

Call for Papers
IEEE Transactions on Human-Machine Systems
Special Issue on Ergonomics, Cognition, and Brain Enhancement

With the development of intelligent systems, the main challenge facing modern human-machine systems is to coordinate technological development with the dynamics and complexity of social, cognitive and emotional processes in these environments, while taking into account the diversity and complexity of human needs. This coordination includes efficient human-machine collaboration, which proves to be resilient to critical situations, and promotes creative solutions to problems in such situations. In addition, the activation and functional connection of brain regions by different task operations have a crucial impact on cognitive ergonomics. For example, the research of driving, navigation, and flight provides requirements for operator-automation collaboration to fully restore operational behavior after a “failure.”

Human cognitive factors mainly include human vision and hearing, human brain state, and the degree of work fatigue caused by working conditions. Human-machine interaction equipment mainly includes displays, controllers (handles, joysticks, steering wheels, buttons). In addition, some environmental factors such as temperature, humidity, sound, vibration, and lighting affect people's cognition by amplifying the so-called situation awareness demons. The special issue of cognition-oriented brain-machine enhancement focuses on the interaction between human cognitive status and ergonomic enhancement in the context of a task. The purpose of this special issue is to reveal the changes in the cognitive law of operators and new methods of cognitive enhancement when complex operation tasks are performed.

Potential contributions may address, but are not limited to, the following topics:

- Brain function allocation corresponding to different operation tasks
- Force tactile perception and feedback enhancing cognitive ergonomics
- Synergistic development and hybrid enhancement of perceptual intelligence and cognitive intelligence (flight intelligence cockpit, space docking)
- Intelligent evolution mechanism of cognition, decision-making and human-machine systems under the condition of multi-domain confrontation
- Emerging trends and new devices for cognition and brain enhancement (cognitive wearables, robotics)
- Cognitive wearables and robotics supporting human cognitive enhancement
- Task ergonomics evaluation by the evolutionary laws of brain cognition
- Formation mechanism of brain function loops corresponding to operations
- Coupling among tasks, ergonomics and brain function activation and connection
- Techniques for situation awareness enhancement in human-machine systems
- New theory and applications related to ergonomics, cognition and brain enhancement.

Important Dates:

- Manuscript initial submission: July 31, 2025
- Notification of first round of reviews: October 31, 2025
- Revised manuscript submission: December 31, 2026
- Notification of final decision: February 28, 2026

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