Nonlinear Model Predictive Control of a 3D Hopping Robot

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Current Challenges

Model based control has demonstrated broad success on a variety of robotic platforms.

Most if not all demonstrations rely on the use of simplified models which **limits the theoretical justification.**

Additionaly, many of the current solutions are **computationaly expensive** due to solving optimization probelms.

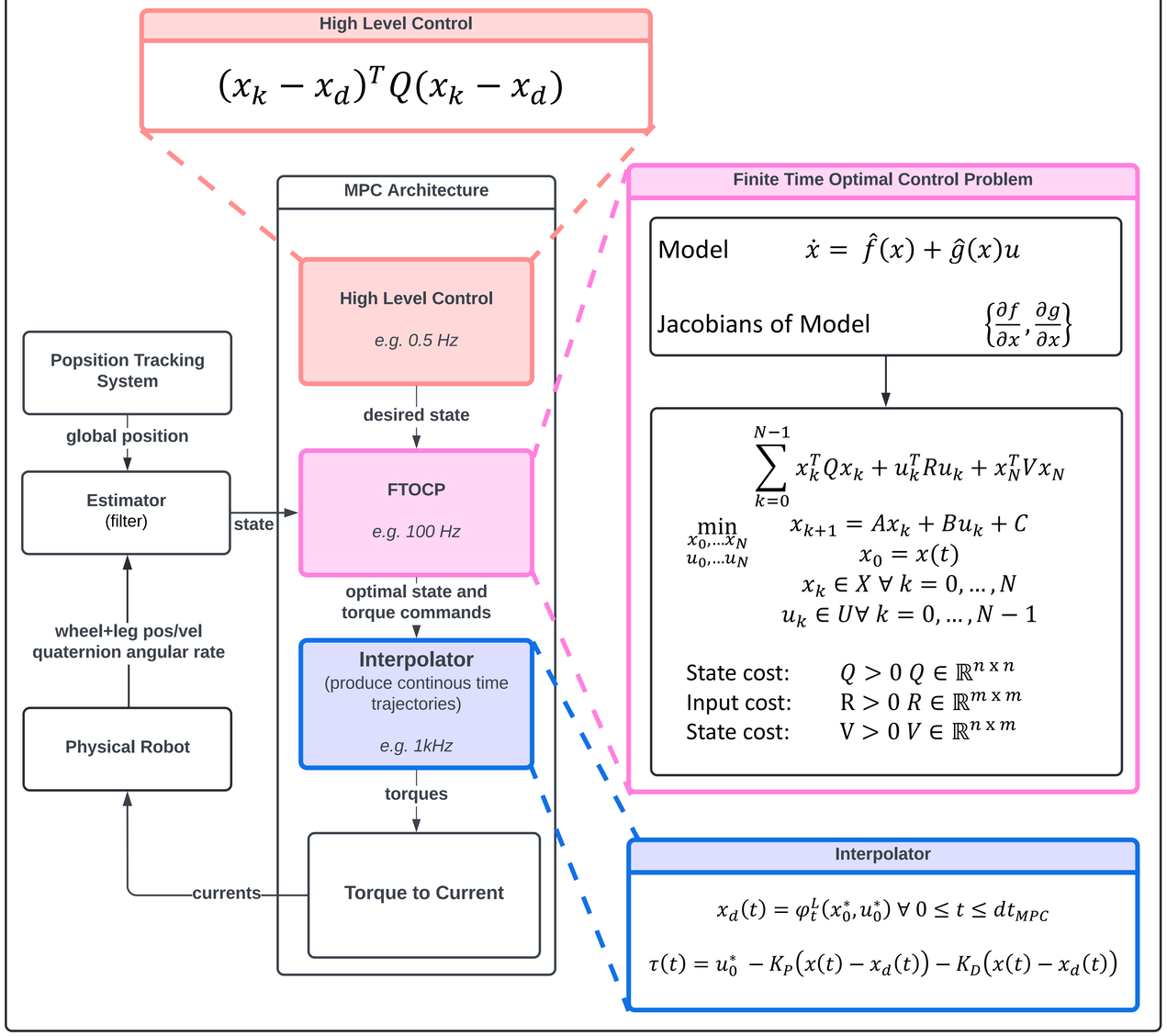
Our Approach

Our approach aims at **using the actuated coordinates to control the underactuated coordinates.**

We observe that **we do not need to optimize MPC while in the flight phase** in a theoreticaly justifiable way.

