

# CS 8803 BHR

## Building Humanoid Robots

### Class 2: Scheduling and Teams

Mike Stilman

Robotics & Intelligent Machines @ GT  
Georgia Institute of Technology

## Thursday Seminars

- Sign up for 2-3 of the most interesting topics with initials
- Make a table of your initials and admin. info on the back

## Next Thursday

### Existing Humanoid Robot Designs

(Asimo, HRP-2, Armar, UMASS uBot etc.)

- A comprehensive review of existing humanoid robots.
- What are the advantages / disadvantages of different designs?
- How are they relevant to our project?
- Be Specific:
  - Modes of Locomotion
  - Types of Actuators
  - Types of Sensors
  - System Architectures
  - Capabilities & Applications

## How To Get Papers

Best Places to Search:

- <http://scholar.google.com>
- <http://citeseer.ist.psu.edu/>

Use this tool to get GaTech Access to Papers:

- [http://www.library.gatech.edu/search/web\\_localizer.php](http://www.library.gatech.edu/search/web_localizer.php)

You can look at digital archives directly by looking here:

- <http://library.gatech.edu/search/databases.php>

Example of a VERY useful digital archive:

- <http://ieeexplore.ieee.org.www.library.gatech.edu:2048/Xplore/dynhome.jsp>

Go to the library!

## Humanoid Builders CMS

Humanoids Lab Content Management System:

- **Central Information Resource**
  - Sections for each topic of design & implementation
  - **Most Recent Information** on Progress
  - Relevant tools and links to resources
  
- **Individual Blogs on Progress**
  - Your personal results and lessons learned
  - Foundation of your grade for the course

## Content Management Part I: Global

<b>Simulation</b>	<ul style="list-style-type: none"> <li>▪Links to available simulation software</li> <li>▪Tips on using the software (as learned through experience)</li> <li>▪Relevant parameters used for simulating the robot</li> <li>▪Parameters learned through simulated experiments</li> <li>▪Recent code that simulates the robot</li> </ul>
<b>Design</b>	<ul style="list-style-type: none"> <li>▪Existing information on robot arms and hands</li> <li>▪Links to software and best tutorials on CAD modeling</li> <li>▪Design Options: sketches and links to current CAD files</li> <li>▪Most Recent Design Decision and CAD model</li> </ul>
<b>Mechanics</b>	<ul style="list-style-type: none"> <li>▪What will the physical structure of the robot consist of?</li> <li>▪Current set of part choices and manufacturers</li> <li>▪Links to suppliers of parts and part manufacturers</li> <li>▪Contact info for relevant people, prices, comparison of components</li> </ul>
<b>Actuation</b>	<ul style="list-style-type: none"> <li>▪What actuators (motors, controllers, interfaces) does our robot need?</li> </ul>
<b>Electrical &amp; Computing</b>	<ul style="list-style-type: none"> <li>▪What are the electrical / electronic and computing requirements?</li> </ul>
<b>Sensors</b>	<ul style="list-style-type: none"> <li>▪What sensors could our robot use?</li> </ul>
<b>Controls</b>	<ul style="list-style-type: none"> <li>▪What controllers will we use</li> <li>▪References on how to implement controllers</li> <li>▪Details on implementation and its relation to hardware on our project</li> </ul>



## Content Management Part II: Personal

### Blog

Demonstrates the significant number of hours you're putting in to help your group and the project. Helps you keep track of what you've done and the things you've learned.

