Automatic Vehicle Guidance: the Experience of the ARGO Autonomous Vehicle

by **Alberto Broggi, Massimo Bertozzi, Alessandra Fascioli & Gianni Conte**
(University of Parma, Italy)

During the last decade, the subject of Intelligent Transportation gained strategic importance and widespread relevance. Many projects were launched worldwide aimed at analysing the problem of people's mobility and goods transportation from a number of different perspectives; and it is in the last few years that the first prototypes of both vehicles equipped with automatic driving facilities and road infrastructures supporting these functionalities, are being tested and demonstrated to the public. This book surveys the history of intelligent vehicles, discusses some of the different approaches developed worldwide by a large number of research institutions, and presents the solutions adopted by the University of Parma in the ARGO Project, which started about 10 years ago within the Eureka PROMETHEUS Project. In particular, this book illustrates the problem, proposes some of the different solutions, and details the design, the development, and the engineering of a hardware and software platform for automatic vehicle guidance, as well as the set-up of two prototype vehicles.

Among the main results of this research, the GOLD (Generic Obstacle and Lane Detection) system is presented; it is an automatic driving system which has been integrated on ARGO, a Lancia Thema 2000 passengers' car, allowing to drive the vehicle autonomously in real traffic conditions along highways and freeways, with no requirements of additional specific road infrastructures.

The results of this long term research was demonstrated to the international scientific community and to the public in the first week of June 1998 with a journey through Italy, the MilleMiglia in Automatico tour, during which the vehicle drove autonomously for about 2000 km. The experience of this demonstration is discussed in the book, along with a description of the main advantages and problems encountered.

This book is divided in three parts. The first part presents the motivation of this research and a brief history of the main projects launched worldwide aimed at vision-based vehicle driving. The second and the third parts are related to the ARGO Project (University of Parma, Italy). Part II describes both the algorithms and the hardware platforms developed during the whole Project, starting from the very first implementation, up to the current, and presents the equipment installed on the ARGO prototype vehicle. Part III reports on the extensive test that was performed on ARGO, a 2000 km trip in automatic mode, and analyses the problems encountered and the overall system performance.

Readership: Researchers, designers and students in robotics, automotive systems and intelligent transportation.

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