

Preface

This book originates from three-dimensional data processing research in the Multimedia Technology and Telecommunications Laboratory (LTTM) at the Department of Information Engineering of the University of Padova. The LTTM laboratory has a long history of research activity on consumer depth cameras, starting with Time-of-Flight (ToF) depth cameras in 2008 and continuing since, with a particular focus on recent structured light and ToF depth cameras like the two versions of Microsoft KinectTM. In the past years, the students and researchers at the LTTM laboratory have extensively explored many topics on 3D data acquisition, processing, and visualization, all fields of large interest for the computer vision and the computer graphics communities, as well as for the telecommunications community active on multimedia.

In contrast to a previous book by some of the authors, published as Springer Briefs in Electrical and Computer Engineering targeted to specialists, this book has been written for a wider audience, including students and practitioners interested in current consumer depth cameras and the data they provide. This book focuses on the system rather than the device and circuit aspects of the acquisition equipment. Processing methods required by the 3D nature of the data are presented within general frameworks purposely as independent as possible from the technological characteristics of the measurement instruments used to capture the data. The results are typically presented by practical exemplifications with real data to give the reader a clear and concrete idea about the actual processing possibilities.

This book is organized into three parts, the first devoted to the working principles of ToF and structured light depth cameras, the second to the extraction of accurate 3D information from depth camera data through proper calibration and data fusion techniques, and the third to the use of 3D data in some challenging computer vision applications.

This book comes from the contribution of a great number of people besides the authors. First, almost every student who worked at the LTTM laboratory in the past years gave some contribution to the know-how at the basis of this book and must be acknowledged. Among them, in particular, Alvise Memo must be thanked for his help with the acquisitions from a number of different depth cameras and for

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