

---

## Preface

This book deals with the problems related to planning motion laws and trajectories for the actuation system of automatic machines, in particular for those based on electric drives, and robots. The problem of planning suitable trajectories is relevant not only for the proper use of these machines, in order to avoid undesired effects such as vibrations or even damages on the mechanical structure, but also in some phases of their design and in the choice and sizing of the actuators. This is particularly true now that the concept of “electronic cams” has replaced, in the design of automatic machines, the classical approach based on “mechanical cams”.

The choice of a particular trajectory has direct and relevant implications on several aspects of the design and use of an automatic machine, like the dimensioning of the actuators and of the reduction gears, the vibrations and efforts generated on the machine and on the load, the tracking errors during the motion execution.

For these reasons, in order to understand and appreciate the peculiarities of the different techniques available for trajectory planning, besides the mathematical aspects of their implementation also a detailed analysis in the time and frequency domains, a comparison of their main properties under different points of view, and general considerations related to their practical use are reported.

For these reasons, we believe that the contents of this book can be of interest, besides for students of Electrical and Mechanical Engineering courses, also for engineers and technicians involved in the design and use of electric drives for automatic machines.

We would like to thank all the persons and colleagues which have contributed to this book. In particular, we would like to thank Claudio Bonivento, for the initial suggestions and motivations, and Alberto Tonielli for the discussions on electric drives and their use. The colleagues and friends Roberto Zanasi, Cesare Fantuzzi, and Alessandro De Luca have contributed not only with several constructive comments, but also with the development of some of the algorithms presented in this book.

Finally, the help of all the students that have worked on these arguments developing software and executing experimental activities, as well as the co-operations and discussions with technicians and engineers of several industries with their problems related to the design, control, and trajectory planning for automatic machines, are gratefully acknowledged.

Bologna,  
June 2008

Luigi Biagiotti  
Claudio Melchiorri

Trajectory Planning for Automatic Machines and Robots

Biagiotti, L.; Melchiorri, C.

2008, XIV, 514 p. 326 illus., Hardcover

ISBN: 978-3-540-85628-3