csce190 – Computing in the Modern World

Fall 2011

Computing Challenges in Robotics

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Main idea

Robots will have huge impact on everyday life in the near future.

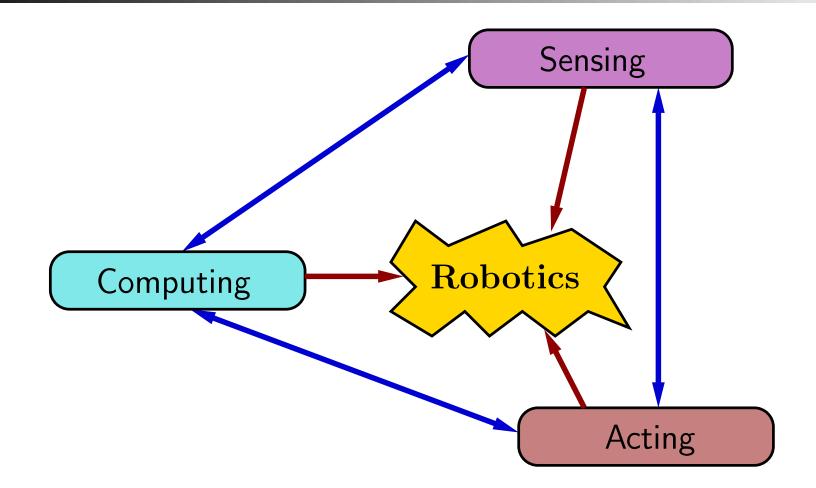
Computing will be centrally important to making this change happen.



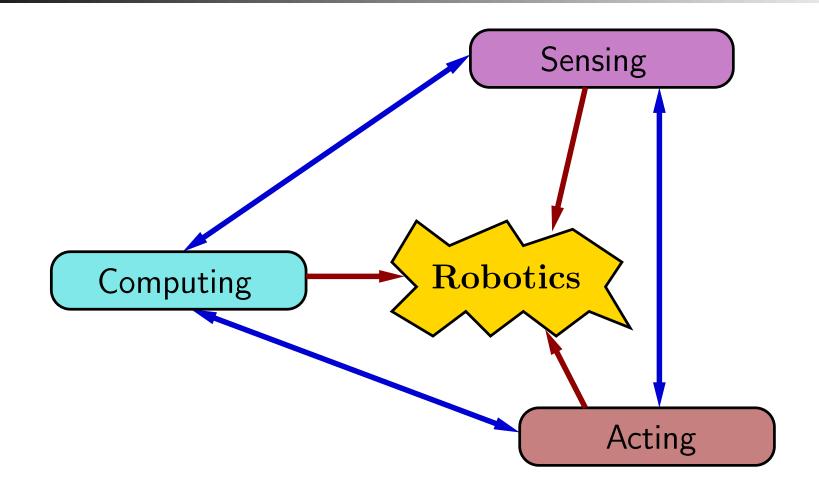
The job market for computer scientists and computer engineers in robotics will continue to grow!



What is robotics all about?



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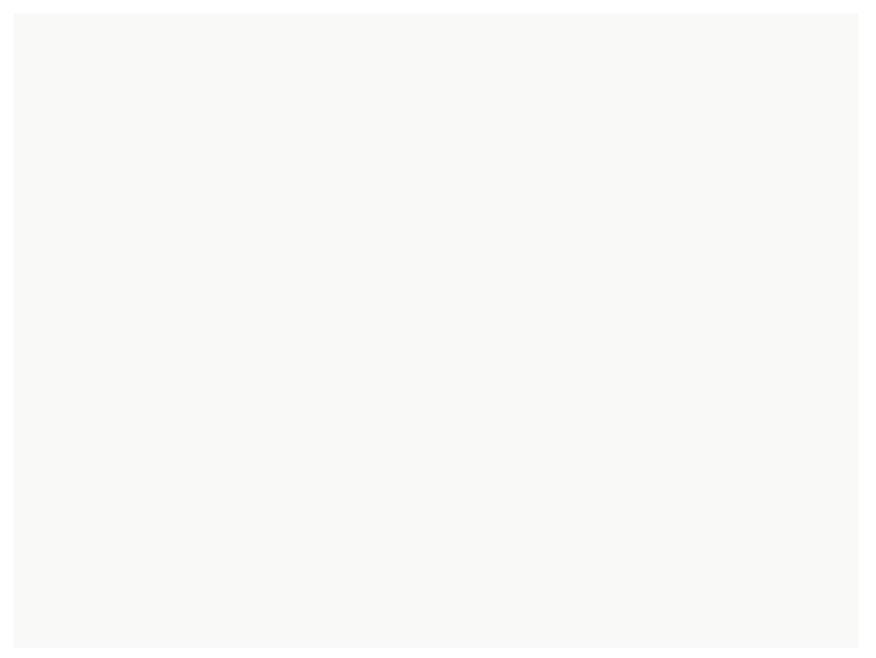
Robotics is what happens when a computer interacts directly with the physical world.

