

# **csce190 – Computing in the Modern World**

**Spring 2010**

## **Computing Challenges in Robotics**

Prof. Jason O’Kane

February 23, 2010

# Main idea

Robots will have huge impact on everyday life in the next 10 years.

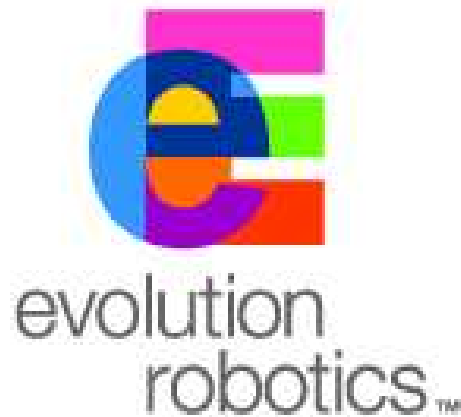
Computing will be centrally important to making this change happen.



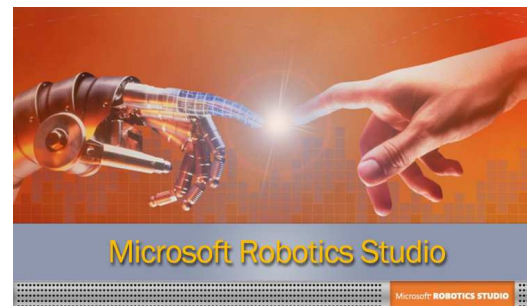
