NRI: FND: Action-perception loops over 5G millimeter wave wireless for cooperative manipulation
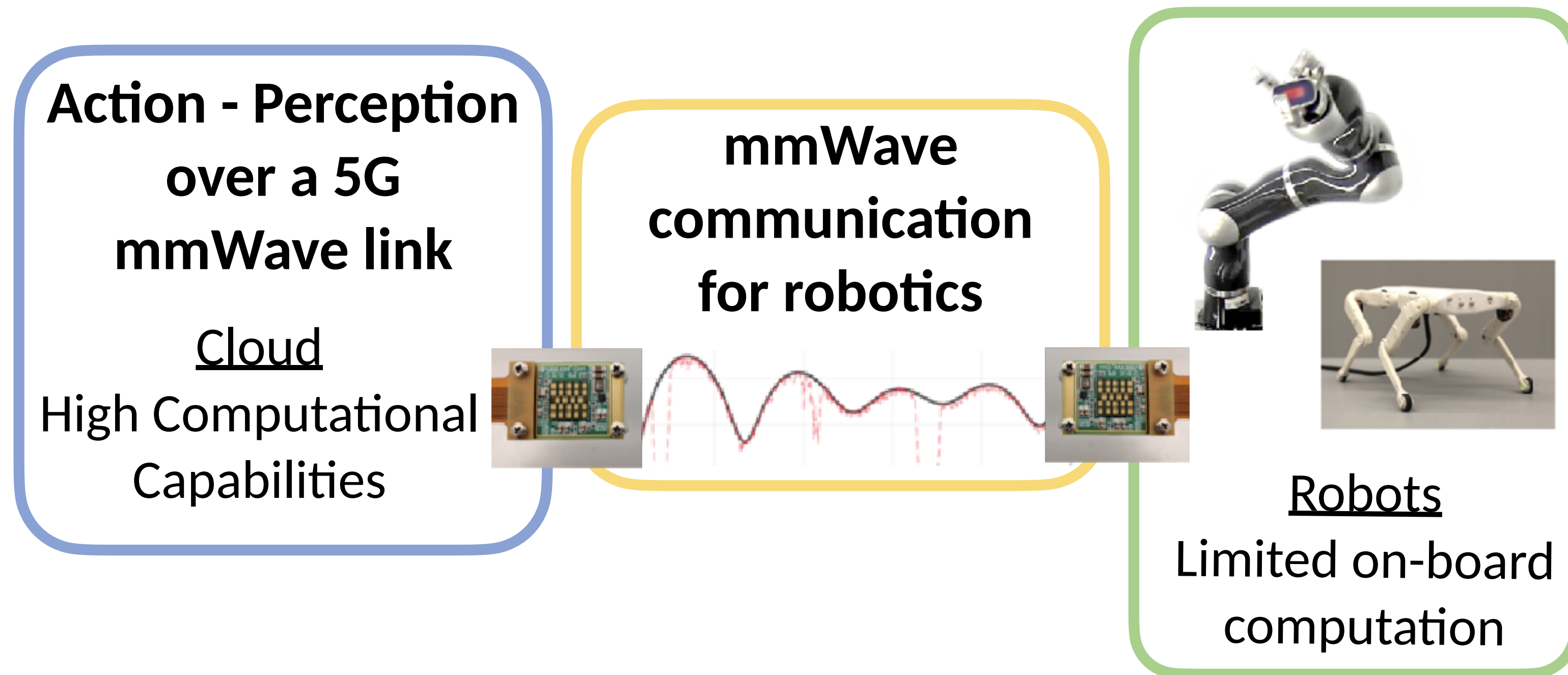
L. Righetti, S. Garg, E. Erkip and S. Rangan, New York University

Challenge

Autonomous robots need increasing access to computation but available on-board computing is limited

