# HUMANOID LOCOMOTION AS NEXT TOKEN PREDICTION

Tech ID: 33980 / UC Case 2025-110-0

## PATENT STATUS

Patent Pending

## BRIEF DESCRIPTION

Advancing the field of robotic agility, this technology treats the complex challenge of bipedal balance and movement as a generative sequence problem. By framing physical movement similarly to language modeling, UC Berkeley researchers have developed a system where a humanoid robot predicts its next motor action as a "next token" based on a vast history of sensorimotor trajectories. The model is trained on diverse data, including real-world robotic walks and simulated movements, allowing it to anticipate the necessary joint adjustments and equilibrium shifts in real-time. This approach enables the robot to navigate uneven terrain and respond to external perturbations with a level of fluidity and adaptability that traditional, rigidly programmed control laws often struggle to achieve.

## SUGGESTED USES

- Disaster Response and Recovery: Deploying humanoid robots into unstable environments, such as collapsed buildings, where they must autonomously adapt their gait to navigate debris and unpredictable surfaces.
- Assistive Healthcare Robotics: Developing mobile service robots capable of moving safely and naturally within dynamic human environments like hospitals or elderly care facilities.
- Industrial Inspection: Utilizing agile bipedal robots to traverse stairs, ladders, and cluttered pathways in refineries or power plants that are inaccessible to wheeled platforms.
- Logistics and Delivery: Improving the "last-mile" delivery capabilities of humanoid systems that must navigate suburban sidewalks, curbs, and doorsteps.
- Space Exploration: Implementing robust locomotion models for planetary rovers that require high-order balance and movement capabilities on rocky, extraterrestrial landscapes.

## ADVANTAGES

- High Generalization: Unlike traditional controllers tuned for specific surfaces, this generative model can generalize to novel environments by drawing on its massive training set of diverse trajectories.
- Real-Time Responsiveness: The "next token" prediction architecture allows for extremely low-latency adjustments, enabling the robot to recover from slips or pushes instantly.
- Simplified Programming: Eliminates the need for manually engineered physics models by allowing the robot to "learn" the nuances of dynamics directly from data.
- Improved Fluidity: The sequence-based prediction results in more natural, human-like motion profiles that reduce mechanical wear and improve energy efficiency during long-distance travel.
- Robustness to Sensor Noise: The probabilistic nature of the model allows it to maintain stable locomotion even when onboard sensor data is imperfect or intermittent.

## RELATED MATERIALS

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Pre-Training Auto-Regressive Robotic Models With 4D Representations
- In-Context Learning Enables Robot Action Prediction in LLMs
- RealWorldPlay: Physical AI In-Situ Revisited
- Llarva: Vision-Action Instruction Tuning Enhances Robot Learning

## CONTACT

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## INVENTORS

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## OTHER INFORMATION

**CATEGORIZED AS**

- **Computer**
  - Software
- **Research Tools**
  - Other
- **Engineering**
  - Robotics and Automation

**RELATED CASES**

2025-110-0



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