ROBOTICS
Current State and Trends

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HNRS 249: Seminar in Science Fiction
Can you name this robot (and the show it was in)?
Can you name this robot (and the show it was in)?

Astro Boy (a.k.a. *Tetsuwan Atomu*)

*Astro Boy (1963)*
What is a robot?
Three Laws of Robotics

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.

2. A robot must obey orders given to it by human beings, except where such orders would conflict with the First Law.

3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

**Zeroth Law:** A robot may not harm a human being, unless it finds a way to prove that in the final analysis, the harm done would benefit humanity in general.
Can you name these robots (and the movie they were in)?
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David and Teddy
A.I. (2001)
DARPA Grand Challenge

- first long distance competition for fully *autonomous* robot cars in the world
- ultimate goal of making one-third of ground military forces autonomous by 2015 (see U.S. Army's *Future Combat Systems*, FCS)
- open to teams and organizations around the world (must have at least one U.S. citizen in the roster)
DARPA Grand Challenge

2003-2004:
- 150-mile route through Mojave Desert just before Barstow, California to Primm, Nevada
- 15 finalists emerged from the qualifying round at the California Speedway
- $1M prize went unclaimed
- best performance (distance) by CMU Red Team's Sandstorm (AM General Hummer H1): 7.36 miles
DARPA Grand Challenge

- 2004-2005:
  - desert Southwest
  - five teams completed the 132-mile course
  - $2M prize went to Stanford Racing Team's Stanley (Volkswagen Tuareg) with the winning time of 6 hours, 53 minutes
DARPA Grand Challenge

- **2006-2007: Urban Challenge**
  - George Air Force Base, Victorville, California
  - 60-mile urban area course in less than 6 hours
  - obey all traffic regulations while negotiating with other traffic and obstacles and merging into traffic
  - $2M prize went to Tartan Racing's (CMU and GM) *Boss* (Chevy Tahoe), 4:10:20 at 14 mph average
UGVs: Unmanned Ground Vehicles

- iRobot PackBot
- iRobot ATRV-2
- Gecko Tactical UGV
- Armed Robotic Vehicle (ARV)

https://www.fcs.army.mil/
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Rosie
The Jetsons (1962)
UAVs: Unmanned Aerial Vehicles

- MQ-1 Predator
- Casper 250
- MQ-8B Fire Scout
- MDARS-E with iSTAR
- Lockheed Martin Polecat
AUVs: Autonomous Underwater Vehicles

Bluefin-12

USVs: Unmanned Surface Vehicles

Naval Postgraduate School
NPS Research AUV

Protector
Commercial Products

Friendly Robotic's *RoboMow*
http://www.friendlyrobotics.com/

iRobot's *Roomba*
http://www.irobot.com/
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Robbie
The Forbidden Planet (1956)
Commercial Products

Hasbro's FurReal Friends
http://www.hasbro.com/furreal/

Ugobe's Pleo
http://www.pleoworld.com/
Other Cool Products

Hanson Robotics' Zeno
http://www.hansonrobotics.com/
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Sonny (an NS-5 robot)
Sony AIBO

Artificial Intelligence roBOt

Robocup 2007
• Atlanta, GA (July 1-10)
• Winners:
  • Northern Bites (Bowdoin College, USA)
  • NUbots (University of Newcastle, Australia)
  • CMDash`07 (CMU, USA)

Chico State SoccerBots
Other Cool Products

Boston Dynamics' *BigDog*
http://www.bostondynamics.com/
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R2D2 and C3PO
Star Wars (1977)
NASA Mars Pathfinder Rover
Can you name this robot (and the movie it was in)?
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Twiki
Buck Rogers in the 25th Century (1977)
Honda ASIMO

Commercial
CES 07 demo
Climbing (and falling)
Can you name this robot (and the show it was in)?
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Bender
Futurama (1999)
Sony QRIQ

Quest for cuRIQsity

Commercial (in Japanese)

Fan dance
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Data

Star Trek: The Next Generation (1987)
CSUC Intelligent Systems Lab

Autonomous Agents

Robotics

Chico State SoccerBots

Machine Vision

Navigation

Machine Learning

Control

Agent Communication

Search & Rescue

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ISL Projects and Activities

- vision
- obstacle avoidance
- workshops and seminars
- decision making
- radio communication
- swarm intelligence
- localization and mapping

Summer Robotics Camp
Can you name this robot (and the movie it was in)?
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Maria
Metropolis (1927)
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References

- BBC h2g2 Guide, *Robots in Science Fiction*, http://www.bbc.co.uk/dna/h2g2/A1106687