

Smartbell: Chip-enabled and AI-driven Dumbbells for Optimized Upper-Body Strength Training

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Many individuals with lower-limb immobility lack access and motivation to engaging and effective upper-body strength training. This project aims to address this problem with Smartbell, a chip-enabled and AI-assisted dumbbell system designed to provide accessible and gamified exercise. The system comprises a dumbbell, a modular sensor unit, and a computer interface. The modular component incorporates sensors and a microcontroller to track its orientation and collect user feedback, transmitting it wirelessly to a computer. A gamified interface on the computer program will display 'targets' on a monitor, guiding the user through a series of pre-designed upper body exercises by directing them to move the device to specific positions. Each successful movement toward a target will reward the user with points and trigger musical notes that contribute to a progressing melody. In addition, a camera will monitor the user's exercise, identifying and tracking the device and joint movements in real-time. Testing showed that Smartbell successfully tracked movement, made adjustments to the program based on user heart rate feedback, and helped increase my upper-body strength. This project demonstrates the possibility of an interactive training tool that makes upper-body strength training more engaging and accessible. Smartbell may have applications in gyms, rehabilitation centers, physical therapy, and at-home fitness.

Awards Won:

