Deep Learning of Biomimetic Sensorimotor Control for Biomechanical Human Animation

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SUMMARY

UCLA researchers from the Department of Computer Science have developed a computer simulation model and associated software system for biomimetic human sensorimotor control.

BACKGROUND

Computer animation and CGI are playing increasing roles in modern movies, especially when it comes to recreating human movement. Better biomechanical modeling should, in theory, lead to more realistic human animation. Advances in deep learning and biomechanical modeling have the reawaken the animation community's interest in machine learning techniques. Previously, computers were not powerful enough to train the complex deep learning architectures required to recreate motion. Furthermore, biomechanical models were limited to "stick figures" in the past, whereas models now incorporate anatomically and mechanically accurate features. This invention takes this a step further by now incorporating sensorimotor information to control these biomechanical models.

INNOVATION

UCLA researchers have developed a computer simulation model and associated software system for biomimetic human sensorimotor control. Previous models have neglected a very important aspect of human movement, the incorporation of sensorimotor information. Human movements use sensory feedback like visual information to adjust motor output in order to accomplish goals (e.g. reaching for an object). This innovation successfully integrates biologically accurate models of the visual system as feedback to control models of the musculoskeletal system. This integration allows their simulation to perform reaching and grasping tasks and even drawing and writing tasks with great accuracy.

APPLICATIONS

- Human animation for:
- Motion pictures
- Video games
- VR and augmented reality
- Medical education
- Robotics

ADVANTAGES

- Integrates sensory and motor modalities
- More realistic movement

PATENT STATUS

Country	Type	Number	Dated	Case
Japan	Issued Patent	7646214	03/07/2025	2019-483
United States Of America	Issued Patent	12,198,274	01/14/2025	2019-483
European Patent Office	Published Application	3984001	04/22/2022	2019-483

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OTHER INFORMATION

KEYWORDS

Movement, biomechanical, sensorimotor, visual, motor, machine learning, deep learning, artificial neural networks, simulation, animation

CATEGORIZED AS

- **Biotechnology**
  - Other
- **Computer**
  - Other
  - Software
- **Medical**
  - Software
- **Sensors & Instrumentation**
  - Other

RELATED CASES

2019-483-0

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