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# Autonomous Robots: Modeling, Path Planning, and Control

By Farbod Fahimi



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**Autonomous Robots: Modeling, Path Planning, and Control** By Farbod Fahimi

It is at least two decades since the conventional robotic manipulators have become a common manufacturing tool for different industries, from automotive to pharmaceutical. The proven benefits of utilizing robotic manipulators for manufacturing in different industries motivated scientists and researchers to try to extend the applications of robots to many other areas by inventing several new types of robots other than conventional manipulators. The new types of robots can be categorized in two groups; redundant (and hyper-redundant) manipulators, and mobile (ground, marine, and aerial) robots. These groups of robots, known as advanced robots, have more freedom for their mobility, which allows them to do tasks that the conventional manipulators cannot do.

Engineers have taken advantage of the extra mobility of the advanced robots to make them work in constrained environments, ranging from limited joint motions for redundant (or hyper-redundant) manipulators to obstacles in the way of mobile (ground, marine, and aerial) robots.

Since these constraints usually depend on the work environment, they are variable. Engineers have had to invent methods to allow the robots to deal with a variety of constraints automatically. A robot that is equipped with those methods is called an Autonomous Robot.

Autonomous Robots: Kinematics, Path Planning, and Control covers the kinematics and dynamic modeling/analysis of Autonomous Robots, as well as the methods suitable for their control. The text is suitable for mechanical and electrical engineers who want to familiarize themselves with methods of modeling/analysis/control that have been proven efficient through research.



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# Autonomous Robots: Modeling, Path Planning, and Control

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## **Autonomous Robots: Modeling, Path Planning, and Control By Farbod Fahimi Bibliography**

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## **Editorial Review**

From the Back Cover

It is at least two decades since the conventional robotic manipulators have become a common manufacturing tool for different industries, from automotive to pharmaceutical. The new generation of robots are now being developed that can be categorized in two groups; redundant (and hyper-redundant) manipulators, and mobile (ground, marine, and aerial) robots. These groups of robots, known as advanced robots, have more freedom for their mobility, which allows them to do tasks that the conventional robots cannot do. Engineers have taken advantage of the extra mobility of the advanced robots to make them work in constrained environments, ranging from limited joint motions for redundant (or hyper-redundant) manipulators to obstacles in the way of mobile (ground, marine, and aerial) robots.

Autonomous Robots: Modeling, Path Planning, and Control covers the kinematics and dynamic modeling/analysis of Autonomous Robots, as well as the methods suitable for their control. Drawing upon years of experience and using numerous examples and illustrations, Farbod Fahimi discusses:

- The application of autonomous robots including but not limited to redundant and hyper-redundant manipulators, and ground, marine, and aerial robots.
- Position and velocity kinematics of redundant and hyper-redundant manipulators.
- Obstacle avoidance in 2D and 3D workspace using the potential field method.
- Kinematic and dynamic models of autonomous robots.
- Control methods such as PID, feedback linearization, sliding modes as applied to autonomous robots.

Autonomous Robots: Modeling , Path Planning, and Control is suitable for mechanical and electrical engineers who want to familiarize themselves with methods of modeling/analysis/control that have been proven efficient through research. This book presents the theoretical tools for analyzing the dynamics of and controlling Autonomous Robots in a form comprehensible for students and engineers.

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**Frank Hegarty:**

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**Patricia Sax:**

Playing with family within a park, coming to see the water world or hanging out with buddies is thing that usually you may have done when you have spare time, then why you don't try thing that really opposite from that. One activity that make you not experience tired but still relaxing, trilling like on roller coaster you are ride on and with addition details. Even you love Autonomous Robots: Modeling, Path Planning, and Control, you are able to enjoy both. It is very good combination right, you still need to miss it? What kind of hang-out type is it? Oh occur its mind hangout folks. What? Still don't have it, oh come on its referred to as reading friends.

**Justin Mireles:**

In this period globalization it is important to someone to find information. The information will make someone to understand the condition of the world. The fitness of the world makes the information quicker to share. You can find a lot of recommendations to get information example: internet, newspapers, book, and soon. You can see that now, a lot of publisher that will print many kinds of book. Typically the book that recommended to your account is Autonomous Robots: Modeling, Path Planning, and Control this publication consist a lot of the information in the condition of this world now. This kind of book was represented just how can the world has grown up. The dialect styles that writer value to explain it is easy to understand. The actual writer made some research when he makes this book. This is why this book suitable all of you.

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