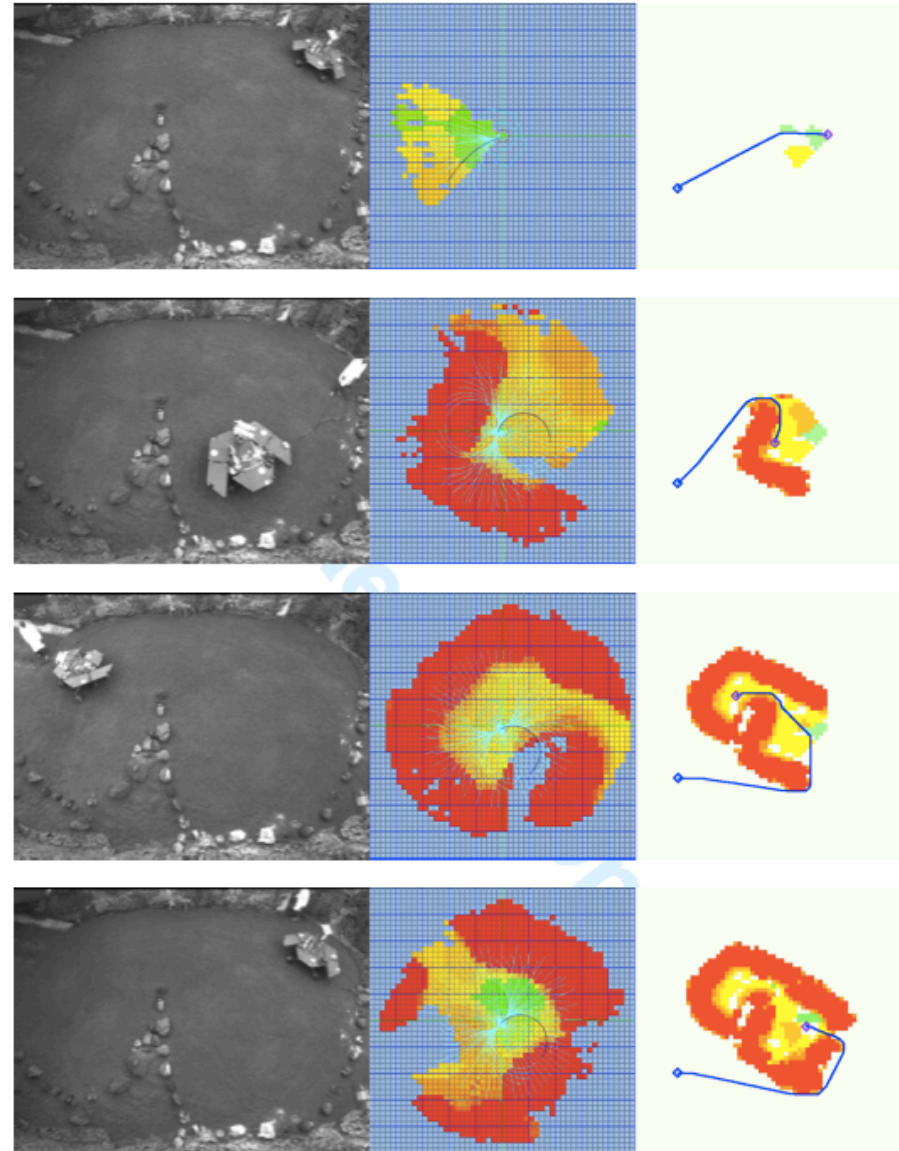


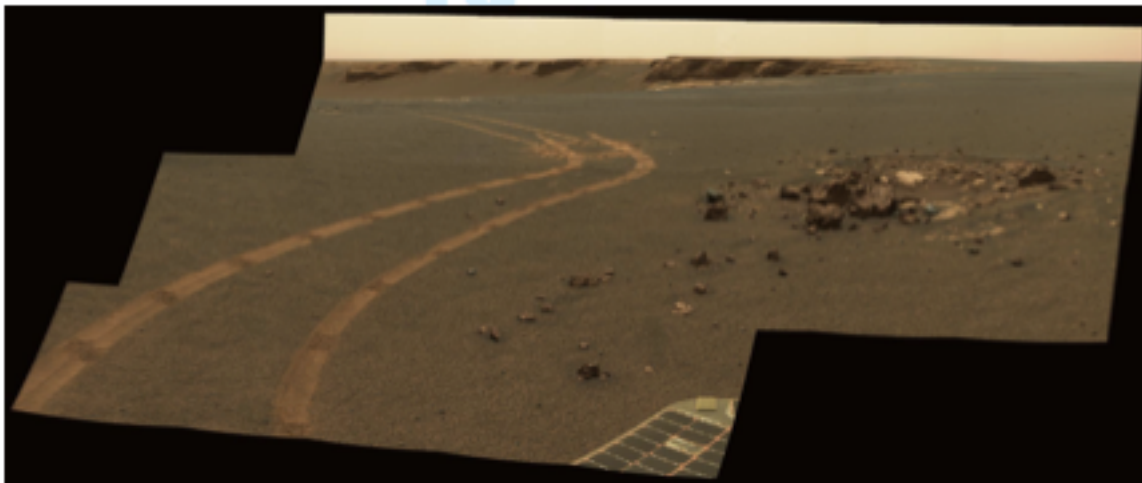
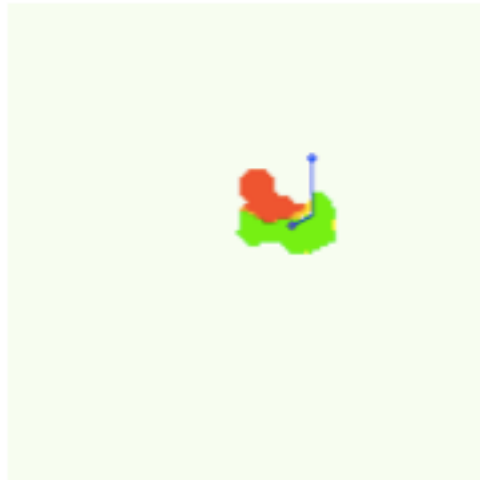
Navigation strategies

- Illustration with the Mars Exploration Rovers (2009)