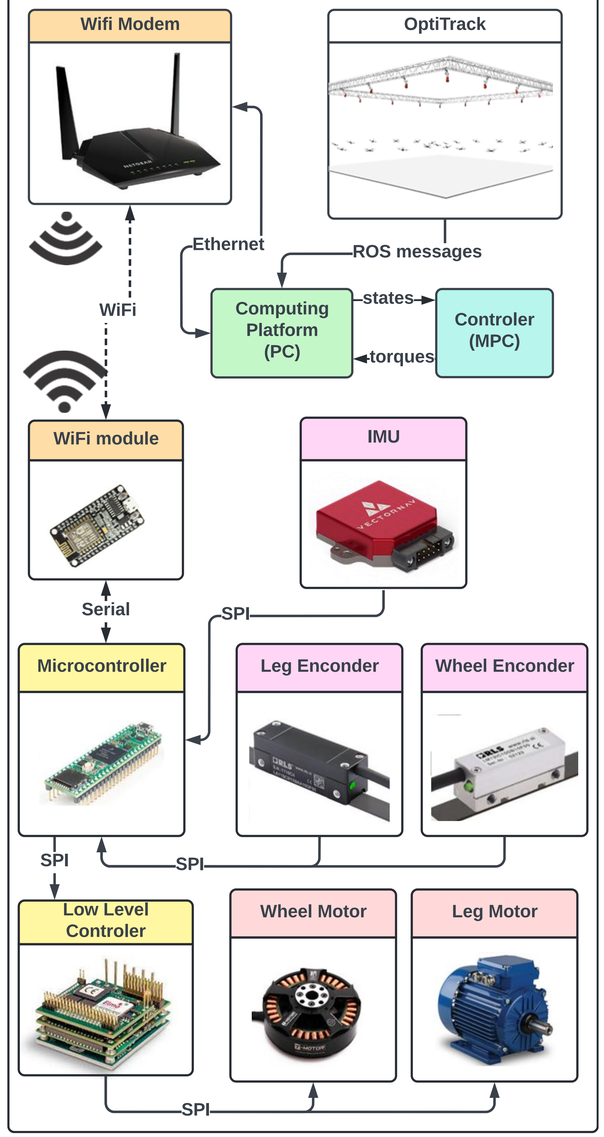
We demonstrate **success in simulation and initial progress** on a custom developed robotic hardware.

Control Architecture

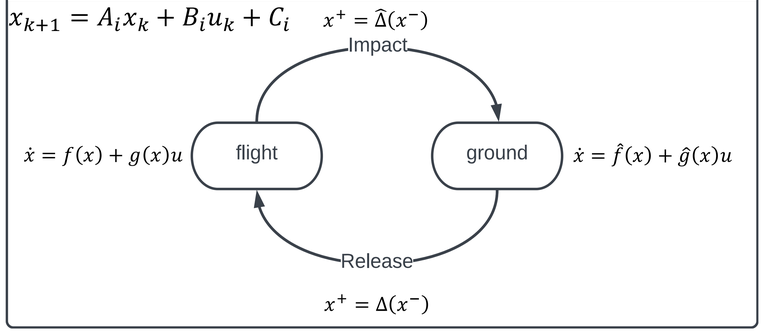


Robotics Hardware

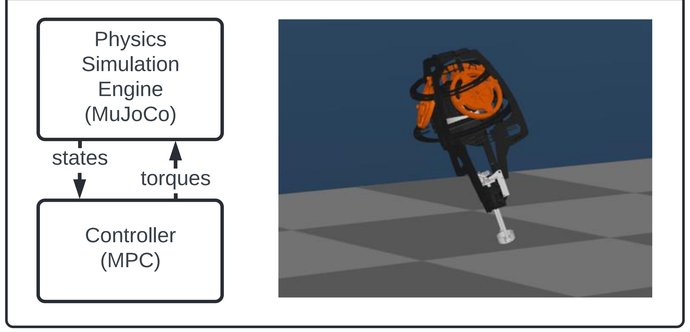
Communication Archuitecture



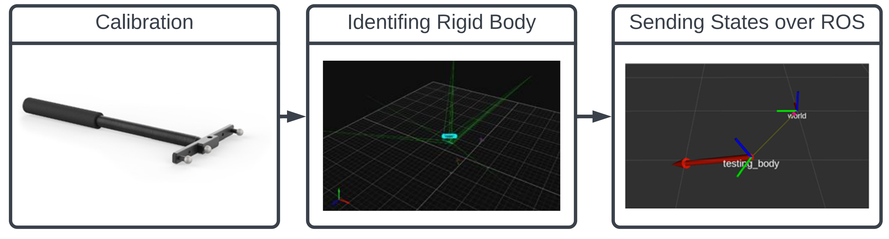
Hybrid Dynamics of the Robot



Simulation Testing



Global Positioning System Using OptiTrack



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