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(57) Abstract :

A neuromuscular-adaptive communication device, comprising a handheld housing 101, a plurality of finger-actuated input buttons 102 to align with fingers of an impaired user, a vibrating unit to provide adaptive tactile feedback based on real-time neuromuscular condition of the user, a calibration unit to detect individual finger strength, tremor characteristics, press duration, and fatigue-related force variation during initial and continuous use, the calibration unit includes a rolling gesture detection unit 103 to detect sequential rolling and sliding finger gestures and translate the gestures into characters, commands, or communication outputs without requiring simultaneous multi-finger actuation, an adaptive fatigue detection module to continuously analyze tap velocity, inter-tap timing consistency, tremor frequency, miss-hit occurrences, and pressure variability, a directional speaker array 105 to selectively operate in a private whisper mode with narrow acoustic projection or a public omnidirectional broadcast mode.

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