Driverless Driving



Challenges

- *Sensing* the road (or lack thereof) and obstacles.
- *Planning* a course around those obstacles.
- Representing information about the world in a well-organized, efficient way.
- *Safety* is supremely important!



Challenges

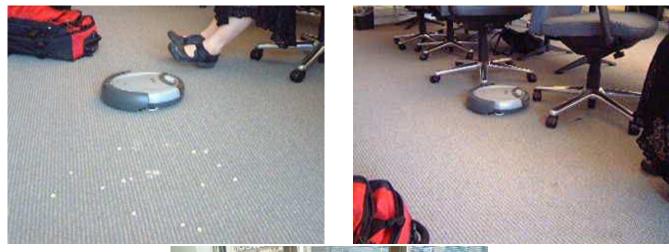
- *Teamwork* Coordinating the strategies of the team members.
- *Planning* Anticipating and countering strategies used by the other team.
- Physics Predicting the outcome of the robots' actions. How will the ball move?

Walking Robots



- *Stability* Make sure the robot stays upright.
- Unpredictability Make footsteps that will make progress on rough, unstable terrain.
- *Real-time responsiveness* React *very* quickly to unexpected changes.

Household Robots

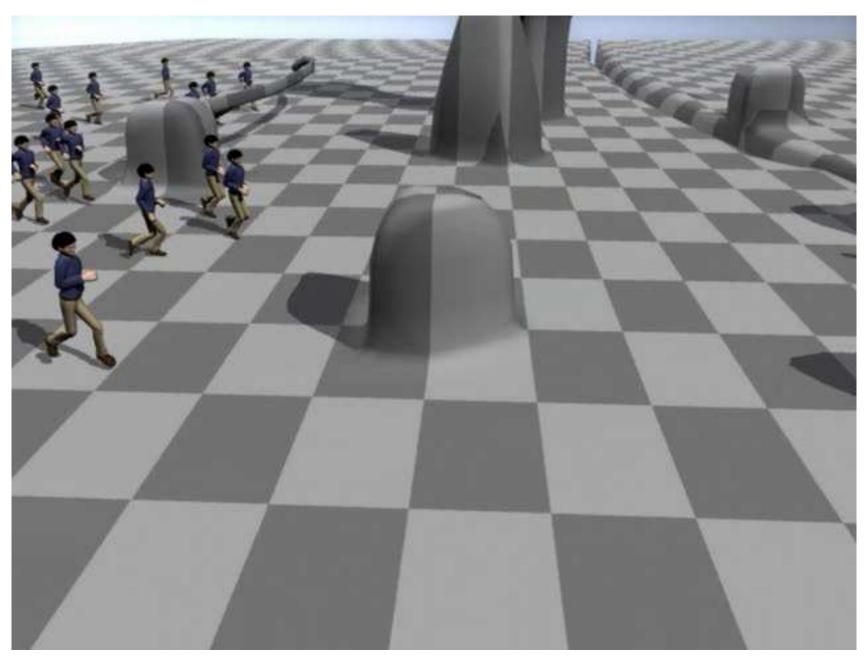




Challenges

- Household robots must be tailored to their *particular applications*.
- They need to be *robust*.
- They also must be *inexpensive*.

Computer Animation



Robotics Courses at USC

CSCE374 Introduction to robot programming.



CSCE574 Combination of hands-on labs and underlying theory.



CSCE774 Learn (and produce!) state-of-the-art robotics research results.