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 Technical Aspects of Multimodal System  
 Dept. Informatics, Faculty of Mathematics, Informatics and Natural Sciences  
 University of Hamburg


# Praktikum: 13

## Open possibilities using GZ-I

**Lecturers**

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# Acknowledgments

- **“Bioinspiration and Robotics: Walking and Climbing Robots”**  
 Edited by: Maki K. Habib, Publisher: I-Tech Education and Publishing, Vienna, Austria, ISBN 978-3-902613-15-8.  
 - <http://s.i-techonline.com/Book/>
- My colleague **Juan Gonzalez-Gomez** from the School of Engineering, Universidad Autonoma de Madrid in Spain.
- Other great work and related information on the internet  
 - [http://en.wikipedia.org/wiki/Self-Reconfiguring\\_Modular\\_Robotics](http://en.wikipedia.org/wiki/Self-Reconfiguring_Modular_Robotics)


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# Lecture material

- **Modular Self-Reconfigurable Robot Systems: Challenges and Opportunities for the Future**, by Yim, Shen, Salemi, Rus, Moll, Lipson, Klavins & Chirikjian, published in IEEE Robotics & Automation Magazine March 2007.
- **Self-Reconfigurable Robot: Shape-Changing Cellular Robots Can Exceed Conventional Robot Flexibility**, by Murata & Kurokawa, published in IEEE Robotics & Automation Magazine March 2007.
- **Locomotion Principles of 1D Topology Pitch and Pitch-Yaw-Connecting Modular Robots**, by Juan Gonzalez-Gomez, Houxiang Zhang, Eduardo Boemo, One Chapter in Book of "Bioinspiration and Robotics: Walking and Climbing Robots", 2007, pp.403-428.
- **Locomotion Capabilities of a Modular Robot with Eight Pitch-Yaw-Connecting Modules**, by Juan Gonzalez-Gomez, Houxiang Zhang, Eduardo Boemo, Jianwei Zhang: The 9th International Conference on Climbing and Walking Robots and their Supporting Technologies for Mobile Machines, CLAWAR 2006, Brussels, Belgium, September 12-14, pp.150-156, 2006.

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1D Topology:

- Locomotion in 1D:
  - Pitch-Pitch (8 pitch-connecting modules)
  - Pitch-Yaw-Pitch (8 pitch-yaw-connecting modules)
- Locomotion in 2D:
  - Star of 3 modules

2D Topology:

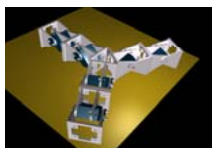
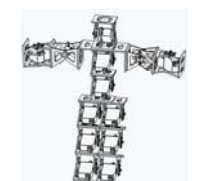
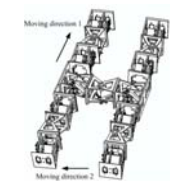
- Locomotion in 2D:

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## Other interesting possibilities

- Other possibilities
  - Three legged robot
  - Four legged robot
  - Six legged robot
  - Biped robot

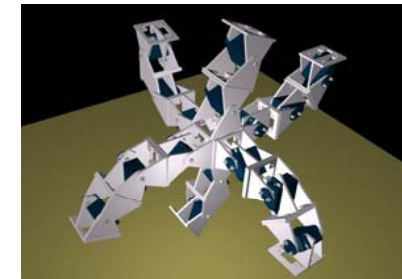




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## Other interesting possibilities

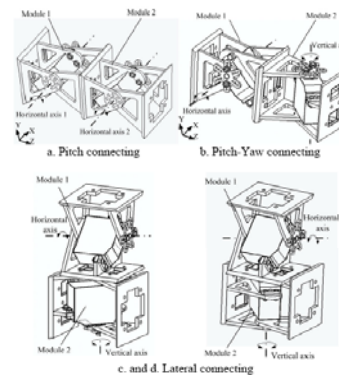
- Other possibilities
  - Three legged robot
  - Four legged robot
  - Six legged robot
  - Biped robot
- Be creative!



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## GZ-I with four connecting faces



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## Robots with various shapes

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## It is time for you now...

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## Praktikum: 14

### Open possibilities and final discussion

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## Thanks for your attention!

### Any questions?

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