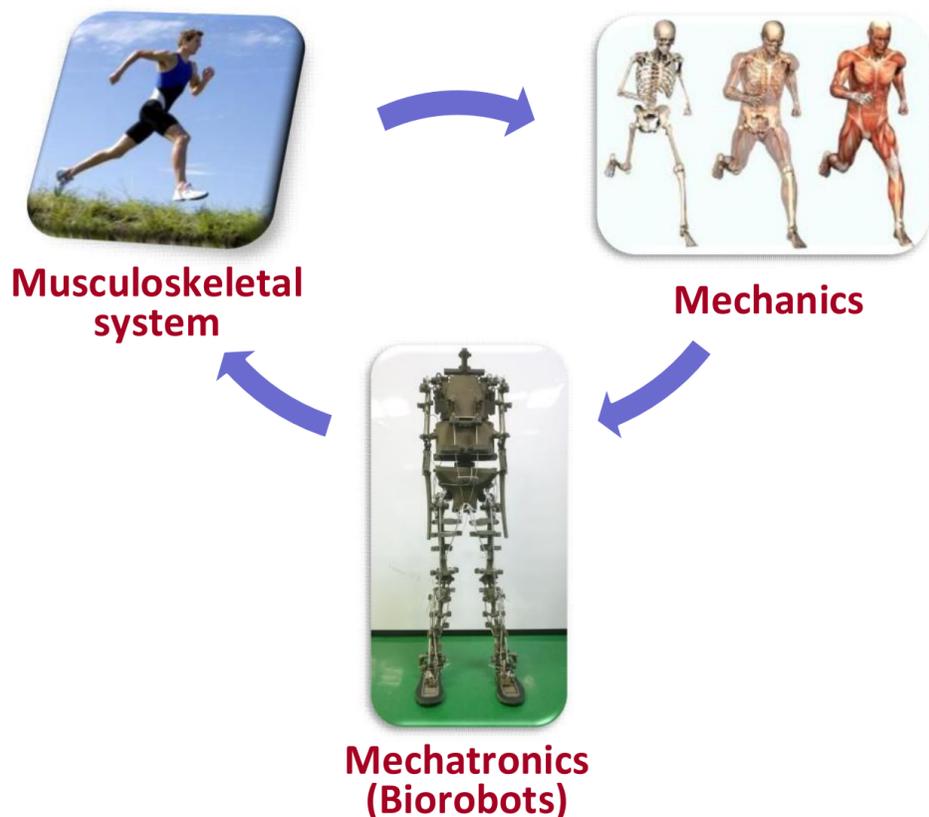
Towards a bio-inspired musculoskeletal robot to investigate human movement biomechanics

Abstract

This research presents an ongoing project to develop a bio-inspired **robot** that will be used as a scientific tool to **investigate** the mechanical design principles underlying human **musculoskeletal system**. The proposed framework would provide a powerful **scientific tool** to **examine** biological hypotheses and fundamental mechanical principles of the **human body** in fields such as biomechanics, neuroscience, physiology, rehabilitation science and engineering.

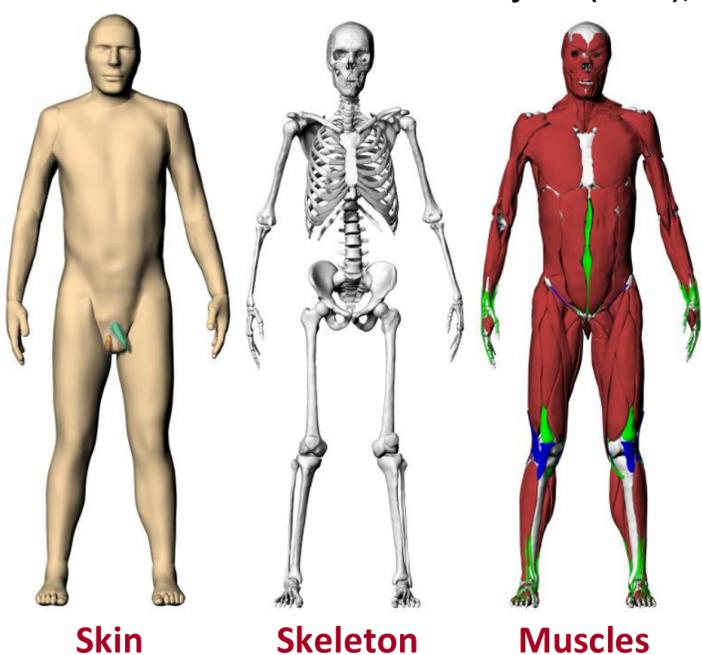
Methods

Inspired from human **musculoskeletal system**, the bio-robot is designed based on human **mechanics** to study human **movement**.