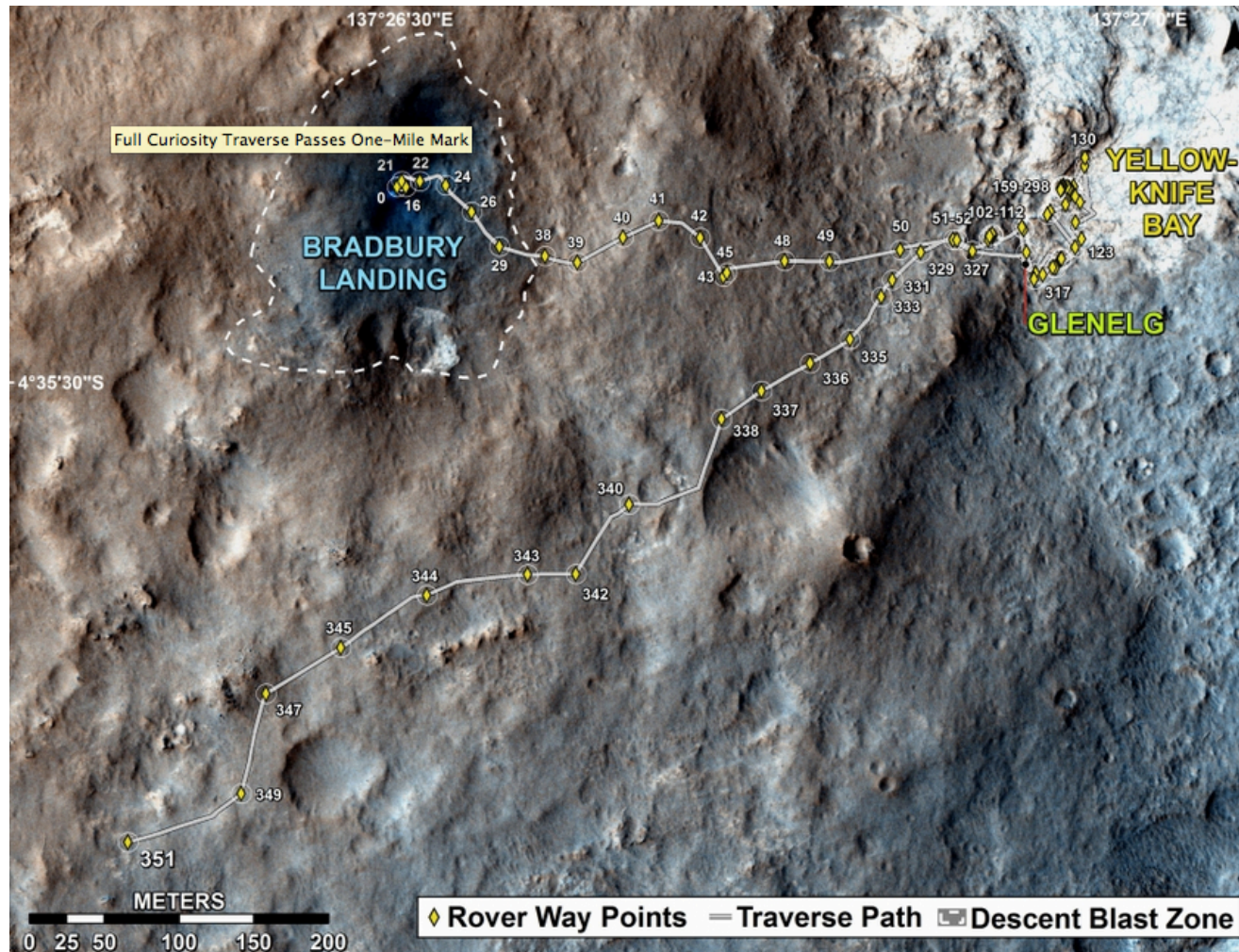
Navigation strategies

- Actual results on Mars (2009)



Navigation strategies

- Does Curiosity use D*? (so far, it seems no)



- Basic notions
 - Configuration space, kinematic constraints, search algorithms
- Practical field solutions
 - Potential field approaches
 - Short-term (“reactive”) planning
 - Long-term itineraries
- Other problems

Crossing obstacles

- The heavy way



“Crusher” (Darpa / CMU)

Crossing obstacles

- A little bit less heavy way



“Rhex” (Boston Dynamics)

