Player Analysis Technology Approval report

Armbeep

Test code: PAT-19-018

Serial no: n/a

Software versions:
1.0 (iOS), 1.0.5 (Android)

Firmware version:
1.3

Issue date: 3 October 2019

Objective: To test and evaluate Armbeep Player Analysis Technology according to Rule 31 of the 2019 Rules of Tennis.

Result: Approved

SUMMARY

The Armbeep device (mass 12 g) containing electronic sensors is held against the wrist of the user using a wristband. The sensors measure the orientation and acceleration of the arm, from which are calculated activity- and shot-related parameters. The device also measures heart rate variability.

Data collected by the device can be transmitted to an auxiliary device, e.g. laptop, via wired (USB) connection.

Coaching information, including wrist speed and acceleration, shot type, shot frequency and heart rate, is available on the auxiliary device.

Restrictions on the access by a player to Armbeep components during periods when coaching is and is not allowed are as follows:

COMPONENT	NO COACHING	COACHING
Armbeep device	Permitted	Permitted
Auxiliary device (e.g. laptop)	Not permitted	Permitted

MAIN COMPONENTS

The main components of the system are described in table 1 and depicted in figure 1.

COMPONENT	FUNCTION(S)
Armbeep device	Record motion of the user's playing arm and heart rate; store and transmit data
Armbeep Uploader software	Transmit data
Auxiliary device (e.g. laptop)	Transmit and communicate data
Armbeep server	Store and process data
armbeep.com website	Communicate data

Table 1. Description of the components of the Armbeep system.

Figure 1. Components of the Armbeep system (from left to right): Armbeep device and auxiliary device (laptop). Images are not to scale.

DATA CAPTURE AND TRANSMISSION

A device containing electronic sensors (an accelerometer, a gyroscope and a photoplethysmogram) is held against the wrist of the user's playing arm using a wristband (see figure 2). The inertial sensors measure the orientation and acceleration of the user's arm. The photoplethysmogram measures the heart rate variability of the user. The mass of the device is 12 g and its dimensions are 34 × 29 × 12 mm.
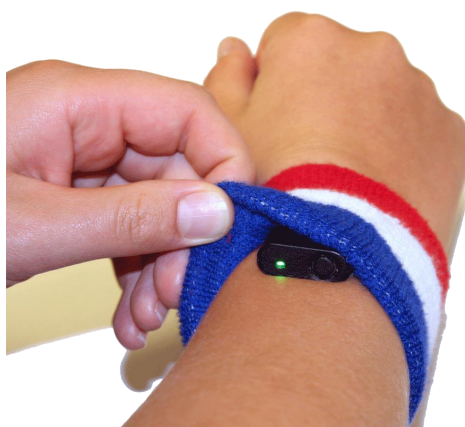

Figure 2. Armbeep device placed on the wrist of the user.

Data capture is started by pressing the power button (see figure 3). An illuminated LED next to the power button indicates that the device is 'on' (sensors are active). The device is switched off, and data capture terminated, by pressing the power button.
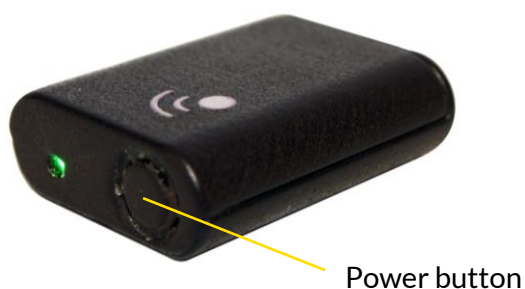
Power button

Figure 3. Power button and green LED (left).

To transmit the data, the device must be connected to an auxiliary device, e.g. a laptop, via a USB cable (see figure 4). The Armbeep Uploader software must be installed on the laptop to transfer the data from the device to the Armbeep server (via the internet).

Figure 4. USB cable connected to the Armbeep device (to download data).

COMMENTS

Start/stopping data capture is player-driven. The device must be switched on to record data. A green light indicates the device is on.

Data can only be transmitted from the device to an auxiliary device, e.g. a laptop, via a USB cable.

DATA PROCESSING AND COMMUNICATION

No coaching information is available on the device. Access to data is via the Armbeep website. The user must create a password-protected account on the Armbeep website and register their device (using the device registration code).

Coaching information is available on an internet-enabled auxiliary device (e.g. laptop or smartphone). Information includes:

1. Frequency and classification of shots (e.g. forehand/backhand).
2. Session duration and total active time.
3. Rally length estimation (i.e. short, medium or long points).

4. Wrist speeds and accelerations.
5. Heart rate and heart rate variability.

COMMENTS

No coaching information is available on the device.

Coaching information is available through the Armbeep website. Therefore, players must not have access to internet-enabled devices, such as smartphones or laptops, when coaching is prohibited.

ADDITIONAL INFORMATION

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Please note:
Approval does not attempt to, nor does it in fact, establish the accuracy or reliability of data or fidelity of its transmission.