

Presenting the sensation of flying with flapping virtual wings independent of the limbs

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Fig. 1. Flying with flapping virtual wings independent of the limbs

Abstract—Since ancient times, people have longed to fly in the sky. Actual flying involves risks and costs, but using a VR device makes it easy to experience flight. In this study, we propose a method of presenting the sensation of flying with flapping virtual wings independent of the limbs, such as a flying lizard. Unlike studies that presents the sensation of flapping wings by moving the arms, new applications that use the limbs during the flight experience can be expected by flying without moving the limbs. In this paper, we proposed a method of presenting the sensation of manipulating the wing without using the limbs and a method of transmitting the force acting on the wing to humans. We conducted experiments using these methods and obtained subjective evaluations. From the experiment, it was confirmed that the operation by static muscle contraction is also effective for operationing wings. It was also shown that the tactile presentation using EMS has a higher overall evaluation. Finally, we obtained the result that the body image expansion of the virtual wing which proposed in this study is possible.

I. INTRODUCTION

Since ancient times, people have longed to fly in the sky.

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*This work was not supported by any organization

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TABLE I
AN EXAMPLE OF A TABLE

One	Two
Three	Four

We suggest that you use a text box to insert a graphic (which is ideally a 300 dpi TIFF or EPS file, with all fonts embedded) because, in an document, this method is somewhat more stable than directly inserting a picture.

Fig. 2. Inductance of oscillation winding on amorphous magnetic core versus DC bias magnetic field

tables after they are cited in the text. Use the abbreviation ?Fig. 1?, even at the beginning of a sentence.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity ?Magnetization?, or ?Magnetization, M?, not just ?M?. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write ?Magnetization (A/m)? or ?Magnetization A[m(1)]?, not just ?A/m?. Do not label axes with a ratio of quantities and units. For example, write ?Temperature (K)?, not ?Temperature/K.?

V. CONCLUSIONS

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes should appear before the acknowledgment.

ACKNOWLEDGMENT

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References are important to the reader; therefore, each citation must be complete and correct. If at all possible, references should be commonly available publications.

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