Player Analysis Technology Approval report

SONY Smart Tennis Sensor

Test code: PAT-14-008

Serial no: 2001590

Software versions:
Android 1.00.0.a.E;
iOS1.00.2

Firmware version: 000.001.000

Issue date: 30 July 2014

Objective: To test and evaluate the SONY Smart Tennis Sensor Player Analysis Technology according to Rule 31 of the 2014 Rules of Tennis.

Result: Approved

SUMMARY

The SONY Smart Tennis Sensor '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, though not simultaneously, 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.

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

Restrictions on the access by a player to the SONY Smart Tennis Sensor 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
Compatible racket	Accommodate pod (on butt of the racket)
SONY Smart Tennis Sensor app	Communicate and transmit data
SONY Entertainment Network 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 SONY Smart Tennis Sensor system.

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

DATA CAPTURE AND TRANSMISSION

A ‘pod’ containing electronic sensors (a gyroscope and accelerometer) is attached to the butt of a compatible racket, i.e. one with a modified butt to fit pod housing (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.

Figure 2. Smart Tennis Sensor pod attached to the butt of a racket.

Data capture is started by pressing the power button (see figure 3). A flashing red light indicates that the pod is 'on' (sensors are active) and the racket motion is being recorded. Data capture is stopped by pressing the power button again (the light turns off) or after 20 minutes of inactivity.

Figure 3. Power button (lower left) and Bluetooth® button (lower right).

To transmit the data, the pod must be connected to a Bluetooth® enabled auxiliary device, e.g. smartphone or tablet. The pod must be initially paired with the auxiliary device. A long press (7 seconds) of the Bluetooth® button (see figure 3) activates pairing mode, making the pod discoverable to auxiliary devices with which it can be paired. A flashing blue light is emitted above the Bluetooth® button. There is no authorisation process, e.g. password protection, to pair the pod with the auxiliary device. Once the pod has been paired with an auxiliary device, a short press (2 seconds) of the Bluetooth® button re-connects the pod to that device.

The pod has two modes of operation:
1. Memory Mode: data are stored on the pod and can be transmitted later.
2. Live Mode: 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 Live 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 (following a long press of the Bluetooth® button), hence data collected in Live or Memory Modes can be imported to any device (that has been paired with the pod) via the SONY Entertainment Network server. For example, one auxiliary device could be used to obtain data in real-time, whereas another auxiliary device could be used to import the very same data.

In addition, the SONY Smart Tennis Sensor app has a Live Mode Video, which combines video capture on the auxiliary device with the pod's Live Mode (real time data).

COMMENTS

The pod must be switched on to record data. A flashing red light indicates the pod is capturing data in Memory Mode (i.e. can be transmitted later).

A flashing blue light indicates the pod may be wirelessly connected to an auxiliary device and transmitting data to it in real-time (or from memory).

The pod can be paired with multiple auxiliary devices, though not simultaneously, 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.

DATA PROCESSING AND COMMUNICATION

Access to processed data is via the SONY Tennis Sensor app installed on an auxiliary device. The SONY Entertainment Network (SEN) 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/volley); racket swing speed, ball speed and ball spin rate; and ball impact location on the stringbed.

When Live Mode Video is used, racket swing speed, ball speed and spin values are displayed on the live video in real-time. During playback, shots are identified on the video timeline and can be filtered by type.

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

Client:
SONY Corporation
1-7-1
Konan Minato-ku, Tokyo
108-0075
Japan

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Report prepared by: Jamie Capel-Davies
Report authorised by: Stuart Miller
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