

### Class Report – Lecture 6 (10/10/2025)

Speaker : Prof. Kostas Bekris

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Prof. Bekris spoke on *Towards Closing the Perception–Planning and Sim2Real Gaps in Robotics*. He explained how robotics is moving from controlled factory lines to more real-world settings like warehouses and homes, where robots must see the world clearly, make good plans, and then carry them out on real hardware—not just in simulation. A main message was that perception, planning, and control should work together in a good collaboration, with the robot constantly updating its actions based on what its sensors observe (rather than a slow “sense–plan–act” cycle). He showed examples from his group, including work with NASA on robots made of rods and cables, which were trained in simulation and then run successfully on real robots, showing progress on the “simulation to reality” problem. He also discussed practical manipulation demos where better visual tracking and learning improved grasping and precise placement. In general, the talk emphasized the combination of solid models with learning-based methods so robots can adapt, be reliable, and handle the complexity of real uncontrolled environments.

#### Questions

- How close are we to robots that can teach each other, for example, one warehouse robot learning from another through shared simulation experiences?
- Can robots eventually develop a kind of instinct, where perception and planning work together so smoothly that they react almost like living beings?

#### Comments

- The talk clearly showed how robotics is moving toward more intelligent and adaptive systems that learn from both simulation and experience.
- I liked how the professor explained complex planning and perception ideas with practical examples such as warehouse robots and NASA projects.
- His explanation of “sense–plan–act” v/s continuous feedback control made the concept easy to relate to even without heavy math.

#### What I Liked

- The lecture was very engaging and enjoyable and full of real examples connecting research to applications.
- I especially liked the demonstration of tensegrity robots and how theory, simulation, and experimentation came together.

#### Overall Assessment

This lecture provided a deep and motivating view of one of the key limits in robotics, closing the gap between simulation and reality while uniting perception and planning. Prof. Bekris’s work explained how careful modeling, data-driven learning, and iterative testing can make robots more robust in unpredictable environments. It was an inspiring and well delivered talk that connected advanced research ideas with real-world challenges in modern robotics.