Reviewer’s report

Title: Dynamic 3D shape of the plantar surface of the foot using coded structured light: A technical report

Version: 2 Date: 21 October 2013

Reviewer: Scott Telfer

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Major Revisions

1. This is a definite improvement compared to the previous version. However in my opinion more time needs to be spent ensuring the writing is suitable for the predominantly clinical audience of the journal.

2. I realise the Samson et al paper [40] is very recent but it probably deserves more attention in the introduction and discussion. In particular the very different approaches to assessing the reliability of the dynamic roll over measurements need to be addressed and justified.

Minor Revisions

Abstract

1. “Foot scanning techniques are moving towards dynamic reconstructions” is very vague. See also “The results obtained in the accuracy and repeatability experiments suggest positive outcomes”.

Introduction

2. P3 - The first paragraph is out of place.

3. P3 - “Different research systems have investigated more economical solutions”?

4. P3 - Typo – “Tefler” should be “Telfer”

5. P5/6 - Rather than having the second last paragraph with bullet points on Page 5, it would be easier to have Table 3 placed in the introduction section and this would help to better guide the reader through the existing research in the area.

6. Final paragraph – Please restrict this paragraph to the aims/hypotheses of the study, keep technical details and descriptions for the methods.

Methods

7. Given the clinical focus of JFAR, in my opinion many of the descriptions here are too technical and could do with being re-written for the benefit of an audience
who may be interested in foot scanning but do not have a background in image processing. In particular the 3D reconstruction section could do with being described using lay terminology that is easier to understand. More technical information could be included as supplementary material if necessary.

8. P7, para 2 – I would expect it to be referred to as a “global” rather than “world” reference frame/co-ordinates.

9. P10 – How were the key events (i.e. heel strike, toe off) associated with stance phase identified? I imagine it might be difficult to be sure of the exact frame of heel strike from just the plantar camera view? The arch lowering frame definition makes no sense, to me heel strike is part of stance phase?

Results

10. The error measurement for the object trials refers to the maximum deviation of the point cloud from the best fit plane, but what about the actual dimensions of the plane? While I realise the aim of the system is to capture the contours of the foot the ability to get accurate linear measurements is still an important factor for 3D scanning systems. Similar for the foot. I’m guessing that the linear accuracy is in the direction equivalent to the long axis of the foot is limited to the thickness of lines in the projected colour pattern?

11. Please give the mean and SD error for all five frames.

12. What was the software package used to analyse and process the images?

13. Figs 8 and 9 – Suggestion: I would have used a Q-Q plot (or similar) to compare the distribution of the errors to the Gaussian distribution and included the correlation coefficient as a measure of agreement.

14. Table 1 – Lose the 1-10 numbers from the first column or put them in a separate column.

Discussion

15. Limitations with the 4DRS system – I would like to see some comment on the practical considerations of the system. According to the manuscript it needs deep pit or raised platform to achieve stand off distance of 100 cm. It is unlikely that the majority of clinical practices (especially smaller podiatric clinics) would be able to accommodate this. In addition, this means the system will not be portable. Commercially available systems like the Lion system from the Samson paper, while not quite light or small enough to carry round different clinics could at least be moved to a different room without much difficulty.

Conclusion

16. Again, “preliminary positive outcomes” means nothing to me in this context.

Level of interest: An article whose findings are important to those with closely
related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.