1. Record Nr. UNINA9910299494003321

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| Autore | Choukchou-Braham Amal |
| Titolo | Analysis and control of underactuated mechanical systems / / Amal Choukchou-Braham [and three others] |
| Pubbl/distr/stampa | Cham, Switzerland : , : Springer, , 2014 |
| ISBN | 3-319-02636-4 |
| Edizione | [1st ed. 2014.] |
| Descrizione fisica | 1 online resource (xv, 138 pages) : illustrations (some color) |
| Collana | Gale eBooks |
| Disciplina | 620<br>629.1<br>629.2<br>629.8 |
| Soggetti | Automatic control |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Note generali | Description based upon print version of record. |
| Nota di bibliografia | Includes bibliographical references and index. |
| Nota di contenuto | Introduction -- Generalities and State-of-the-Art on the Control of Underactuated Mechanical Systems.- Underactuated Mechanical Systems from the Langrangian formalism -- Classification of Underactuated Mechanical Systems -- Control Design Schemes for Underactuated Mechanical Systems.- Appendices: Theoretical Background on Nonlinear System Stability and Control -- Limits of Linearization and Dangers of Destabilization -- Differential Geometry -- Controllability of Continuous Systems. |
| Sommario/riassunto | This monograph provides readers with tools for the analysis, and control of systems with fewer control inputs than degrees of freedom to be controlled, i.e., underactuated systems. The text deals with the consequences of a lack of a general theory that would allow methodical treatment of such systems and the ad hoc approach to control design that often results, imposing a level of organization whenever the latter is lacking. The authors take as their starting point the construction of a graphical characterization or control flow diagram reflecting the transmission of generalized forces through the degrees of freedom. Underactuated systems are classified according to the three main structures by which this is found to happen—chain, tree, and isolated vertex—and control design procedures proposed. The procedure is |

applied to several well-known examples of underactuated systems: acrobot; pendubot; Tora system; ball and beam; inertia wheel; and robotic arm with elastic joint. <The text is illustrated with MATLAB®/Simulink® simulations that demonstrate the effectiveness of the methods detailed. Readers interested in aircraft, vehicle control or various forms of walking robot will be able to learn from Analysis and Control of Underactuated Mechanical Systems how to estimate the degree of complexity required in the control design of several classes of underactuated systems and proceed on to further generate more systematic control laws according to its methods of analysis.