Player Analysis Technology Approval report

ZEPP Tennis

Test code: PAT-15-012

Serial no: 1T2N1406002496

Software versions:
Android 1.3.3;
iOS 1.2.3

Firmware version: 3.3.6

Issue date: 9 February 2015

Objective: To test and evaluate the ZEPP Tennis Player Analysis Technology according to Rule 31 of the 2015 Rules of Tennis.

Result: Approved

SUMMARY

The ZEPP Tennis 'pod' (mass 8 g) containing electronic sensors is attached to the butt of the racket to record the orientation, acceleration and vibration of the racket. Data collected by the pod are sent to an auxiliary device, e.g. smartphone, via a wireless (Bluetooth®) connection.

The pod can be paired with multiple auxiliary devices with no authorisation required. Real-time data can only be transmitted from the pod to a single auxiliary device and data stored on the pod can only be downloaded once. There is no notification to the user of the pod as to which auxiliary device the pod is connected.

Coaching information, including ball impact location on the stringbed, racket trajectory, racket swing speed, ball speed (estimate) and spin, is available on the auxiliary device.

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

COMPONENT	NO COACHING	COACHING
Pod	Permitted	Permitted
Auxiliary device (e.g. smartphone)	Not permitted	Permitted

MAIN COMPONENTS

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

COMPONENT	FUNCTION(S)
Pod	Record motion and vibration of the racket; store and transmit data
ZEPP Tennis Sensor app	Analyse and transmit data
Cloud Sync (server)	Store and synchronise data across devices
Auxiliary device (e.g. smartphone)	Communicate, store and transmit data

Table 1. Description of the components of the ZEPP Tennis system.

Figure 1. Components of the ZEPP Tennis system: ZEPP Tennis pod (left); auxiliary device (smartphone).

DATA CAPTURE AND TRANSMISSION

A 'pod' containing electronic sensors (a gyroscope and two accelerometers) is attached to the butt of a racket, with an adhesive or elastic mount (see figure 2). The sensors in the pod measure the orientation and acceleration of the racket, and vibration of the frame (on impact with a ball). The mass of the pod is 8 g. The masses of the Pro Mount and Flex Mount are 4 g and 13 g, respectively.
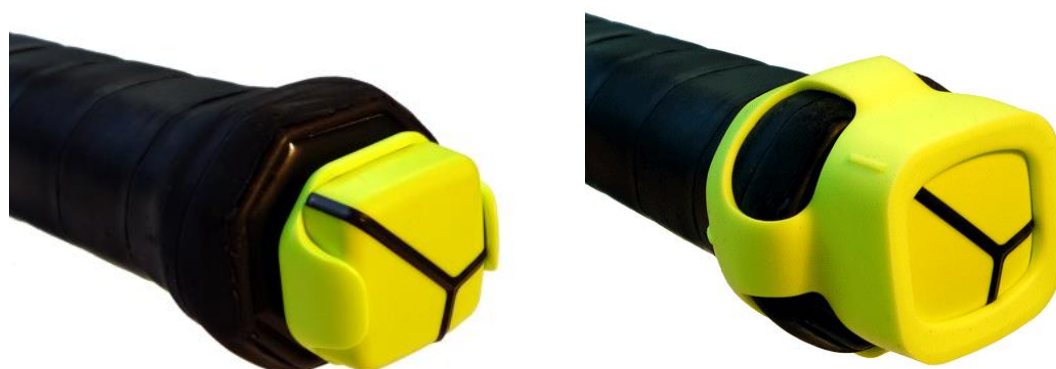

Figure 2. ZEPP Tennis pod attached to the butt of a racket using the Pro (adhesive) Mount (left) and Flex (elastic) Mount.

Data capture is started by holding the multi-function button for 4 seconds (see figure 3). A series of white LED lights indicates that the pod is 'on' (sensors are active) and the racket motion is being recorded. Data capture is stopped by holding the power button again. Data capture is paused if there is no movement of the pod for 5 minutes (the pod enters Hibernation Mode) but is resumed upon movement of the pod or pressing the multi-function button.
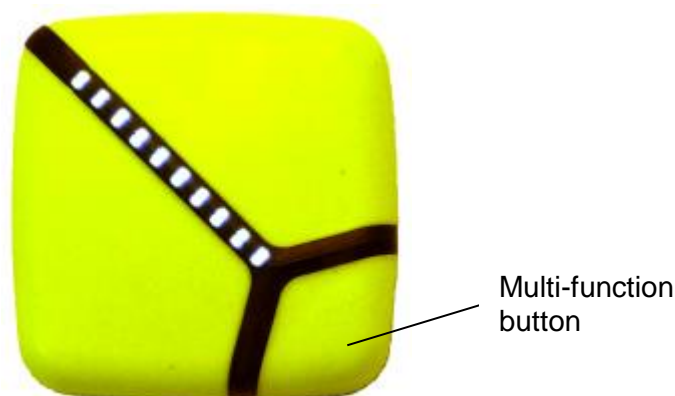

Multi-function button

Figure 3. Multi-function button (bottom right corner) and LED display.

To transmit the data, the pod must be wirelessly connected to a Bluetooth® enabled auxiliary device, e.g. smartphone or tablet. The auxiliary device must be initially paired with the pod. The auxiliary device can be paired with the pod at any time while the pod is switched 'on' (and not already wirelessly connected to another device). There is no authorisation process, e.g. password protection, to pair the auxiliary device with the pod. Although there is a passkey prompt when pairing, this can be ignored and is not needed to pair. Once the auxiliary device has been paired with the pod, the pod automatically re-connects to the device when available. If the pod has been paired with more than one auxiliary device, it will connect to the first available device.

The pod has two modes of operation:
1. Offline: data are stored on the pod and can be transmitted later.
2. Online: data are streamed, i.e. collected and transmitted, by the pod to a connected device in real-time.

The pod cannot be connected to multiple auxiliary devices simultaneously. Therefore, real-time data are only available on a single device when operating in Online Mode. Similarly, once data are imported (downloaded) to an auxiliary device they are removed from the pod, i.e. data cannot be imported to multiple auxiliary devices.

However, the pod can be paired (and connected sequentially) with multiple/different auxiliary devices, hence data collected in Online or Offline Modes can be transmitted to any device (that has been paired with the pod). For example, the pod could be connected to an initial auxiliary device which moves out of range of the Bluetooth® radio signal allowing a second device (within range) to take over the connection (with no notification to the user of the pod).

COMMENTS

The pod must be switched on to record data. White LED lights running back and forth along the pod indicate the pod is 'on'.

The pod can be paired with multiple auxiliary devices with no authorisation required. Real-time data can only be transmitted from the pod to a single auxiliary device and data stored on the pod can only be downloaded once. There is no notification to the user of the pod as to which auxiliary device the pod is connected.

DATA PROCESSING AND COMMUNICATION

Access to processed data is via the ZEPP Tennis app installed on an auxiliary device. The Cloud Sync server is used to backup (store) data and synchronise data across devices that are logged on to the same user account.

Information available on the auxiliary device includes: time and classification of shots (i.e. forehand/backhand/serve); racket trajectory, backswing time and impact time; racket swing speed; ball speed (estimate) and ball spin type (topspin/slice/flat); and ball impact location on the stringbed.

COMMENTS

The pod does not have a means to communicate data collected directly to the user. An auxiliary device with Bluetooth® connectivity is required to receive the data from the pod, and subsequently display the data.

Coaching information is available on the auxiliary device. Therefore, players must not have access to auxiliary devices, e.g. smartphone, tablet, when coaching is prohibited.

ADDITIONAL INFORMATION

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Revision number: 0

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