



## Adventures In HUMANOID ROBOTICS

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## CS 4649/7649: RIP

### Robot Intelligence - Planning



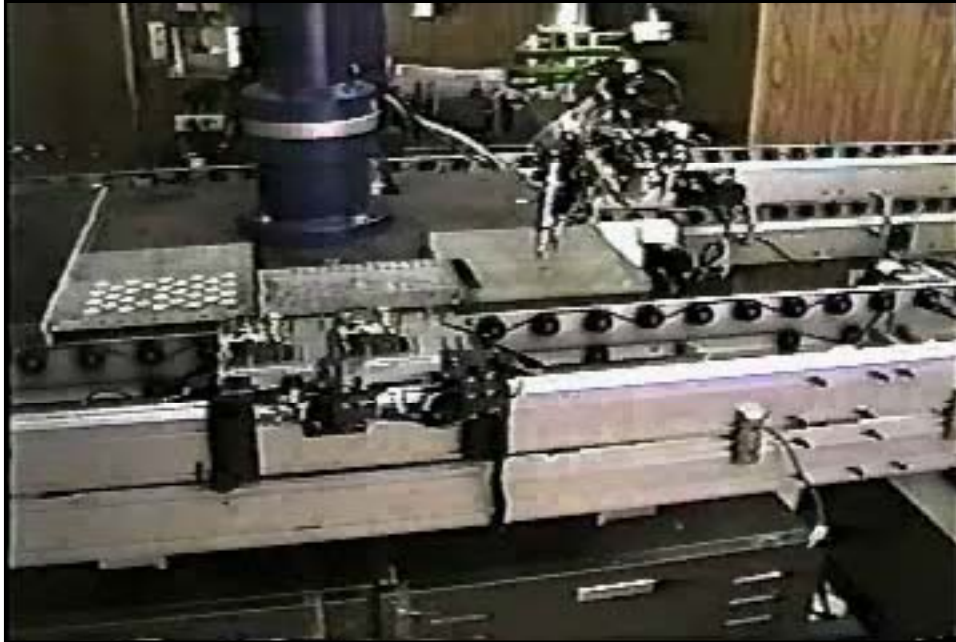




Reality



## Automated Assembly



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### Engineering

- Egypt – Imhotep 2600 BC (Pyramid Designer)
- 14<sup>th</sup> Century – Terminology of Engineer



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### Engineering

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  - 14<sup>th</sup> Century – Terminology of Engineer
- 
- 1819 US Military Academy offers Engineering Degree
  - 1847 British Professional Society of Mechanical Engineering



### Computer Science

- Abacus (2400 BC)
  - 5<sup>th</sup> Century BCE – Formal grammars first used in ancient India
  - 1640 Pascal creates mechanical adding device
- 
- 1950s + 60s First *Modern* Computers
  - 1960s First Computer Science Degree

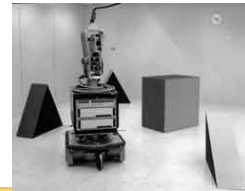
### Engineering

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- 1950 Alan Turing publishes "Computing Machinery and Intelligence"  
... the "Turing test"
- 1954 Devol and Engelberger design the first programmable robot arm, start *Unimation*
- 1956 John McCarthy coins "AI" at Dartmouth Conference co-organized with Marvin Minsky
- 1970 SRI Shakey: First "Intelligent" Robot



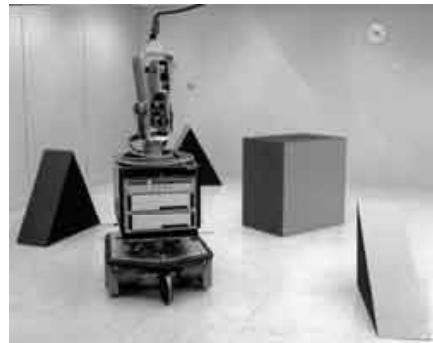
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- "SHAKEY: Experimentation in **Robot Learning and Planning**"
- "First Electronic Person" – Life Magazine
- Sensors: Cameras, Tactile
- Actuators: Motors, Wheels
- Algorithm: STRIPS Planner



