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Research Article

# Postural Analysis: Description of a Dedicated System - an Upgrade

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## Abstract

**Background**

In June 2021 an aericle was published describing a possible ssystem to perform postural analysis. In six months use, the ssystem has more clarely showed its lights and shadows. So the author tought some improvements that are now ready to be applyed. 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 in indoor and outdoor location.

**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 resultas.

**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 that ome from the comparison with other professionals.

**Key words:** posture; analysis; photographic; upgrade

## INTRODUCTION

"Does people really know what is posture analysis and its relevance?"

May be this is a little bit difficult answer to get, but some other aspects in the relationship between people and posture analysis, are more clear.

As a matter of fact literature shows how posture analysis is largely employed to study human activities in order to find and prevent possible damage to the body structure, due to the need of particular not ergonomic posture [1-8].

At the same time other authors underline the relevance of posture analysis in infirm subjects as a fundamental tool in the understanding and classification of various signs and symptoms that often seem not to be correlated among others [9-13].

As a natural outcome, posture analysis relevance leads to increase of system and method to perform it, as many regarding articles show [14-21]. From these works it is possible to infer that there is essentially no univocal protocol of posture analysis and that every professional basically builds his own, aimed at the goals he had set for himself. Regarding this aspect, other authors work to compare and analyze these methods in order to improve them, as showed by several articles [22-25].

In this landscape, recently, in June 2021, an article was published [26] aimed to propose a standard posture analysis protocol usable by professionals from different sectors. In the same light of improving cited above, the author, using his own protocol, made experiences that led him to find the critical points and the upgrade to overcame them in order to make the protocol more usable and performing. The aim of this article is to illustrate the improvements introduced.

## MATERIALS AND METHODS

Improving the system has been directed on two main targets: (1) the analysis protocol itself and (2) the management of the analysis performed in other locations. Now they will be deep detailed

Upgrade in analysis protocol

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 memory 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 memory 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 (Figure 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.

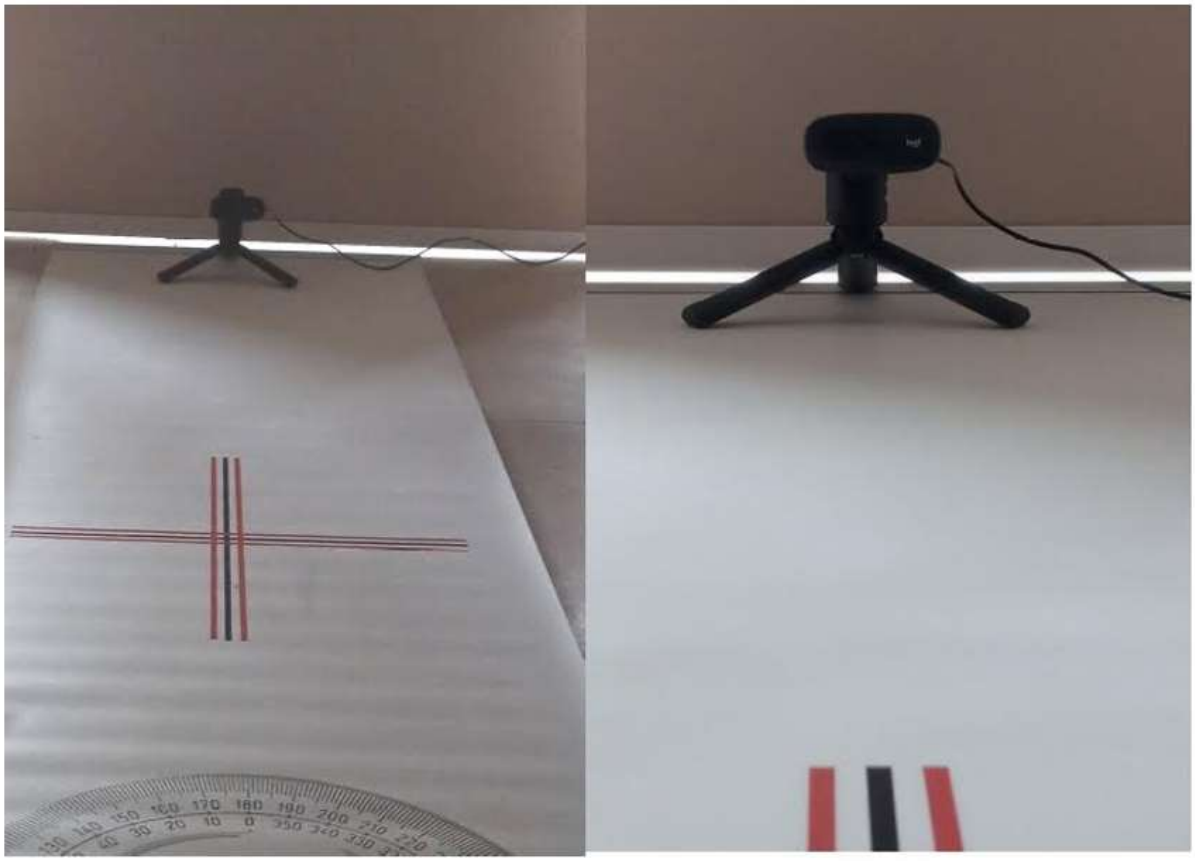

**Figure 1**: Webcam for feet Standing Analysis and Detail

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 Figure. 2.

**Figure 2:** Tripod for supporting laser level and 4K webcam with detail

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 (Figure 3).

**Figure 3:** USB 3.0 hub to connect webcams to PC and driving top laser level

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 (Figure 4).


**Figure 4:** Tools set for overall observation suitable both for fixed and portable use

### Upgrade in management analysis performed in other locations

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 Figure.5.


**Figure 5:** Cases Containig all the material needed to outdoor postural analysis.

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

**Figure 6:** Flight case used for trasport all the cases tripos and carpets needed

Even the transportable support for top view has been entirely redesigned and built, in order to have greater practicality in assembly / disassembly operations, greater stability and also better aesthetics. Figure. 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.

**Figure 7:** Outdoor support for top view webcam and details

## RESULTS

Two indoor and one outdoor postural analysis have been performed applying the described upgrading. The first results obtained are encouraging from the point of view of image quality and the greater fluidity in the operations management of the entire postural analysis process: tools are immediately available and orderly, while computer centered image acquisition avoid time wasting, data loss risk and, for outdoor analysis, unauthorized data access risk. Furthermore a time reduction of the setup for indoor analyzes to few Minutes and a time reduction of about 50% in the setup for outdoor analysis has been clearly observed.

## DISCUSSION

From showed literature [22-25], it's easy to infer that comparison between different professionals is the only secure way that leads to a real improvement of a method or a system.

Listening to the needs of the professionals who will use the results of a posture analysis made by the described protocol [26], helped the author to

examine in detail the postural analysis system he built up, find its critical aspect and make the right upgrading to make it more useful and available. Only further postural analysis will allow to establish the real effectiveness of the improvements introduced, but only a continuous comparison will let more probable to reach this target.

## 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

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## DECLARATIONS

The author declare to have no conflict of interested

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