Vibrating armband helps athletes make the right moves

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(Phys.org)—An engineering team from Imperial College London have come up with a vibrating armband tagged Ghost that can train a person's muscles and teach the user how to swing like Nadal, or play golf like Tiger, or help improve moves in other sports. The vibrating device, in prototype stage, is called Ghost because it can copy another person's movement. The user can download the movements of Wimbledon tennis players, for example, and the device will teach the user how to copy the stars' movements. Arm motion can be digitally recorded from the player of choice, and that arm motion is uploaded to the armband from the computer.

Through "muscle memory" the player, in a tennis practice scenario, can attempt to repeat the serve. "Muscle memory" is when sports players are able to perform a precise movement unconsciously after repeatedly practicing the same task. The hand and armband device uses vibrating pads and sensors to fine-tune arms into carrying out the preplanned movements.

Benedict Copping, an engineer at Imperial College London and the Royal College of Art and the team leader, said: "A coach can set a series of way points that the wearer has to move through and the device tells them if they are hitting them by vibrating as they move." The Ghost has an array of sensors that detect the twisting and flexing of a person's joints. LED lights tell the user of stroke accuracy. Vibrators help guide the path of the arm.

The vibrating armband originated, though, as not something for aspiring Wimbledon stars but as an assistive device to teach blind athletes how to swim. "Ghost: A Paralympic Trainer" was purposed as a wearable coaching aid that would give feedback when certain moves were correctly executed. The designer team noted that it is vision that allows people in sports to imitate and refine muscular movements. Those with severe visual impairments find it difficult to correct complex motion skills.

The Ghost team noted how swimmers practice to refine and polish their stroke mechanics, and vision allows sighted swimmers to imitate and refine muscular movements. Having a severe visual impairment can make it difficult to correct and perfect complex motion skills; the visually impaired cannot make use of coaching demos or video analysis techniques, for example. The team's device provided instant feedback via vibration for constant technique improvement in conjunction with or in the absence of the coach.

Feedback of the athlete's motion was along a predefined pathway, made of a series of gateways memorized by the device and set by the coach, which allowed them to form competitive muscle memories through repetition. The athlete guided motions through these gateways by strong LED indications and vibration at each joint.

The device was programmed from an Arduino mini, using off the shelf components.

"For people who cannot see very well, this could allow them to practice technique and become really efficient," said Copping.

More information: workspace.imperial.ac.uk/engin … ublic/Projects/Group%207%20Ghost.pdf