

Review Summary Report for a paper submitted to a
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Submission:

Title: Whole-body multi-contact motion in Humans and Humanoids

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Assessment: MAJOR REVISION

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Comments to Authors from Guest Editors

The paper presents an overview of work conducted in CoDyCo, an FP7 EU project. In addition, the paper provides a review of the state of the art. One reviewer said that the authors should more clearly state what is the description of the state of the art and what are the novel contributions made in the paper, since the two parts are mixed together. As Co-Editors we believe that it is important that the paper keeps a general view on the state of the art. So we prefer that the paper devotes a substantial part of its content to a general view, according to the Call of NRF-IAS Workshop, since overview papers are very attractive for the RAS Journal readers. Authors may keep the organization of the submitted paper as is, but need to reorganize the introduction and be more precise in separating the two aspects (State of the art, and CoDyCo project).

Section 3 is very long, while section 4 is very short. Additionally, as suggested by one reviewer the authors should enhance the conclusions of the paper, including some material on expected future work in the field and how their project could stimulate further research. Finally, the authors should be very clear in specifying which parts of the work have already been published and where, and what is new. The reviewers comments contain many corrections of mismatching figures, missing citations, and other errors. Please check the paper carefully, and possibly try to include some more recent results from the advancement of Your CoDyCo project since your initial submission.

The Comments to Authors from Reviewers are listed below.

Reviewer No. 1 Comments to Author:

The paper presents an overview of the works conducted in the CoDyCo project. Readers may find a paper summarizing the results of a big-scale and broad aim project like CoDyCo worth reading. The paper also provides a review of the state of the art, but this is strongly biased toward the CoDyCo project. The scope of the paper should be clarified in the paper's title, which should include a reference to the project.

The paper is well written, however the authors are suggested to re-read their paper before submission. Most of the references to the figures are wrong, and many of the links to external material (videos, etc.) are missing. Even some references (e.g. in Sections 2.2, 2.4, 3.2.2) are missing.

Advantages and the reasoning underlying the classification presented in Section 1 should be clarified. Alternatively, the section may be removed altogether. Indeed, the state of the art overview presented in Section 2 is not organized according to the classification presented in Section 1, and Section 1 does not seem to provide additional value to the paper in its current form.

A listing, and possible categorization of the material that follows, should instead be provided toward the beginning of the paper. In fact, the single sections present very heterogeneous material, and an overview of the relationship between them is what could make the paper worth, since the works themselves are all presented elsewhere, in more specific papers.

The conclusions should be extended with the limitations of the work. Indeed, readers of this overview paper may be interested in knowing what kind of difficulties emerge, and which problems are still open.

References to figure's colors in the descriptions should be removed, and instead different line styles should be used (e.g. references to "blue" for Fig. 4 or to the traces colors in Fig.18). Both black and white printing and color blind readers will be impaired by the current figures.

Reviewer No. 2 Comments to Author:

This paper reviews the state-of-the-art on the whole body motion in the presence of multiple contacts and presents the main results achieved within the European Project CoDyCo. The subject addressed in the paper is worthy of investigation however the clearness of the paper should be improved before its publication. Indeed, the paper is very long and rich of information, however, due to the lack of some details and a lot of confusion with the figures, it is difficult to follow.

About the organization of the paper my comments are the following:

- 1) Section "Introduction". It would be nice to add a paragraph that describes the organization of the paper
- 2) Section "Some advances w.r.t. the state-of-the-art...". In my opinion this section is very long and I would divide it into two sections, one describing the findings obtained studying humans and the other describing the results achieved with the robot.
- 3) Section "Conclusions". After a so long paper, it is quite frustrating to read a so short conclusion. I would resume the main findings I would say something more about the future work.

About the figures, the paper is a mess:

- Page 2, column 1, second paragraph: "in the following figure" could be replaced with "in Fig. 1" because otherwise Fig. 1 will not be referenced.
- Page 2, column 2, first paragraph: I think that "Figure 1" should be replaced with "Figure 2"
- Page 3, column 1, line 5: "Figure 1" => "Figure 2"
- Page 3, column 1, 2nd to last line: "Figure 2" => "Figure 3"
- Page 3, column 2, 3rd to last line: "Figure 3" => "Figure 4"
- Page 7, column 1: "Figure 4" => "Figure 5" (three times).
- Page 7, column 2: "Figure 5" => "Figure 6" (twice)
- Page 8: "Figure 6" => "Figure 7"; "Figure 7" => "Figure 8"; "Figure 8" => "Figure 9"
- Page 9: "Figure 9" => "Figure 10" (twice); "Figure 10" => "Figure 11"
- Page 10: "Figure 11" => "Figure 12";
- Page 10: "Figure 12" => "Figure 13"
- Page 10: "Figure 14" => "Figure 13" ?
- Page 11: "Figure 15" => "Figure 14" (three times)
- Page 11, column 2, last line: "Figure 16" => "Figure 15"
- Page 12, column 2, last line: "Figure 17" => "Figure 16"
- Page 13, column 2: "Figure 18" => "Figure 17"
- Page 13, column 2: "Figure 19" => "Figure 18"
- Page 14, column 2: "Figure 20" => "Figure 19"
- Page 14, column 2: Not sure if the reference to Figure 21 is right. Maybe it refers to Fig 20. The description here should be improved. One between Fig 20 and Fig 21 seems to be not referenced.
- Page 15, column 2: "Figure 23" => "Figure 22"
- Page 16, column 2: "Figure 24" => "Figure 23"
- Page 17, column 2: "Figure 25" => "Figure 24"
- Page 17, column 2: "Figure 26" => "Figure 25" (twice)
- Page 19. Figures 26 and 27 are not referenced

Missing references and details:

- Page 4, column 2 => contact forces of complex manipulators and humanoids [?]
- Page 6, section "Model Learning" => SVM and Neural Network[?]
- Page 6, section "Operational space control learning" => iCub[?] ... compliance [?]
- Page 7, end of column 1 and column 2. Please add a reference to about the 3D dynamic model.
- Page 7, column 2, "Metric for postural ..." subsection. Which joints are involved in the metric? Why? Explain better this part, please.

- Page 13, column 2, last paragraph => ... torque estimation [?]
- Page 17, column 1, first line => CMA-ES[?]

Minor comments:

- Page 2, column 2, first paragraph: “genrally” => “generally”
- Figure 4: “ the metric space”=> “The metric space“ (to be coherent in the notation)
- Page 5, column 2, Section 2.3: QP is not defined (Quadratic Programming?)
- Page 5, column 2, Section 2.3: “complexity and uncertainty” => check the quotation marks
- Figure 5: “perturbation. the subjects” => “perturbation. The subjects”
- Figure 5, left panel: I would insert the labels “posterior” and “anterior” near the arrows, and the labels “low”, ”mid”, ”long”, ”high” near the sketches.
- Figure 7 and 8: please, insert the labels of the z-axes
- Figure 13: what does the symbol “ \mathbf{i} ” stand for? Perhaps is “<”
- Figure 16: “left” => “top”; “right”=>“bottom”
- Page 13, column 1: MPC is not defined
- Page 13, column 1: ZPM is not defined (zero moment point?)
- Figure 22: the symbols “plus minus” is inverted and looks strange.
- Page 16, column 1, last line: after “tasks” a dot misses
- Figure 26. after “wrench” a dot misses
