



3D Computer Vision: Efficient Methods and Applications (X.media.publishing)

By Christian Wöhler



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This indispensable text introduces the foundations of three-dimensional computer vision and describes recent contributions to the field. Fully revised and updated, this much-anticipated new edition reviews a range of triangulation-based methods, including linear and bundle adjustment based approaches to scene reconstruction and camera calibration, stereo vision, point cloud segmentation, and pose estimation of rigid, articulated, and flexible objects. Also covered are intensity-based techniques that evaluate the pixel grey values in the image to infer three-dimensional scene structure, and point spread function based approaches that exploit the effect of the optical system. The text shows how methods which integrate these concepts are able to increase reconstruction accuracy and robustness, describing applications in industrial quality inspection and metrology, human-robot interaction, and remote sensing.

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Editorial Review

Review

"I do recommend serious consideration of this book for a one-semester advanced graduate course on methods for 3D scene reconstruction, based on the first five chapters. For graduate students pursuing PhDs in the field of computer vision, this is a book they won't want to miss." (Zhaoqiang Lai, ACM Computing Reviews, Mar 8 2013, Review # CR141001)

From the Back Cover

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Practitioners of computer vision, photogrammetry, optical metrology, robotics and planetary science will find the book an essential reference.

Key Topics

- Examines three-dimensional surface reconstruction of strongly non-Lambertian surfaces by the combination of photometric stereo and active range scanning, with applications to industrial metrology (**NEW**)
- Discusses pose estimation and tracking of human body parts, and subsequent recognition of actions performed in a complex industrial production environment, in the context of safe interaction between humans and industrial robots (**NEW**)
- Reviews the construction of high-resolution lunar digital elevation models based on orbital imagery in combination with laser altimetry data, including a discussion of the latest lunar spacecraft data sets (**NEW**)

About the Author

Christian Wöhler is Professor of Image Analysis at the Department of Electrical Engineering and Information Technology of TU Dortmund, Germany. His scientific interests are in the domains of computer vision, photogrammetry, remote sensing, and pattern classification, with applications in various fields including machine vision, robotics, advanced driver assistance systems, and planetary science.

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