Results	<ul style="list-style-type: none"><li>•What did you accomplish?</li><li>•Contributions with explanations, pictures and movies</li><li>•Explanations on how results can be duplicated</li></ul>
Challenges & Solutions	<ul style="list-style-type: none"><li>•What challenges did you face?</li><li>•How did you overcome them?</li><li>•If not overcome yet, what options are you considering?</li></ul>
Concepts Learned	<ul style="list-style-type: none"><li>•What is the most exciting thing you learned?</li><li>•What are the other concepts you learned about?</li><li>•If possible, provide additional information that would help students.</li></ul>

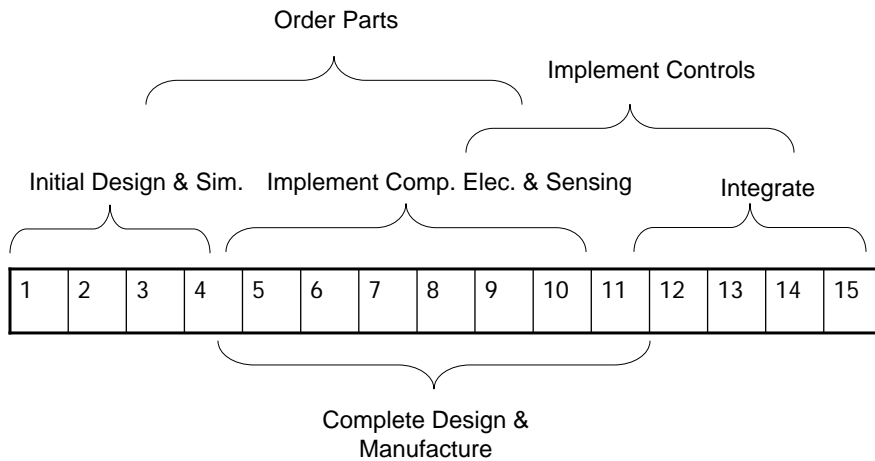
## Content Management Part III: Seminar

### Seminar Thursdays

Topics for thursday discussions with abstracts.  
Provides links to papers for reading and slides from the seminar.

Topic	<ul style="list-style-type: none"><li>•What are the major lessons to be learned from previous work?</li><li>•Abstract contains goals for presentation &amp; discussion</li></ul>
Papers	<ul style="list-style-type: none"><li>•2 – 3 papers for each discussion</li><li>•Upload papers to CMS! (Easy access for class &amp; archiving)</li></ul>
Links & Discussion	<ul style="list-style-type: none"><li>•Add links to relevant labs &amp; resources ?</li><li>•Additional space for forum-style discussion ?</li></ul>

## Tentative Timeline



## Teams!

- 5 Teams of ~3 Students
- Responsibilities will change over time
- Grading is individual, teams can change over time
- Space
  - Welcome to the Humanoids Lab! (Central Watering Hole)
  - Additional Space for Robot Base & Torso in RIM Center
  - Meet with your groups anywhere

## Mike's Advice

- **Pick a group leader:**
  - In charge of distributing the workload and responsible for achieving goals.
- Everyone Should Contribute!
  - **Use what you know**
  - **Experiment to learn what you don't**
  - **Contact** other groups to discuss how to make progress together and get the most recent info on what they've learned.
  - **Write Up Results** to the CMS
  - Gather **relevant information** (put it on CMS) Surf Web, **Use the PHONE!**
  - **Experiment!!!**
    - (for example - say you haven't used some software)
    - Make a goal for yourself, to design or make something
    - Do the tutorial
    - Try to make it, fail, try again, get help!



## Initial Team Objectives

	Objectives	Responsibilities (next week)
Team 1 (Design)	Complete the Robot Structure & Begin Investigating Components	CAD Model of the Robot (Options and Rationales) (Sketches of Robot Designs)
Team 2 (Design)		(Find Relevant Suppliers and Choices for Motors and Control Boards)
Team 3 (Simulation)	Determine System Requirements	Write Software that Simulates Robot ( Simulate a Balancing Base )
Team 4 (Base/Torso Control)	Develop Basic Controls	Compute Robot Dynamics Design a Basic Suite of Controllers ( Matlab Implementation of Dynamics )
Team 5 (Arm/Hand Control)	Get Existing Hardware Operational	Write And Validate Controllers ( Controller for Robot Hand )

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