



Player Analysis Technology Approval report

Wingfield

Test code: PAT-19-019

Serial no: n/a

Software versions:
0.1.13 (iOS), 0.1.12 (Android)

Firmware version:
0.2.4

Issue date: 29 April 2019



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

Result: Approved

SUMMARY

A pair of cameras mounted above the net post and an additional camera at one end of the court capture images of play. The cameras are connected by cables to a central unit fitted to the net post (the "BOX") which houses a processing unit and touchscreen display. Software on the processing unit reconstructs the player positions and ball trajectories in three dimensions from the camera images.

Players must log in to the Wingfield server, by scanning a QR code using the BOX, to start data capture. No coaching information is displayed on the BOX. Players must end the session before match data are uploaded to their account. Coaching information, such as match statistics, ball speeds and ball bounce locations are then available on an auxiliary device (e.g. smartphone) via the Wingfield app.

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

COMPONENT	NO COACHING	COACHING
Wingfield BOX (cameras and display)	Permitted	Permitted
End-court camera	Permitted	Permitted
Auxiliary device (e.g. smartphone)	Not permitted	Permitted

NOTE Approval does not attempt to, nor does it in fact, establish the accuracy or reliability of data or fidelity of its transmission, including (but not limited to) the provision of ‘in’/ ‘out’ decisions for the purposes of line-calling.

MAIN COMPONENTS

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

COMPONENT	FUNCTION(S)
Wingfield BOX (cameras and display)	Capture images of play; user-interface to start/stop data capture; transmit, store and process data
Internet protocol (end-court) camera	Capture images of play
Wingfield server	Store and transmit data
Wingfield app	Communicate data
Auxiliary device (e.g. smartphone)	Communicate data

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



Figure 1. Components of the Wingfield system (from left to right): Wingfield BOX; Internet protocol camera; auxiliary device (smartphone). Not to scale.

DATA CAPTURE AND PROCESSING

A pair of cameras are mounted above the net post to capture images of play. The cameras are directed either side of the net (one camera for each side of the court). The cameras are housed inside a protective case together with a processing unit and touchscreen display called the Wingfield BOX (see figure 2). The BOX is 120 × 36 × 31 cm in size. An internet protocol (IP) camera (see figure 1) is mounted in an elevated position behind the baseline at one end of the court. This camera is connected to the BOX by an Ethernet cable.

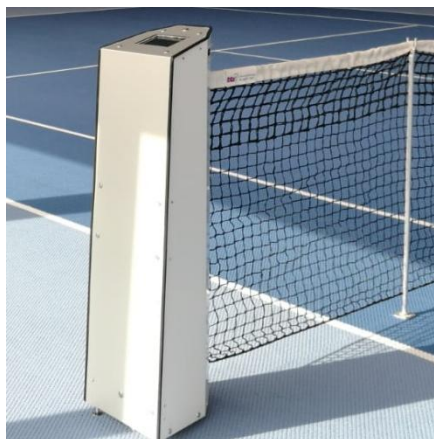


Figure 2. Wingfield BOX fitted to one of the net posts.

Software on the processing unit reconstructs the player positions and ball trajectories in three dimensions from the camera images.

At least one of the players must use the touchscreen display to log in to their Wingfield account (which is held on the Wingfield server) by scanning a QR code on their smartphone. Alternatively, the player(s) can scan a printout of the QR code (to avoid bringing a smartphone onto the court).

The following types of session are displayed on the main menu of the touchscreen display:

1. Match – the system will automatically keep score.
2. Freeplay – the system does not attempt to keep score.

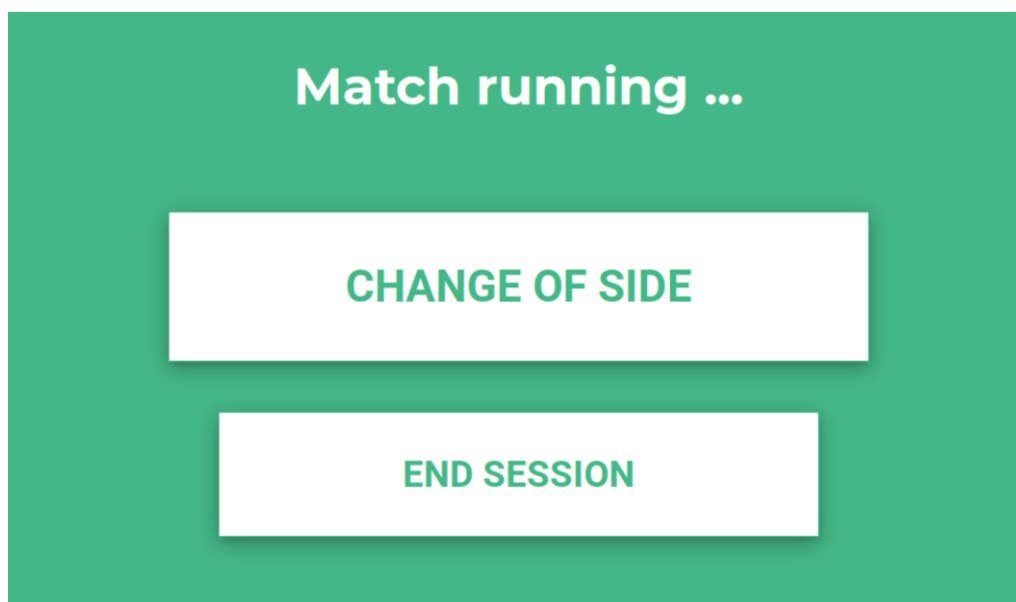


Figure 3. Touchscreen display showing options when a match is in progress.

Once a session is in progress, the players can only inform the system that they are changing sides or choose to end the session (see figure 3).

If a player chooses to end the session, data capture is stopped and the tracking data and video from the end-court IP camera are uploaded to their account on the Wingfield server.

COMMENTS

Start/stopping data capture is player-driven. Starting data capture requires an internet connection for players to log in to the Wingfield server using a QR code. No assistance from human operators is required to run the system.

Transmission of data between the cameras and the BOX (processing unit and touchscreen display) is wired, limiting its susceptibility to hacking. Transmission of data from the BOX to the Wingfield server is via an encrypted wireless or wired internet connection.

No coaching information is displayed on the BOX. Players must end the session before match data are uploaded to their account.

DATA COMMUNICATION

No coaching information is presented on the touchscreen display.

Coaching information is available on an auxiliary device (e.g. smartphone) using the Wingfield app. Information includes:

1. Stroke type (e.g. first and second serves, forehands, backhands).
2. Ball speed for all stroke types.
3. Ball bounce locations.
4. Match statistics (e.g. serve percentages, points won, rally length).

Additionally, players can replay video of the session using the Wingfield app.

Players automatically share data with their opponent (if the opponent is also logged in).

COMMENTS

No coaching information is presented on the touchscreen display.

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

Players automatically share data with their opponent (if logged in). Consequently, a player can have access to data on their opponent at times when play is suspended, e.g. during a rain delay.

ADDITIONAL INFORMATION

Client:

Wingfield GmbH
Oeltzenstrasse 13
30169 Hannover

Germany

Date received: 8 March 2019

Report prepared by: Jamie Capel-Davies

Report authorised by: James Spurr

Revision number: 1

Please note:

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