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Nota di contenuto	Cover; Unmanned Aerial Vehicles; Title Page; Copyright Page; Table of Contents; Chapter 1. Aerodynamic Configurations and Dynamic Models; 1.1. Aerodynamic configurations; 1.2. Dynamic models; 1.2.1. Newton-Euler approach; 1.2.2. Euler-Lagrange approach; 1.2.3. Quaternion approach; 1.2.4. Example: dynamic model of a quad-rotor rotorcraft; 1.3. Bibliography; Chapter 2. Nested Saturation Control for Stabilizing the PVTOL Aircraft; 2.1. Introduction; 2.2. Bibliographical study; 2.3. The PVTOL aircraft model; 2.4. Control strategy; 2.4.1. Control of the vertical displacement $y$ 2.4.2. Control of the roll angle $\phi$ and the horizontal displacement $x_2$ . 4.2.1. Boundedness of $y$ ; 2.4.2.2. Boundedness of $\phi$ ; 2.4.2.3. Boundedness of $x_2$ ; 2.4.2.4. Boundedness of $\dot{x}_2$ ; 2.4.2.5. Convergence of $y, \phi, x_2$ and $\dot{x}_2$ to zero; 2.5. Other control strategies for the stabilization

of the PVTOL aircraft; 2.6. Experimental results; 2.7. Conclusions; 2.8. Bibliography; Chapter 3. Two-Rotor VTOL Mini UAV: Design, Modeling and Control; 3.1. Introduction; 3.2. Dynamic model; 3.2.1. Kinematics; 3.2.2. Dynamics; 3.2.2.1. Forces acting on the vehicle; 3.2.2.2. Torques acting on the vehicle  
3.2.3. Model for control analysis  
3.3. Control strategy; 3.3.1. Altitude control; 3.3.2. Horizontal motion control; 3.3.3. Attitude control; 3.4. Experimental setup; 3.4.1. Onboard flight system (OFS); 3.4.2. Outboard visual system; 3.4.2.1. Position; 3.4.2.2. Optical flow; 3.4.3. Experimental results; 3.5. Concluding remarks; 3.6. Bibliography; Chapter 4. Autonomous Hovering of a Two-Rotor UAV; 4.1. Introduction; 4.2. Two-rotor UAV; 4.2.1. Description; 4.2.2. Dynamic model; 4.2.2.1. Translational motion; 4.2.2.2. Rotational motion; 4.2.2.3. Reduced model; 4.3. Control algorithm design  
4.4. Experimental platform  
4.4.1. Real-time PC-control system (PCCS); 4.4.1.1. Sensors and communication hardware; 4.4.2. Experimental results; 4.5. Conclusion; 4.6. Bibliography; Chapter 5. Modeling and Control of a Convertible Plane UAV; 5.1. Introduction; 5.2. Convertible plane UAV; 5.2.1. Vertical mode; 5.2.2. Transition maneuver; 5.2.3. Horizontal mode; 5.3. Mathematical model; 5.3.1. Translation of the vehicle; 5.3.2. Orientation of the vehicle; 5.3.2.1. Euler angles; 5.3.2.2. Aerodynamic axes; 5.3.2.3. Torques; 5.3.3. Equations of motion; 5.4. Controller design; 5.4.1. Hover control  
5.4.1.1. Axial system  
5.4.1.2. Longitudinal system; 5.4.1.3. Lateral system; 5.4.1.4. Simulation and experimental results; 5.4.2. Transition maneuver control; 5.4.3. Horizontal flight control; 5.5. Embedded system; 5.5.1. Experimental platform; 5.5.2. Microcontroller; 5.5.3. Inertial measurement unit (IMU); 5.5.4. Sensor fusion; 5.6. Conclusions and future works; 5.6.1. Conclusions; 5.6.2. Future works; 5.7. Bibliography; Chapter 6. Control of Different UAVs with Tilting Rotors; 6.1. Introduction; 6.2. Dynamic model of a flying VTOL vehicle; 6.2.1. Kinematics; 6.2.2. Dynamics  
6.3. Attitude control of a flying VTOL vehicle

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## Sommario/riassunto

This book presents the basic tools required to obtain the dynamical models for aerial vehicles (in the Newtonian or Lagrangian approach). Several control laws are presented for mini-helicopters, quadrotors, mini-blimps, flapping-wing aerial vehicles, planes, etc. Finally, this book has two chapters devoted to embedded control systems and Kalman filters applied for aerial vehicles control and navigation. This book presents the state of the art in the area of UAVs. The aerodynamical models of different configurations are presented in detail as well as the control strategies which are validated i

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