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Abstract

At the forefront of human-computer interaction, Brain-Computer Interface (BCI) technology is redefining system integration, enabling a future where the Internet of Things (IoT) and robotic systems are seamlessly controlled by neural intent. As BCI-integrated systems shape the future internet, real-time distributed solutions will increasingly rely on AI and machine learning (ML), orchestrated through users' thoughts. This article presents an open-source automation platform designed for BCI systems, developed in compliance with data privacy regulations. By streamlining documentation and protecting neural data through RSA-based encryption and automated file management, the platform enhances security and accountability while ensuring participant confidentiality. A comprehensive case study demonstrates the platform's capabilities through an "Avatar" system that integrates Unmanned Aerial Vehicles (UAVs) and humanoid robotics using a dataset of over 4,000 EEG readings. The framework utilizes a dual-stream video architecture to facilitate immersive telepresence, bridging the gap between remote aerial sensing and localized human presence. This implementation is driven by the fundamental belief that human thoughts, when mapped through BCI-driven kinematics, possess the physical power to move and interact with the world. The open-source software solution—supporting PyTorch, TensorFlow, and JAX—is available on GitHub, providing a scalable foundation for brain-cloud connectivity and neuroscientific innovation.

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Keywords

integrative medicine, robotics, nanotechnology, artificial intelligence, biomedical computing, big data analytics, biomimetics, brain-computer interfaces, cloud computing, clinical trial, ethics and regulatory frameworks, augmented humans, new integrative science, biohybrid systems, immersive reality, avatar, quantum computing, quantum blockchain.

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