

# Preface

The purpose of evaluation procedures for haptic interfaces is to achieve both qualitative and quantitative statements on haptic rendering realism and performance. Since haptic technology is being increasingly used in computer games, surgical simulators, mobile phones etc., there is a need for defining standards for haptic applications. This book aims at meeting this need by establishing standard practices for the evaluation of haptic interfaces and by identifying significant benchmark metrics.

Towards this end, a combined physical and psychophysical experimental methodology is given in this book. First, the existing physical performance measures and device characterization techniques were investigated and described in an illustrative way. The physical characterization methods were demonstrated on a two degrees-of-freedom haptic interface. Second, a wide range of human psychophysical experiments were reviewed and the appropriate ones were applied to haptic interactions. The psychophysical experiments were unified as a systematic and complete evaluation method for haptic interfaces. Seven psychophysical tests were derived and implemented for three commercial force-feedback devices. Experimental user studies were carried out and applicability of the tests to a tactile feedback device was investigated. Finally, synthesis of both evaluation methods is also discussed.

The generic methodology provided in this book enables readers to evaluate the suitability of a haptic interface for a specific purpose, to characterize and compare devices quantitatively and to identify possible improvement strategies in the design of the system.

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