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## Shakey (3X) Fikes & Nilsson



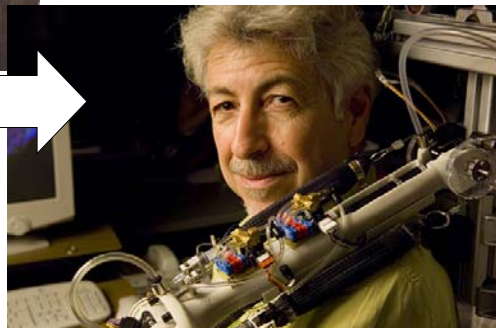
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John McCarthy



Honda Humanoids



Oussama Khatib

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## Honda P2 – Asimo Predecessor



*Tokyo, November 20, 2000* - "Honda Motor Co., Ltd. today announced the development of a new small, lightweight humanoid robot named ASIMO"





## Juggling (Atkeson '96)

Interesting A.I. Projects  
with  
SARCOS  
and other groups

Contact SARCOS

## Air Hockey (Bentivegna '03)



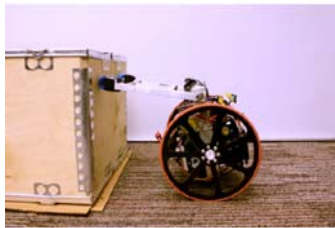
Hardware and low level control by SRC  
High level control & programming by ATR



## What Would Humans Be Like IF Nature Had Invented The Wheel?



- Anthropomorphic Mobile Manipulator
- Focus on **CAPABILITIES** of Humans
- Less emphasis on human appearance