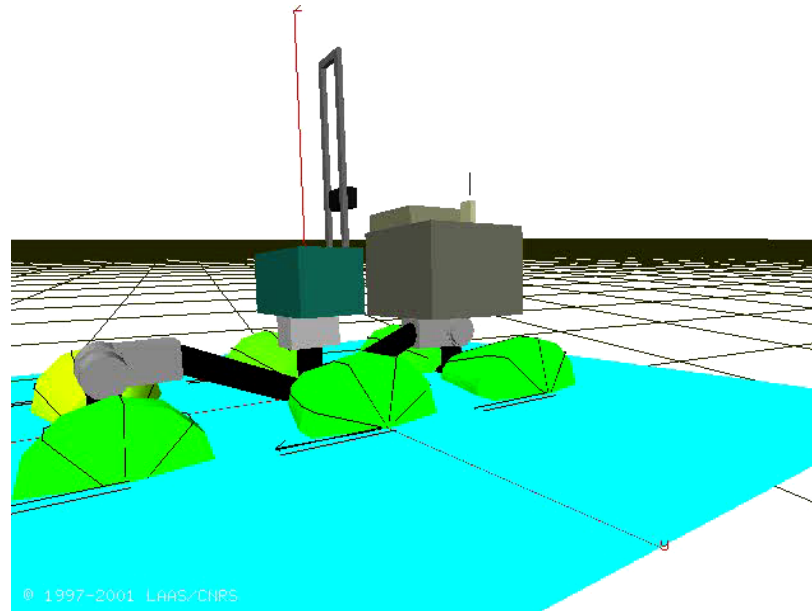
Crossing obstacles

- Agile robots can be powerful



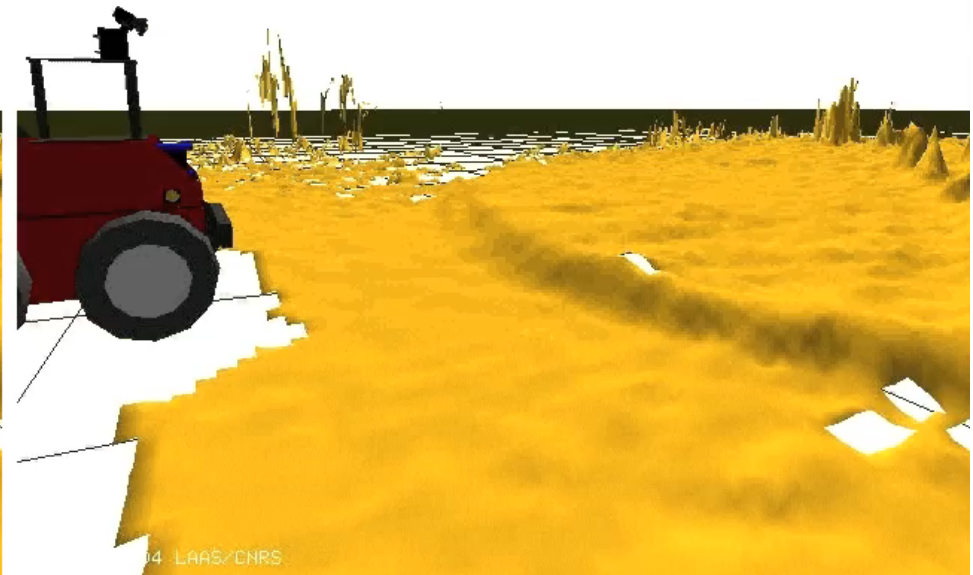
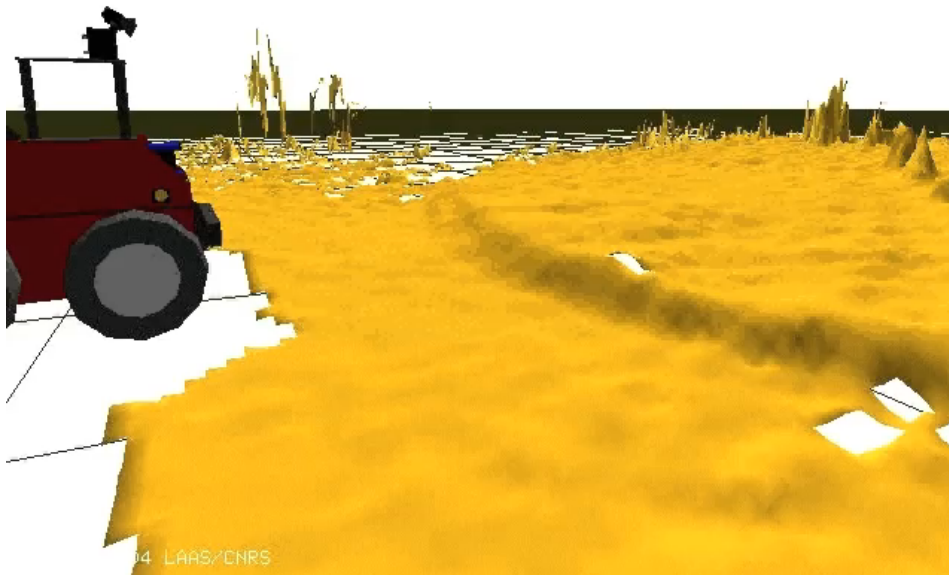
Crossing obstacles

- Smarter ways to cross obstacles ?
 - Advanced locomotion control
 - On line evaluation of the masses repartition
 - On line evaluation of the wheel torques



Crossing obstacles

- Smarter ways to cross obstacles ?
 - Advanced locomotion control
 - On line evaluation of the masses repartition
 - On line evaluation of the wheel torques
 - On line evaluation of the chassis configuration evolution



Going fast

- Stepping into dynamics of motion



But wait one more time...

- Given

- A current position ?
- A goal position
- Information on the environment
- Constraints to satisfy / criteria to optimize

- Find

- A trajectory that satisfies the constraints / optimizes the criteria

Summary

- Basic notions
 - Configuration space, kinematic constraints, search algorithms
- Practical field solutions
 - Potential field approaches
 - Short-term (“reactive”) planning
 - Long-term itineraries
- Other problems

Some readings

<http://homepages.laas.fr/jpl/book-toc.html>

Robot Motion Planning and Control

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