Dexterous Manipulation for In-Space Missions

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Robonaut 1 Development History

• 1998
  – Subsystem Development
  – Testing of hand mechanism
• 1999
  – Single Arm Integration
  – Testing with teleoperator
• 2000
  – Dual Arm Integration
  – Testing with dual arm control
• 2001
  – Waist and Vision Integration
  – Testing under autonomous control
• 2002
  – R1A Testing of Autonomous Learning
  – R1B Integration
• 2003
  – R1A Testing Multi Agent EVA Team
  – R1B Segway Integration
• 2004
  – R1A Autonomous Manipulation
  – R1B 0g Airbearing Development
• 2005
  – Development of R1C Joints
  – Supervision Across Time Delay
• 2006
  – Integrate R1B with Centaur Base
  – Thermal, vacuum and vibe testing of R1C

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Hubble Aft Shroud Door (4/2004)

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Robonaut 2 Development History

- **2007**
  - R2 Finger and arm joint concepts
  - Prototype series elastic controller

- **2008**
  - R2 Single Limb Integration
  - R2A Integrated

- **2009**
  - R2A completes first assembly task
  - R2B Integrated

- **2010**
  - February Public Release
  - R2A EMI, Power, toxicity testing
  - R2B Vibration testing, software safety

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