Human Patented

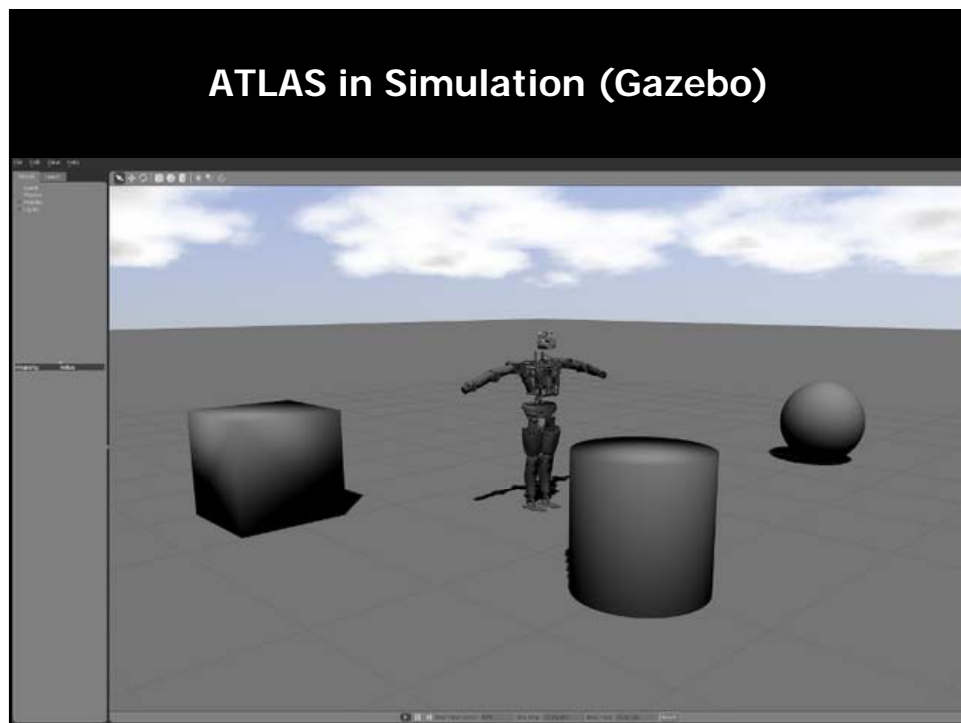
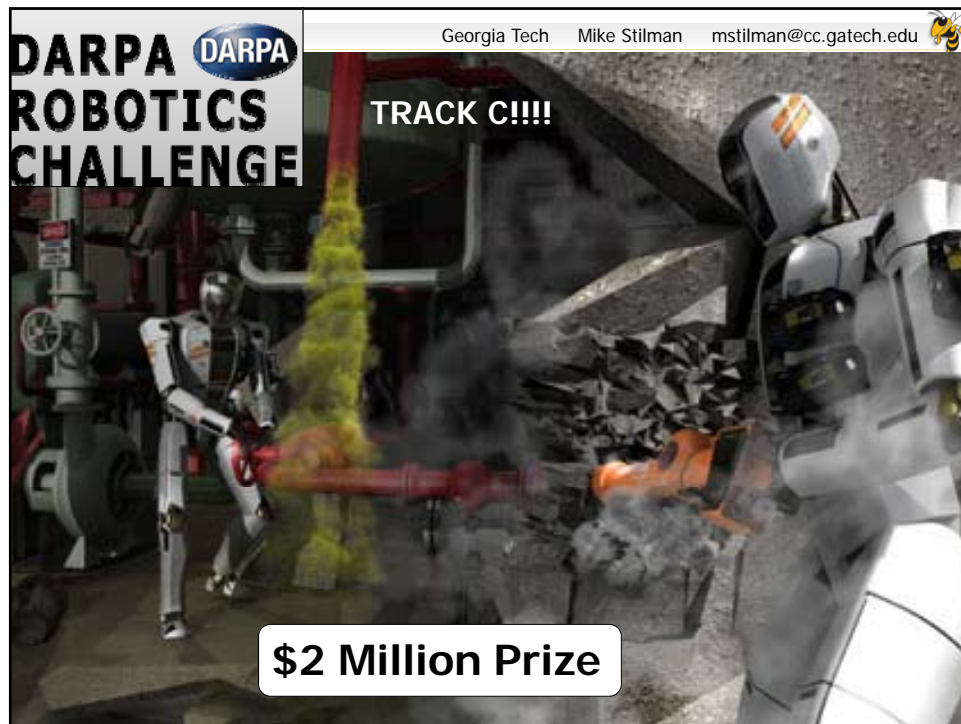
Nature Approved



# GOLEM KRANG

Humanoid Robot  
Dual Arm Torso  
Dynamic Balance  
Energy Storage



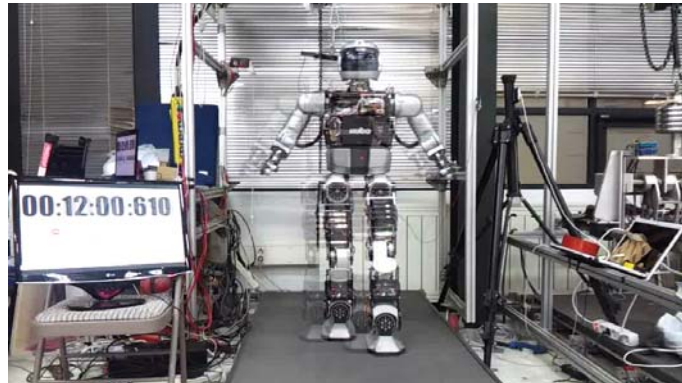
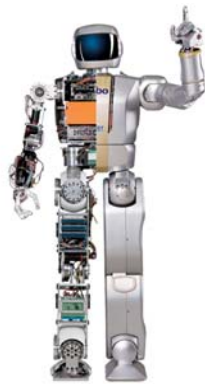




## TRACK C in MOTION!

Contact: [drc-admin@cc.gatech.edu](mailto:drc-admin@cc.gatech.edu)

Lots of crazy programming!



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