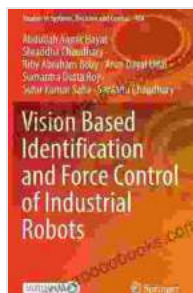


# Vision-Based Identification and Force Control of Industrial Robots: A Comprehensive Guide for Engineers and Researchers

Industrial robots are increasingly being utilized in various industries due to their ability to automate repetitive and dangerous tasks with high precision and efficiency. However, these robots often require sophisticated vision systems and force control mechanisms to perform their jobs effectively. This book, "Vision-Based Identification and Force Control of Industrial Robots," provides a comprehensive overview of these key technologies and their applications in the field of robotics.

## Vision-Based Identification

Vision-based identification, also known as object recognition, is a critical aspect of robotic systems that allows them to perceive and understand their surroundings. This book covers various image processing and computer vision techniques used for object recognition, including:



## Vision Based Identification and Force Control of Industrial Robots (Studies in Systems, Decision and Control Book 404) by Subir Kumar Saha

★★★★★ 5 out of 5

Language : English  
File size : 49387 KB  
Text-to-Speech : Enabled  
Screen Reader : Supported  
Enhanced typesetting : Enabled  
Print length : 334 pages



- Feature extraction algorithms, such as Scale-Invariant Feature Transform (SIFT) and Speeded-Up Robust Features (SURF)
- Machine learning algorithms, such as Support Vector Machines (SVMs) and Artificial Neural Networks (ANNs)
- Deep learning algorithms, such as Convolutional Neural Networks (CNNs)

The book provides detailed explanations of these methods and discusses their advantages and limitations. It also presents case studies to illustrate how vision-based identification is used in real-world applications, such as product inspection, object sorting, and bin-picking.

## **Force Control**

Force control is another important aspect of industrial robots, allowing them to interact with their environment in a safe and efficient manner. This book covers both model-based and sensor-based force control techniques, including:

- Model-based force control, which uses mathematical models of the robot and its environment to predict and compensate for external forces
- Sensor-based force control, which uses force sensors to measure the interaction forces and adjust the robot's actions accordingly

The book provides an in-depth analysis of these methods and discusses their strengths and weaknesses. It also describes various force control algorithms and their implementation on industrial robots.

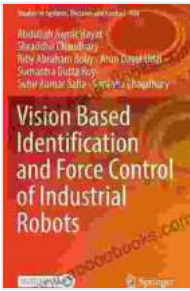
## **Applications and Case Studies**

To demonstrate the practical applications of vision-based identification and force control, this book presents numerous case studies from various industries:

- **Automotive industry:** Object recognition and force control for automated assembly lines
- **Electronics industry:** Vision-guided pick-and-place operations for circuit board assembly
- **Food industry:** Force control for delicate handling of food products
- **Medical industry:** Vision-assisted surgical robots with force sensing capabilities

These case studies provide valuable insights into how these technologies are used to solve real-world problems and improve productivity in various sectors.

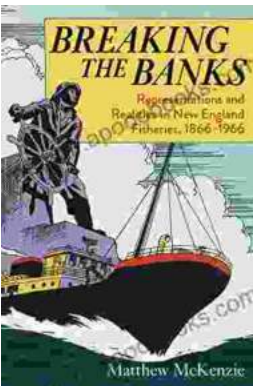
This book, "Vision-Based Identification and Force Control of Industrial Robots," is an essential resource for engineers, researchers, and students working in the field of robotics. It offers a comprehensive overview of key technologies that enable industrial robots to perform complex tasks with high accuracy and efficiency. By combining theory with practical examples, this book provides a solid foundation for understanding and applying these technologies in a wide range of industrial applications.



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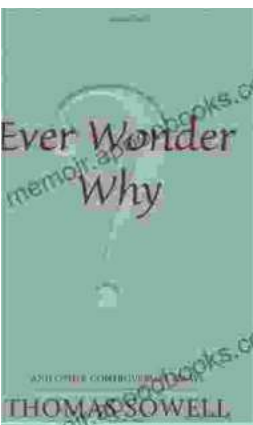
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