

Foreword

Augmented Reality (AR) has recently become recognized as an emerging new medium. A broad audience today is interested in AR applications such as personal navigation, marketing or games. However, the history of AR applications in an industrial context goes further back. This field of application is currently reaching a turning point that marks the productive deployment of AR in the field.

You are holding the dissertation of Dr. Gerhard Schall in your hands, which deals with the use of AR systems for industrial applications in wide outdoor environments. Such an AR system requires at least three significant components: a model of the environment in which the system should be deployed, a real-time capable method for tracking the human user and an ergonomically acceptable mobile hardware setup. These three are the core topics of this book.

Maybe the most important of the three topics is the geospatial model that is suitable for AR applications. This implies that the model allows both localization from and visualization of the model data, which requires novel structures for the model data. Moreover, the model must be measured from scratch or converted from existing sources; both cases require appropriate processing method. Ultimately, the AR system must support the user in a better way than hitherto possible with conventional maps. A key achievement of the work described in this book is the systematic development of technology that addresses these requirements.

The first part of the book is concerned with two kinds of model creation. Models of large indoor environments are acquired using a mobile robot equipped with a computer vision system. Data from outdoor underground infrastructure databases is transcoded into 3D models.

The second part of the book describes the design and crafting of handheld AR systems relying on tablet computers. The AR device is held with both hands and has suitable ergonomic properties for outdoor work of engineers.

The third part of the book deals with outdoor 3D tracking. A hybrid tracking system is presented, which integrates GPS, compass and inertial sensor with a visual orientation tracker. Using sensor fusion, improved robustness and precision can be achieved.

Overall, this book points into new directions concerning outdoor AR for industrial applications. It can be assumed that AR is soon going to be an important medium for presenting geospatial information in-situ, i.e., directly at the task location where engineers work.

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