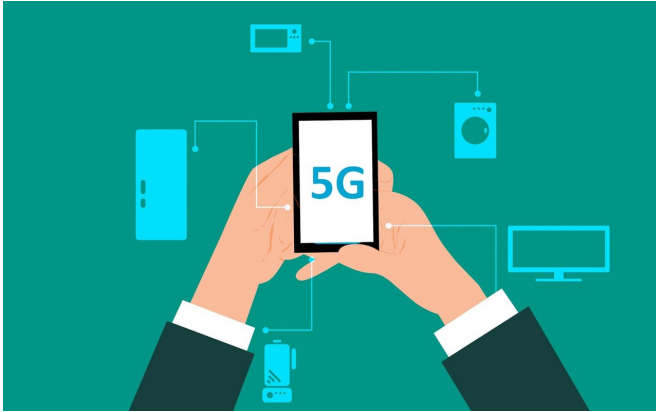


# Enabling remote whole-body control with 5G edge computing

15 September 2020



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There are many real-world—and, someday, off-world—applications for light-weight, energy-efficient, fully autonomous robots. Yet the more autonomous a robot is, the greater its computational requirements. Onboarding the components to handle this computational function adds weight, cost and reduces potential for applications in hostile environments.

It might thus be desirable to offload intensive computation—not only sensing and planning, but also low-level whole-body control—to remote servers in order to reduce on-board computational needs. 5G wireless cellular technology, with its low latency and high bandwidth capabilities, has the potential to unlock cloud-based high performance control of complex robots. However, state-of-the-art control algorithms for legged robots can only tolerate very low control delays, which even ultra-low latency 5G edge computing can sometimes fail to achieve.

In this work, the investigators, led by Ludovic Righetti, associate professor of electrical and [computer engineering](#) and mechanical and

[aerospace engineering](#), and a member of NYU WIRELESS, investigate the problem of cloud-based whole-body control of legged robots over a 5G link. Their novel approach consists of a standard optimization-based controller on the network edge and a local linear, approximately optimal controller that significantly reduces on-board computational needs while increasing robustness to delay and possible loss of communication.

Simulation experiments on humanoid balancing and walking tasks that includes a realistic 5G communication model demonstrate significant improvement of the reliability of [robot](#) locomotion under jitter and delays likely to experienced in 5G wireless links.

**More information:** Zhu et al., Enabling Remote Whole-Body Control with 5G Edge Computing. [arXiv:2008.08243 \[cs.RO\]](#). [arxiv.org/abs/2008.08243](https://arxiv.org/abs/2008.08243)

Provided by NYU Tandon School of Engineering

APA citation: Enabling remote whole-body control with 5G edge computing (2020, September 15) retrieved 1 October 2020 from <https://techxplore.com/news/2020-09-enabling-remote-whole-body-5g-edge.html>

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