=> Exploit high bandwidth and low latency communication offered by 5G wireless to **offload real-time action-perception loops to the network edge**
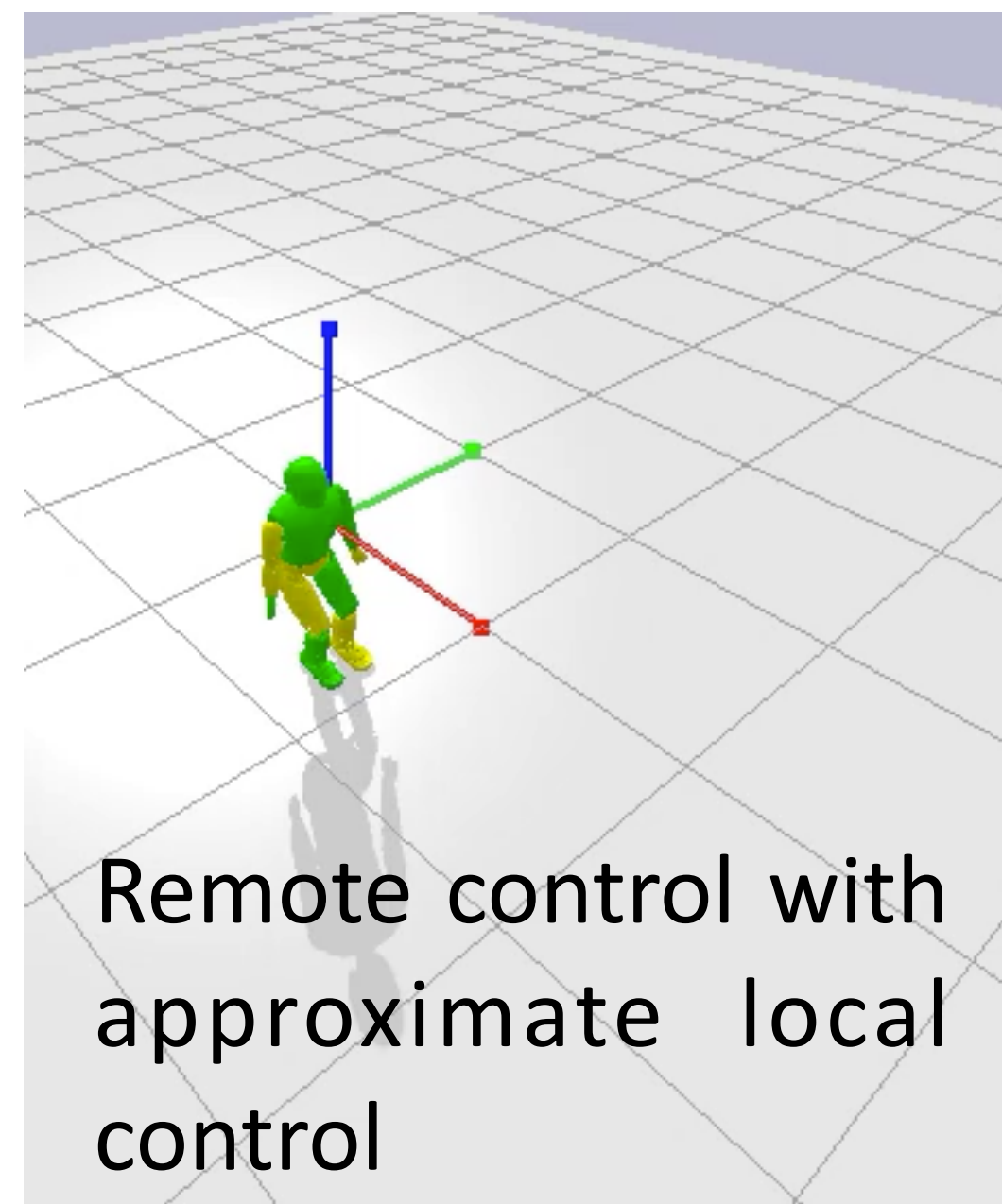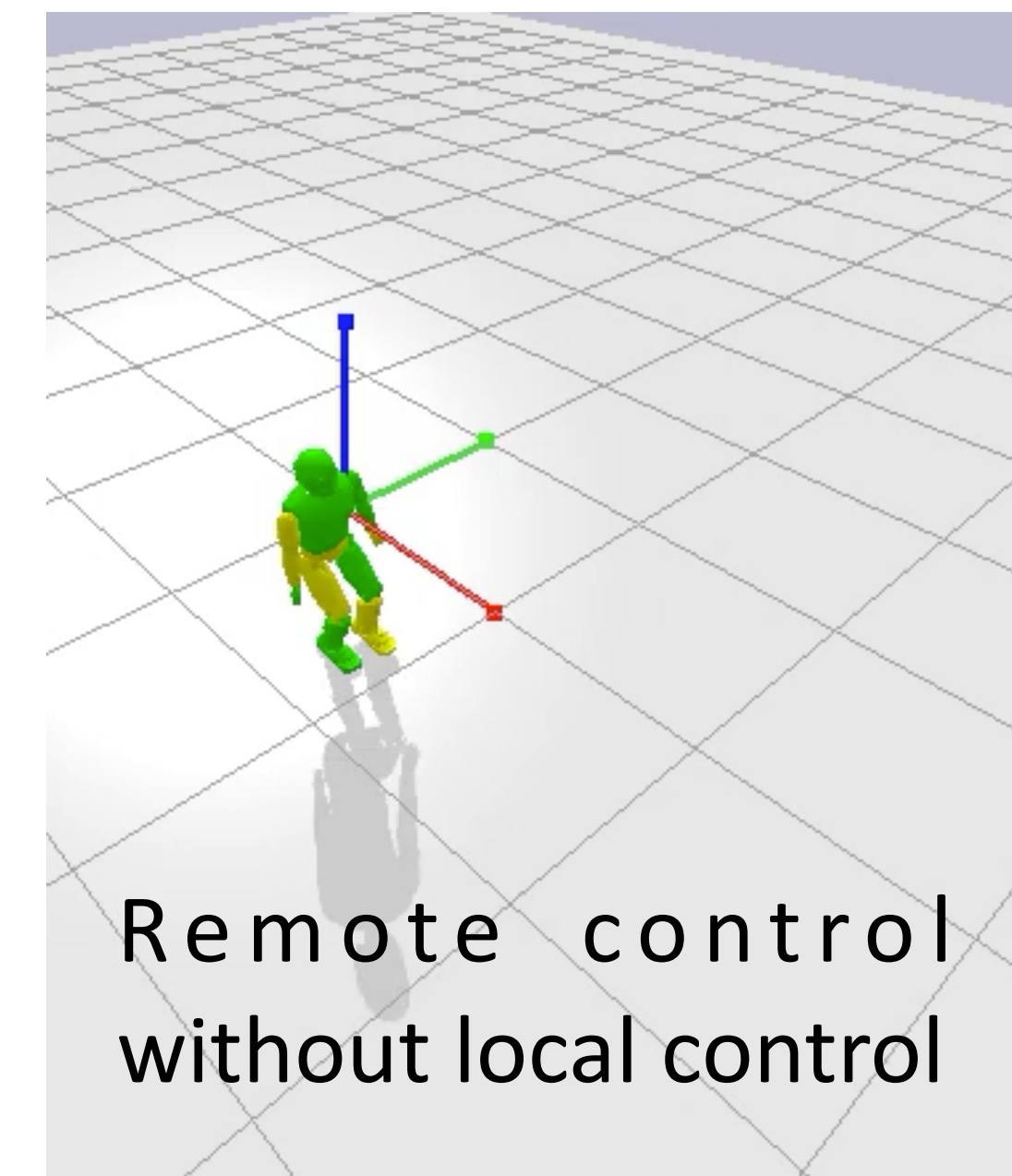
- Split control algorithms (Local + Edge)
- Wireless-aware perception
- Planning to reduce communication loss
- Robotics-centered wireless models

Action - Perception over a 5G mmWave link

Cloud
High Computational Capabilities

mmWave communication for robotics

Robots
Limited on-board computation

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Remote control without local control

Remote control with approximate local control

Physics simulation including realistic 5G communication with blockages (various indoor environments)

Remote/local whole-body controller robust to blockages

[Zhu et al. IROS 2020]

Broader Impact

Lowering barrier to entry for industries and academia (open-source software / relation with industries through NYU Wireless)

K12 Summer Machine Learning Program (all PIs)
K12 ARISE: New York-centered summer research experience for high school students

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