Research Statement

Yuanshao Yang

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1 Background & Motivation

Research in Wearable Robotics Systems, such as prosthesis and exoskeleton, has advanced to the point where benefiting people with disabilities. However, most of these systems fail to offer a [smooth] experience for addressing the locomotor deficits of disabled people, due to a lack of bidirectional feedback between human locomotion and Mechatronics system.

2 Research Questions

The presence of these issues raises the following questions, which also serves as my research focus:

- How mechanical design is developed to aid the interactions between Mechatronics systems and environments?

I strive to construct and improve the experience of interactions between Mechatronics systems and human activities.

3 Related Projects

In essence, my research helps to improve the experience of human - robotics systems on the following aspects:

- I help improve series elastic actuator (SEA) designs by the implementation of torsional springs assemblies, that both spans the mechanical design space as energy storage gadgets and maintains high performance (e.g. low stiffness behaviors[1]).
- I help optimize the design of robotics systems and their control strategies from mechanical designs and computational simulations.
- I help optimize the design of the robotics software systems to create a more generalized platform in evaluating further mechanical designs and control strategies of wearable robotics systems.

3.1 Series-Spring Design & Evaluation of Open-Source Leg

3.2 Software Library Design & Generalization of Open-Source Leg

3.3 Design & Control of Bionic Robot Swimmer

4 Future Agenda

My long-term research goal is keeping to ..
My past work mainly focuses on the
Nevertheless,
Specifically, the research focus lies as follows:

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References

[1] Z. Bons, G. C. Thomas, L. Mooney, and E. J. Rouse, "An energy-dense two-part torsion spring architecture and design tool," *IEEE/ASME Transactions on Mechatronics*, 2023.