ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC CÔNG NGHỆ THÔNG TIN

UIT INNORESEARCH CONNECT 2025
/// KẾT NỐI NGHIÊN CỨU - KIẾN TẠO TƯƠNG LAI

SpotMicro-Inspired Quadruped Robot

This project presents a quadruped robot inspired by SpotMicroAI, featuring custom 3D-printed parts for cost-efficient, high-quality design. Powered by Jetson Nano with ROS, it offers precise control, smooth movement, and advanced vision with a camera and LiDAR. Using Genesis for virtual training, it ensures safe, efficient development, with seamless hardware-software integration.

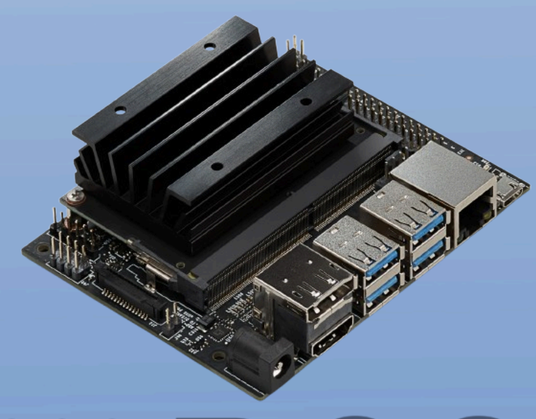
CS-UIT AI CLUB

ROBOT MODEL

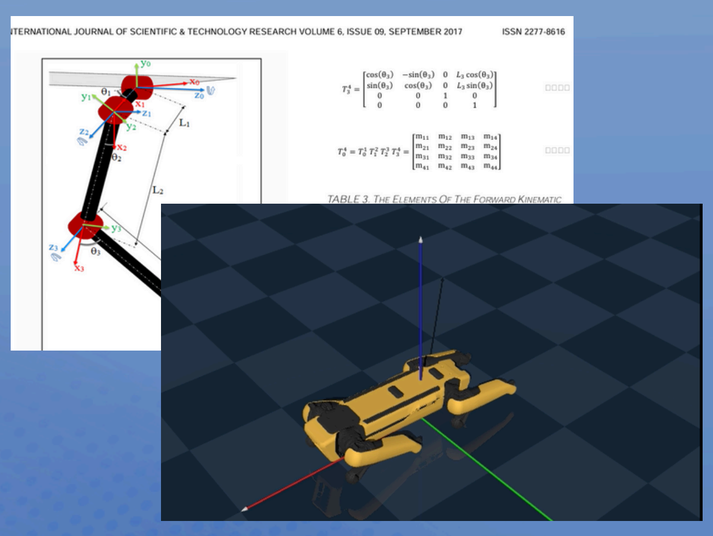
In our SpotMicroBot project, inspired by the SpotMicroAI design, we utilized 3D printing technology, leveraging our custom-built 3D printer to manufacture high-quality parts. This approach allowed us to maintain precise control over the design and quality of each component while keeping production costs in check. Our custom 3D printer was meticulously calibrated to ensure that the printed parts met strict dimensional accuracy and durability standards, resulting in a robust and reliable robot. By using our in-house 3D printing setup, we effectively minimized expenses, making the project both cost-efficient and high-performing.

JETSON WITH ROS

Additionally, we chose the Jetson Nano with ROS (Robot Operating System) for controlling our SpotMicroBot, providing several key advantages. The Jetson Nano's high-performance computing capabilities ensure smooth and responsive control of the robot, minimizing delay and enhancing movement precision. This setup is particularly beneficial when implementing reinforcement learning (RL) for autonomous navigation, where Jetson Nano with ROS outperforms other options in both efficiency and flexibility. Moreover, our system demonstrates a seamless integration of hardware and software, ensuring optimal performance through harmonious coordination between components.



ROS



INVERSE KINEMATICS WITH GENESIS

In our SpotMicroBot project, we implemented inverse kinematics (IK) to precisely control the robot's leg movements, ensuring smooth, accurate motion across various terrains. The IK algorithm calculates the required joint angles for each leg to achieve a target position, providing stable and adaptive movement. To refine and test these kinematics, we utilized Genesis, a virtual environment that allowed for safe, efficient simulation of the robot's behavior under different conditions. This approach ensured that the IK was optimized before deployment on the physical robot, reducing the risk of hardware errors and improving overall performance.

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