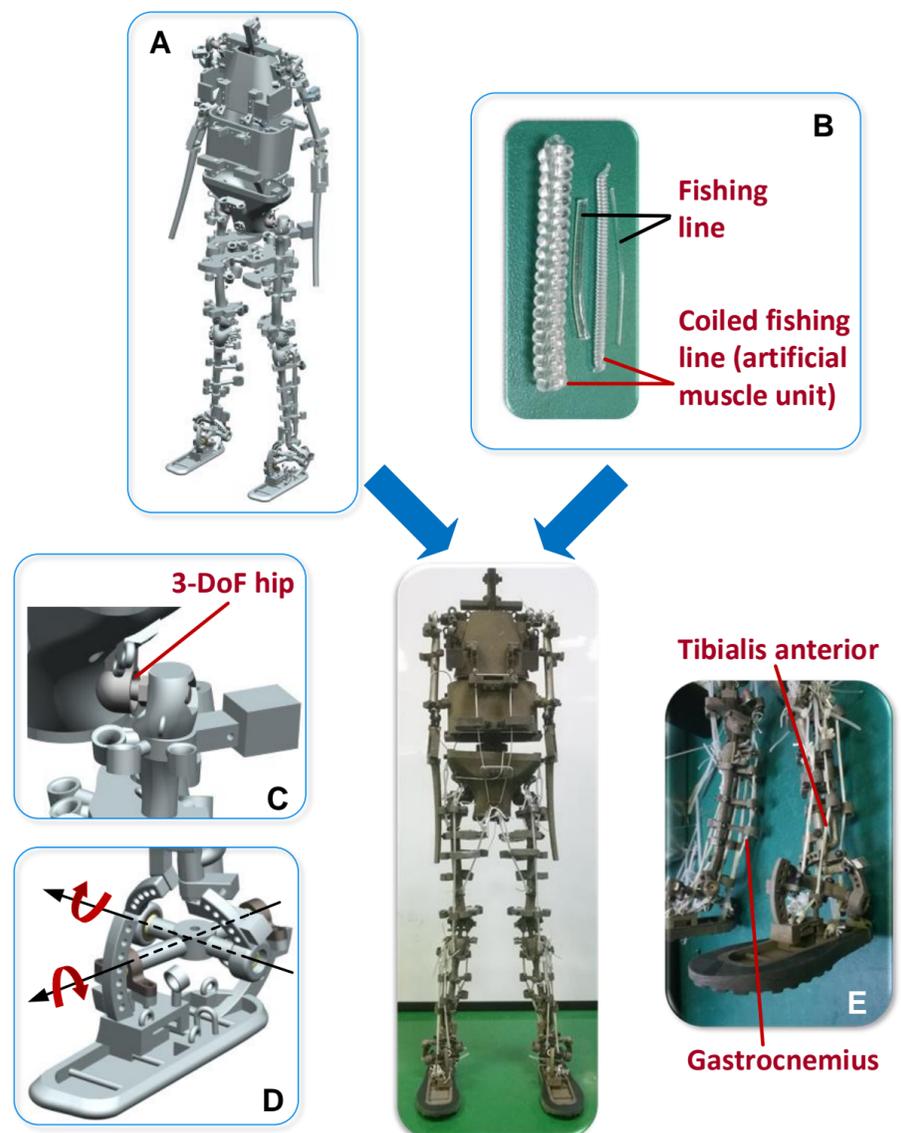
Results – Analysis of biomechanics

Reconstructed human **skin, skeleton, and muscle** model based on Visible Human Project (VHP), U.S.A.



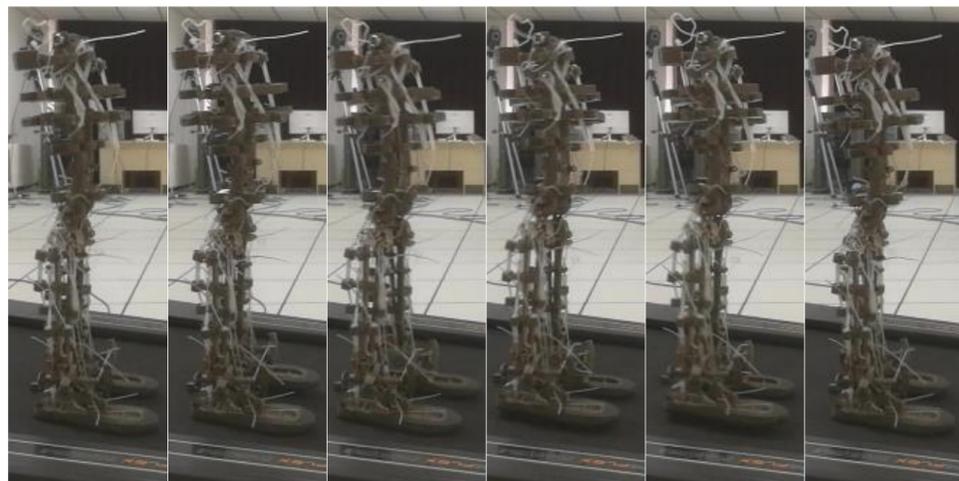
Results – Robot development

- **3D metal printing skeleton (A)**: anthropometric data (mass distribution), key kinematic parameters, e.g., hip (C) and ankle (D), and musculoskeletal geometry (E) same as human
- **Artificial muscle groups (E)**: coiled fishing line (B) used to mimic the mechanical functions of major musculotendon units of human body



Results -- Walking test

- Passive walk with **70 steps** and **200 cm** distance (full length of the treadmill)



Walking sequence

Publications

- Towards a bio-inspired musculoskeletal robot to investigate human movement biomechanics. In Proceedings of 5th International Conference of Bionic Engineering (ICBE), Ningbo, China, June 2016.