Postural Analysis: Description of a Dedicated System. An Upgrade

Sergio Palandri (✉ danaskully@bl1036.org)

AO Ordine Mauriziano di Torino - Turin - ITALY <https://orcid.org/0000-0001-9776-3618>

Method Article

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Abstract

Background

In June 2021 an article was published describing a possible system to perform postural analysis. In six months use, the system has more clearly showed its lights and shadows. So the author thought some improvements of the system that are now ready to be applied. This article will show them in details.

Materials and Methods

Upgrade interested both aspects close connected to the analysis and both connected to its management .

Results

First results obtained are interesting and encourage the use of the upgrades introduced. However a more long period of use is necessary to confirm first results.

Conclusions

Upgrading is a natural step in every life project. And it is made up not only by a single step. So also this system may be further improved with other upgrades in the future.

Introduction

As is known in the literature, postural analysis is a fundamental tool in the understanding and classification of various signs and symptoms that often seem not to be correlated among others [1–5]. From these works it is also clear that there is essentially no univocal protocol of postural analysis and that every professional basically builds his own, aimed at the goals he had set for himself. Recently, in June 2021, an article was published [6] in contrast to this vision, as it was aimed at proposing a standard postural analysis protocol usable by professionals from different sectors. In the time that has elapsed since its publication, the author used his own protocol and the experiences made, led him to improve the proposed protocol in order to make it more usable and performing. The purpose of this article is to illustrate the improvements introduced.

Materials And Methods

Improving the system has been directed on two main targets: first the analysis itself and second the management of the analysis. Now they will be deep detailed.

ANALYSIS

Acquiring part of the video-photographic material from a camera, part from a webcam and part from a smartphone, was soon not easy for several reasons:

- - need to transfer the captured images from the camera's SD card to the hard disk of the computer used for post-processing, results in an extension of the time associated with this operation
- - in particular for analyzes carried out by third parties, a critical point was created in maintaining the confidentiality of the data, since the SD card was not protected from unauthorized access and the transfer during the analysis was not possible due to lack of time
- - similarly, the same argument applies to the images and videos acquired via smartphone in relation to feet standing, the configuration of the dental arches and swallowing

It was therefore decided to centralize the acquisition of images and videos, introducing a webcam for the analysis of the feet standing (Fig. 1) and to replace the camera with a 4K webcam to detect both the images of the subject in the AP, PA, right lateral and left lateral views, both of the detail of the dental arches and of the swallowing. This choice consequently led to the need of improving the support of the 4K webcam, replacing the construction site tripod previously used, with a professional photographic tripod capable of rising up to approx 1,54m from the floor and equipped with a rack elevation segment for precision translations on the plane orthogonal to the floor. At the same time, the second level was also equipped with a better support, replacing analogously the construction site tripod in use, with a professional photographic tripod, with the same general characteristics as the previous one, even if slightly limited in the maximum height reduced to about 1,48m. Both systems are visible in Fig. 2.

The signals of the three webcams (top view, main view and feet standing) were brought together in a USB 3.0 hub connected to the computer (Fig. 3). The software for managing and capturing photos and videos was provided directly by the operating system used (Ubuntu 20.04)

Also the overall observation has been improved by building a set of tools that are immediately ready and available, for indoor analysis as well as at third parties ones (Fig. 4).

MANAGEMENT

Since the system has been designed to be used in different locations and therefore transportable, an improvement has been thought and realized also in this sense.

All the material needed to perform the analysis was then divided into sectors to each of which was dedicated a specific aluminum container, internally equipped with housings designed to fit the individual components, using the model of what has already been illustrated above for the instruments dedicated to the overall analysis of the subject. The series of containers obtained is visible in Fig. 5.

For the easy transport of the containers, a special flight case type container has been designed and manufactured. The result is visible in Fig. 6.

Even the transportable support for top view above has been entirely redesigned and built in order to have greater practicality in assembly / disassembly operations, greater stability and also better aesthetics. Fig. 7 shows the overall support and some details relating to the support system entirely redesigned to ensure maximum stability on any type of floor, without compromising practicality and speed in assembly.

Results

The first results obtained using the upgraded system are encouraging from the point of view of image quality and the greater fluidity of the management operations of the entire postural analysis process, observing a reduction of the set-up for indoor analyzes to a few minutes and a reduction of about 50% in the set-up times for outdoor analysis

Discussion

Even if only further postural analysis will allow to establish the real effectiveness of the improvements introduced, it is essential to underline that these have been the result of comparison with other professionals interested in the previous postural analysis system, inspiring the innovation itself and with other professionals external to the sector, which have however contributed with their knowledge to the practical realization of these

Conclusions

Upgrading is a natural step in every life project. And it is made up not only by a single step. So also this system may be further improved with other upgrades in the future

Declarations

The author declare to have no conflict of interested

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Figures

Fig.1 Webcam for feet standing analysis and detail

Figure 1

Webcam for feet standing analysis and detail

Fig.2 Tripod for supporting laser level and 4K webcam with detail

Figure 2

Tripod for supporting laser level and 4K webcam with detail

Fig.3 USB 3.0 hub to connect webcams to PC and driving top laser level

Figure 3

USB 3.0 hub to connect webcams to PC and driving top laser level

Fig.4 Tools set for overall observation suitable both for fixed and portable use

Figure 4

Tools set for overall observation suitable both for fixed and portable use

Figure 5

cases containig all the materials needed to outdoor postural analysis

Fig.6 Flight case used for trasport all the cases, tripods and carpets needed

Figure 6

Flight case used for trasport all the cases, tripods and carpets needed

Fig.7 Outdoor support for top view webcam and details

Figure 7

Outdoor support for top view webcam and details