



Information Technology and Software

Game and Simulation Control

Control modification through user
physiological state

NASA's Langley Research Center has developed a technology at the forefront of a new generation of computer and video game environments that train valuable mental skills, beyond eye-hand coordination, for the personal improvement, not just the diversion, of the user.

Monitoring and enhancement of operator state is an objective of the current LaRC Intelligent Integrated Flight Deck Technology (IIFDT) program. Prior research by the inventor, Alan Pope, modulate (based on player physiological signals) the manual inputs that a player makes to the buttons or joysticks of a video game hand controller. However, a new type of controller allows a player to make inputs to a video game by moving the entire controller itself, allowing the present inventions entirely new approach to integrating psychophysiological signals into game play.

BENEFITS

- ➔ **User-Control Interaction:** Introduces, for the first time, user-control interaction with the Wii video game system via the users physiological signals.
- ➔ **Variety:** Can be used with several physiological signal-measuring devices (heart rate, muscle tension, and brain wave activity).
- ➔ **Wireless:** Operates with third-generation gaming consoles wirelessly.
- ➔ **Low Power:** Use of LED infrared communication reduces device power consumption.
- ➔ **Healthy Living:** Encourages healthenhancing physiological self-regulation skills and therapeutic amplification of healthful physiological characteristics.
- ➔ **LED Embodiment:** The current invention interacts wirelessly with the Wii remote through infrared signal.

technology solution



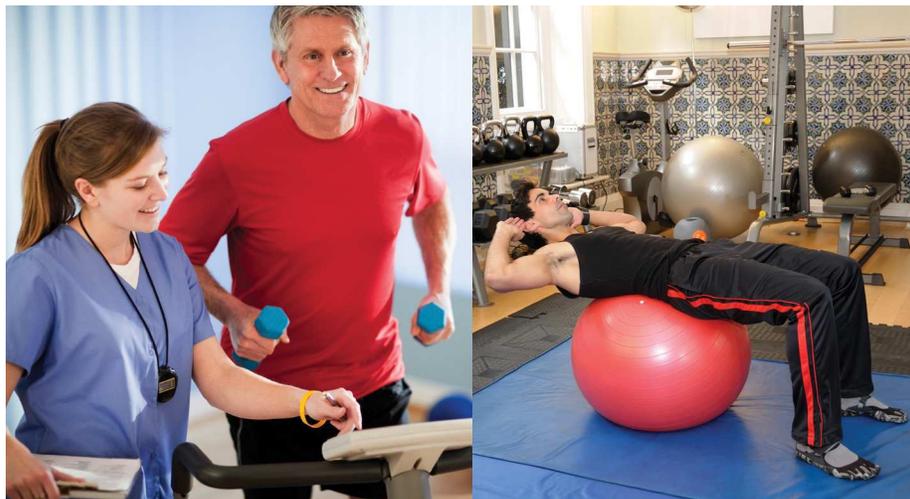
NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

THE TECHNOLOGY

The technology is constructed to allow modulation of player inputs to a video game or simulation from a user interface device based on the player's psychophysiological state. The invention exploits current wireless motion-sensing technologies to utilize physiological signals for input modulation. These include, but are not limited to, heart rate, muscle tension, and brain wave activity.

The current capability has been successfully prototyped using the Nintendo Wii console and wireless Wii remote. The experience of electronic game play may also be enhanced by introducing a multiplayer component in which various players collaboratively pursue the goals of the game. The device can also enhance multiplayer experiences such as a video game tournament, in which the skill set required in competitive game play is increased by allowing players to interact with the game, and compete with one another, on a psychophysiological level. This system is compatible with the Nintendo Wii, and prototypes have been designed and are being developed to extend this capability to the PlayStation Move, Xbox Kinect, and other similar game platforms.



The NASA technology could be used to improve athletic performance.

APPLICATIONS

The technology has several potential applications:

- Consumer brain-computer interface devices
- Biofeedback equipment
- Third generation video game systems
- Physical therapy
- Third-party video game peripherals
- Athletic training
- Mind-body medicine

PUBLICATIONS

Patent No: 8,858,325; 9,084,933; 8,827,717

Patent Pending

National Aeronautics and Space Administration

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NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

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