Technical suggestions and comments

1. Thank you for this suggestion, using step frequency is a more reasonable way to justify the time delays since they are directly related. The control of the ankle and knee clutches are designed to match the normal step frequency at 55 strides per minute, and we have used the corresponding gait cycle period and the typical percentage of stance (~60%) and swing (~40%) phases to justify the time delays listed in Table 2. However, we also mentioned in the text that these time delays are mostly designed empirically considering the unknown mechanical system delay and the sensitivity of the pressure insole.

For the experiment, we used three force plates on the ground instead of an instrumented treadmill, so the walking speed of the subjects was not fixed, and they had the control over step length. The average walking speed of the subjects were 1.3±0.1 m/s during the tests. We have changed the phrasing in the protocol section to make this clearer

We recognize this current control system design is prone to malfunctioning in daily usage without a metronome, considering the variability of step frequency. This can be addressed in future work by using IMUs to measure joints angles to make the control system adapted.

1. Adsf

Presentation suggestions and comments

1. a) We recognize the phrasing in the “Parameter design” subsection in our first submission is confusing and unclear, so we have rewritten this subsection. Briefly, the design process was (i) calculating the power and work performed by the exoskeleton to the knee and ankle joints using the geometric relationships indicated in Fig. 7 and 8, and normal walking (around 1.3 m/s) joint velocities and angles, as functions of the design parameters listed in Table 3. (ii) Using the two criterions on power and work performed by the exoskeleton discussed earlier to specify the design parameters.

As for the torsion spring stiffness, it is another free parameter which can be utilized to change the maximum energy that can be stored in the exoskeleton without exaggerating other geometric parameters (especially the moment arms). In this design, we switched back and forth between the stiffness and those geometric parameters, and finally found 1 Nm/rad would lead to moderate geometric parameters which make the exoskeleton compact.

b) More details about inverse kinematics and dynamics

1. Review the structures
2. Thank you for your suggestion, we have reviewed the manuscript carefully to reduce potential grammatic mistakes and unclear expressions.
3. The reason for not connecting ropes in the EXO\_OFF condition is even if the clutches are open, the thigh and foot are still connected by the two ropes and the torque spring. Without controlling the clutches to couple and decouple the torque spring from knee joint and ankle joint, it will impose large hindering moments at both joints during walking. The functionality of the clutches is mainly to hold the torque spring without passing moments to knee or ankle during some periods in a gait cycle. The kinematic constraints evaluated by the EXO\_OFF condition are those imposed by the foot, shank braces and the artificial ankle joint connecting them. We have made this explicit in the manuscript
4. Thank you for helping us improve the langrage in details. We think your expressions are easier understood than ours, thus we have adapted it into the text.

Other Minor Comments

1. Adsf.
2. Thank you for pointing this out, and we have noticed the confusion. We have replaced the less meaningful equations by those directly related to the parameter design, i.e. the calculations of the negative power and work performed by the exoskeleton to the knee and ankle joints. And now the notations in those equations are explained in the text.
3. Yes, the next step would be to use surface EMGs to monitor the muscle activities wearing the exoskeleton, and more importantly, use a respiratory system to measure the metabolic expenditure. These results will suggest more information at the physiologic level, which may be more relevant to the evaluation of “benefits to human”. But please kindly allow us to reserve these tests as future work due to the time and expenses required to conduct these more advanced experiments.
4. For wearers weighing more than 65 kg, a larger torsion spring stiffness may be chosen to make the exoskeleton able to store more energy. We have included this in the “Parameter design” subsection.