# Jobs in Robotics

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

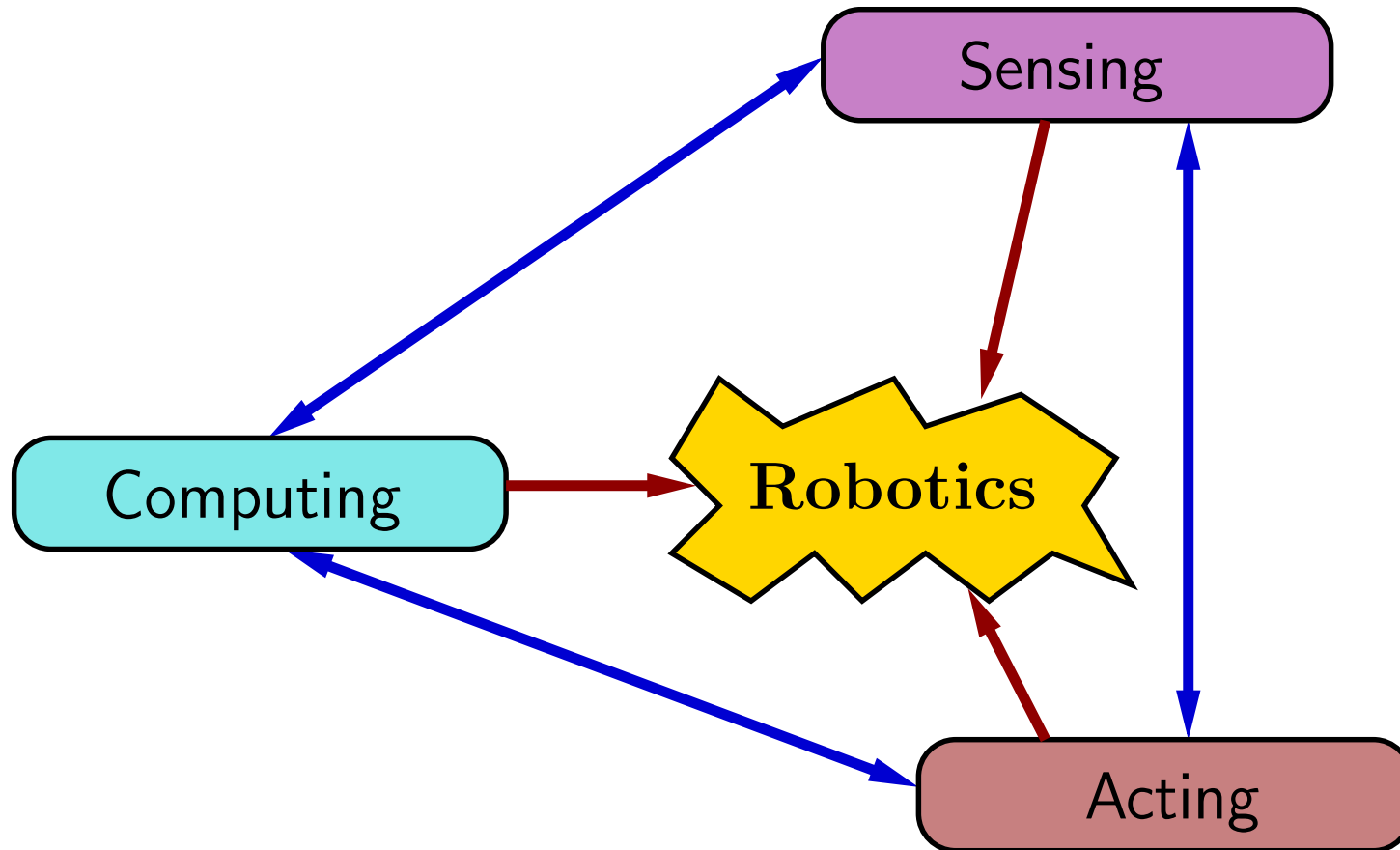
Boston Dynamics



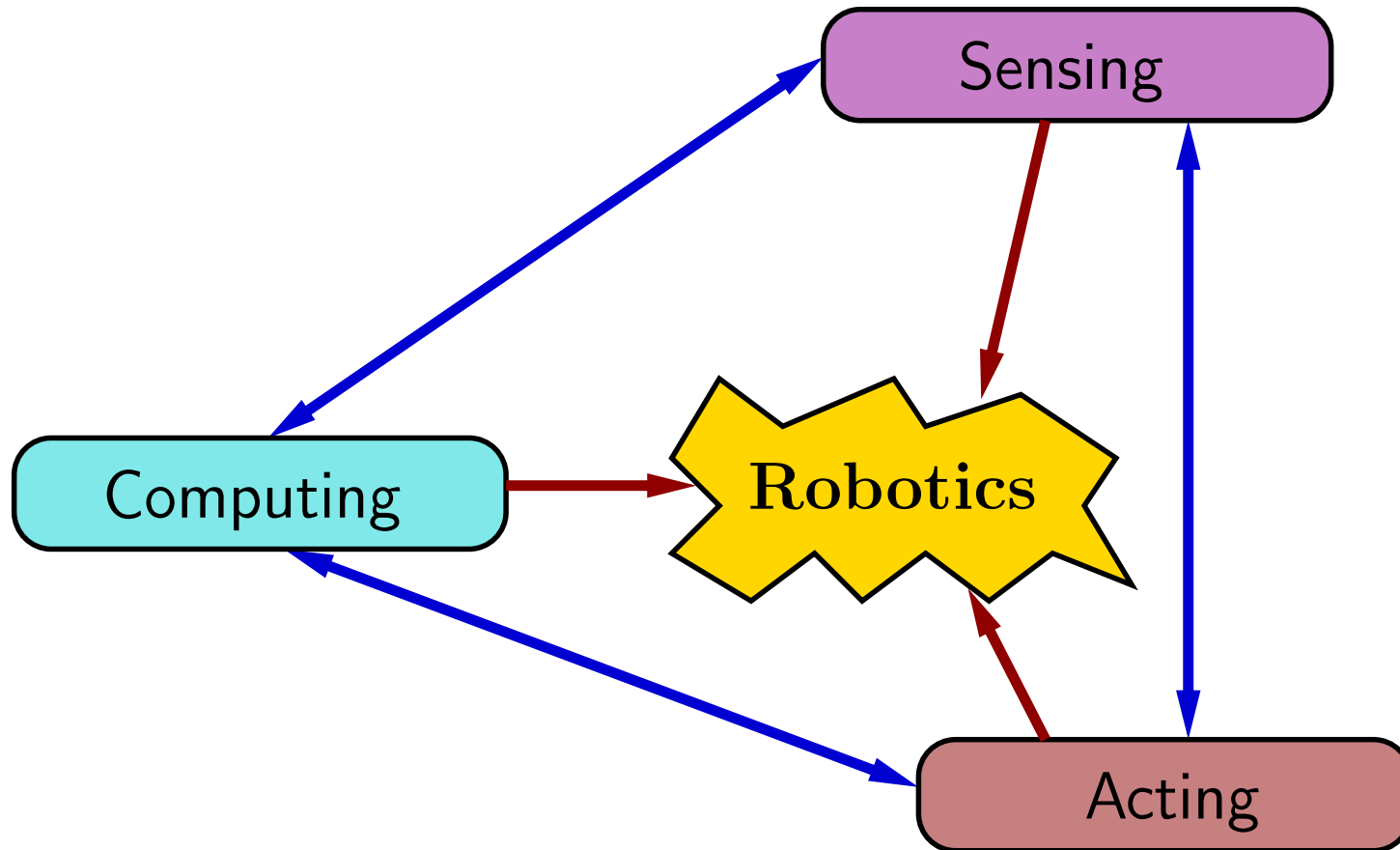
**iRobot®**  
www.irobot.com



# 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

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- *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!

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# Soccer with Robots

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# Challenges

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- *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?

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# Walking Robots



# Challenges

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- *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.

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# Household Robots



# Challenges

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

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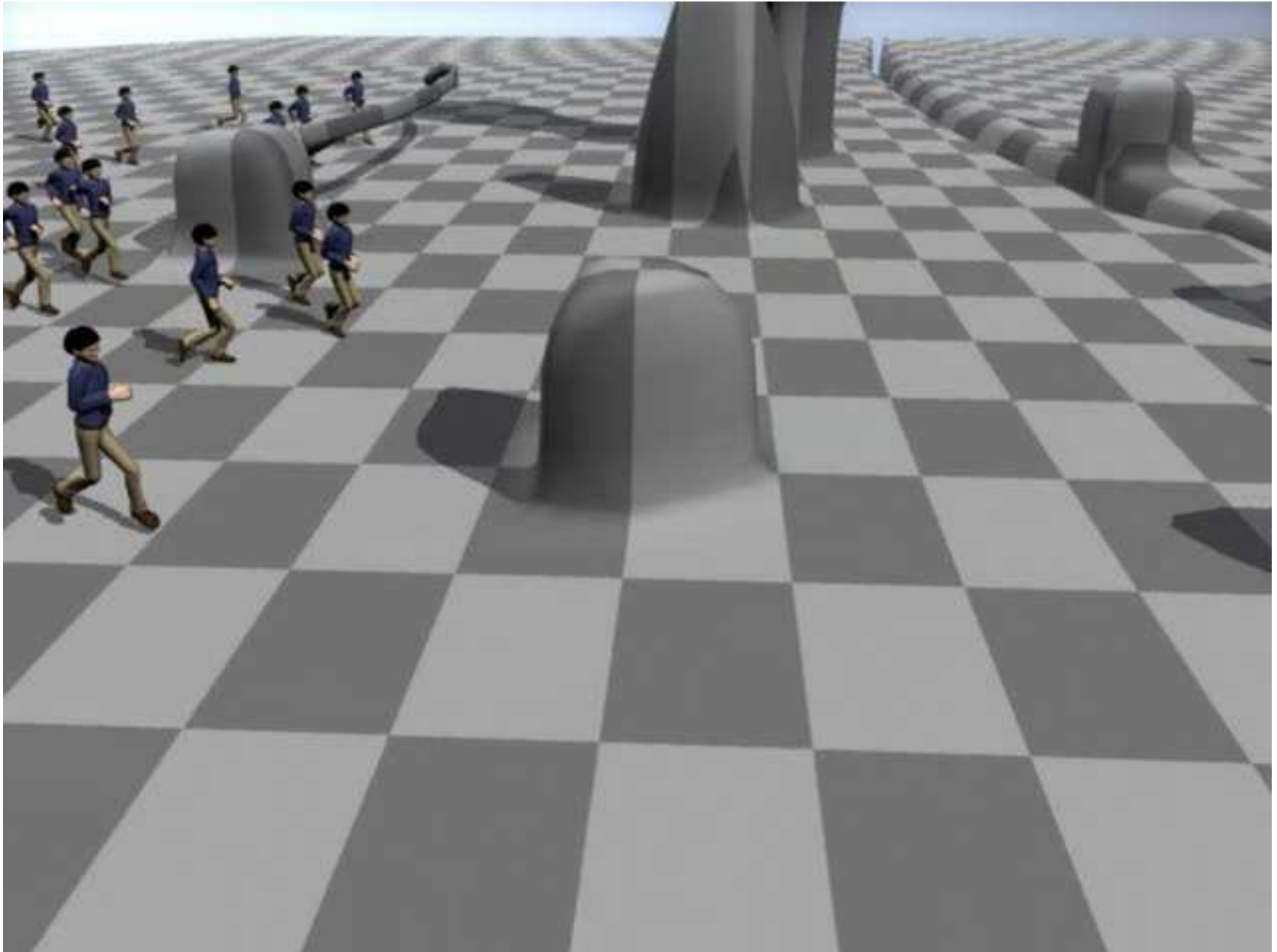
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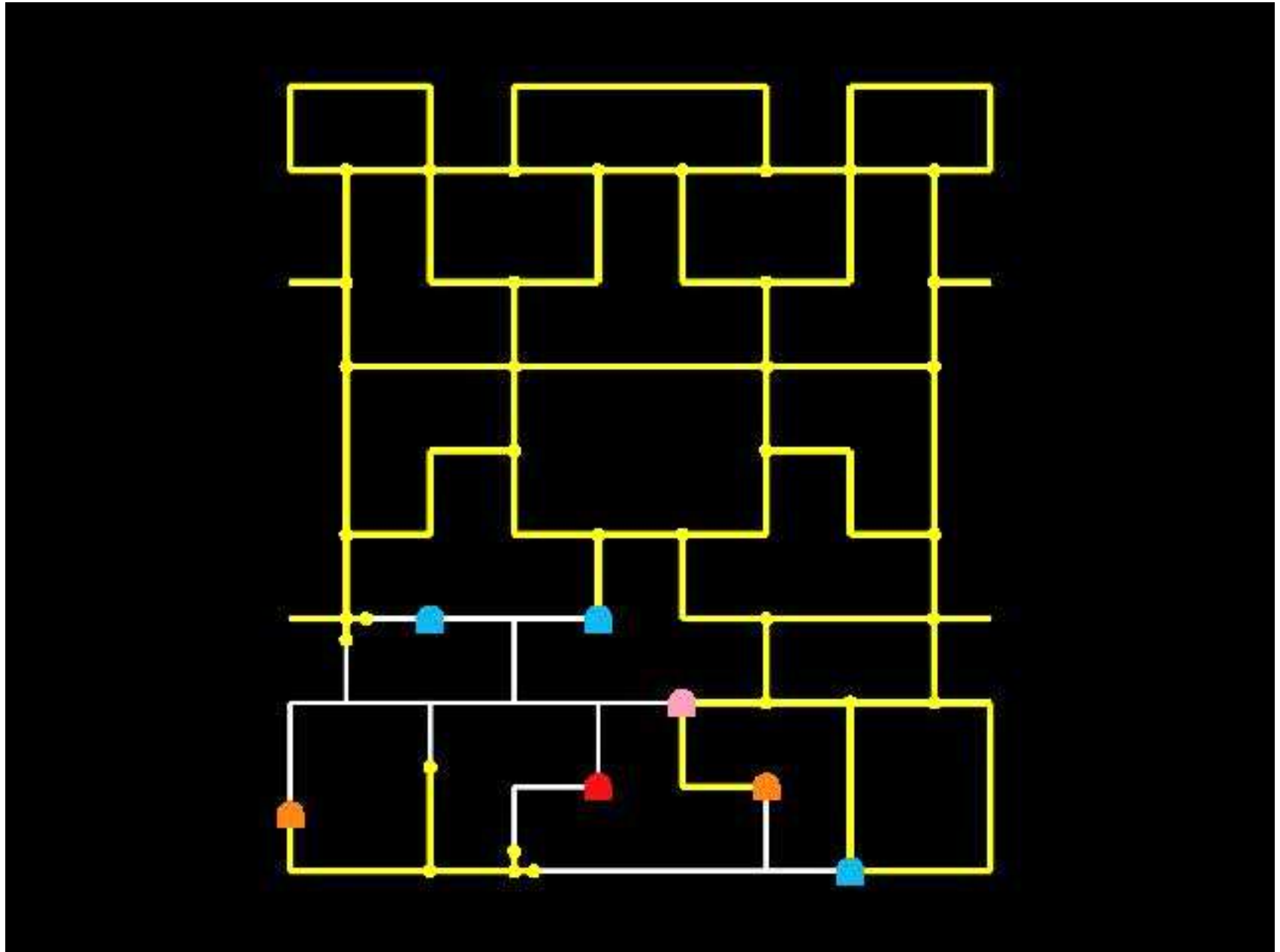
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# Computer Animation



# Hide and Seek



# Robotics Courses at USC

## CSCE574 – Robotics

Combination of hands-on labs and underlying theory.

