NSF Highlight
Research Experiences for Undergraduates

1. **Basic Info and NSF Award Number(s)**
   Your name, award number and program director

   Alex Stoytchev, 0851976 (PI Stephen Gilbert), Sven Koenig

2. **What is your Suggested Title for your highlight?**

   Undergraduate Research: Robot Learns to Swipe a Card through a Card Reader: a Complex Proprioceptive Task

3. **What is the outcome or accomplishment?**

   Undergraduates Veselin Georgiev, Ramy Sweidan, and Todd Wegter broke new ground in robot learning by creating a constraint detection algorithm for proprioceptive (touch-based) tasks. They used the algorithm to teach a robot to swipe a credit card in a card reader, a difficult task without a subtle sense of touch.

4. **What is the impact?**

   It's usually difficult for robots to learn new tasks without specific instructions. This constraint detection software enables robots to learn many touch-based tasks more easily, e.g. turning a key in a lock, opening doors, and other tasks that are critical for integration of robots into our daily life and work.

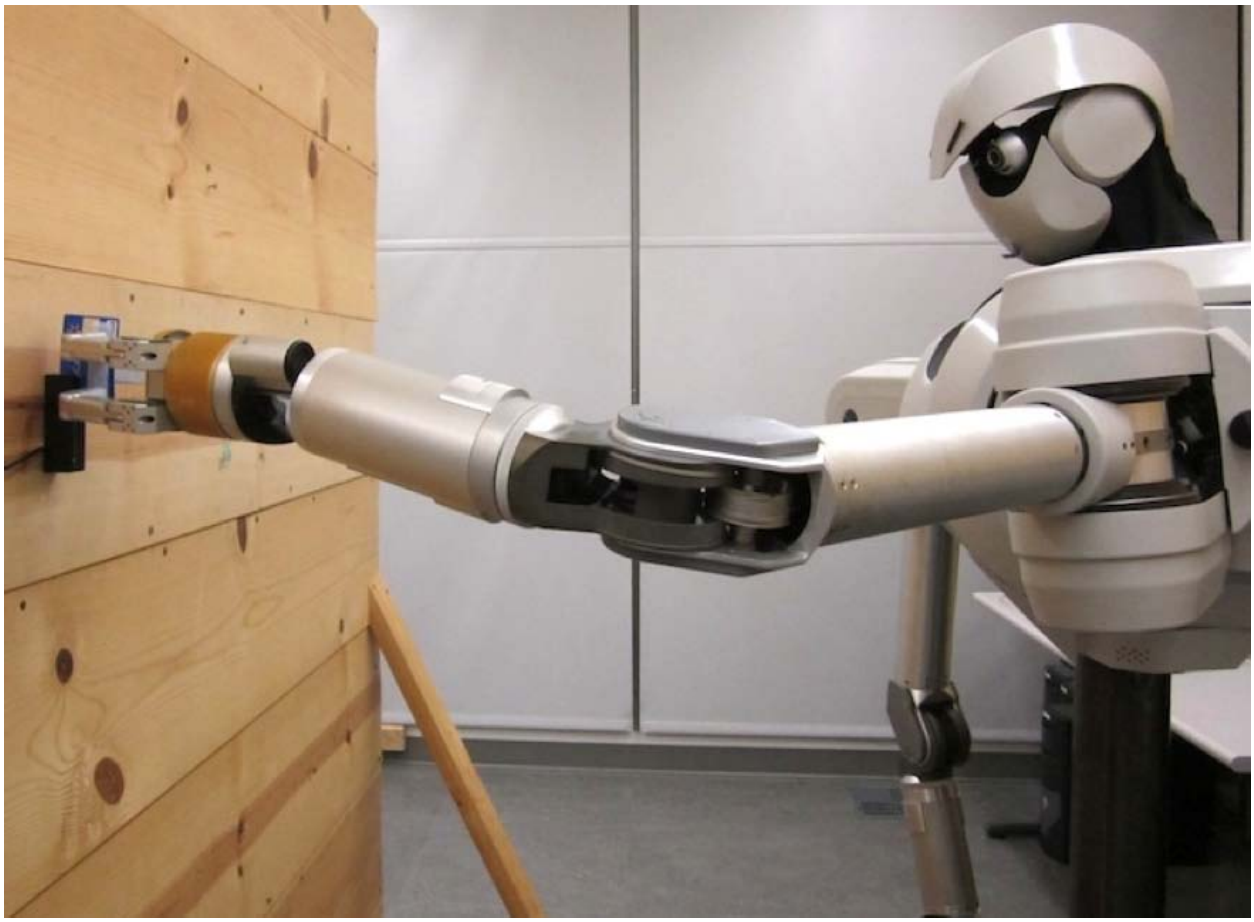
5. **What explanation / background does the lay reader need to understand the significance of this outcome?**

   Developmental robotics is a research field that treats robots like children, developing generic learning algorithms that enable robots to learn like a child learns, rather than teaching robots specific skills. While this approach may be more successful in the long run, it is difficult because many seemingly simple tasks for children involve careful fusion of multiple senses, e.g,, touch, sight, and hearing.

   Professor Alex Stoytchev and his students in Electrical and Computer Engineering at Iowa State University, have made impressive accomplishments in developmental robotics, teaching a robot to use sound, vision, and touch-based (proprioceptive) cues to differentiate objects, to sort containers from non-containers, to push buttons, and now with the help of three SPIRE-EIT undergraduates, to slide a card through a card reader, a difficult touch-based task.

   SPIRE-EIT is an intensive 10-week research program at Iowa State University particularly focused on increasing diversity in computer science and engineering with a focus on emerging interface technologies. Over 75% of participants have come from groups underrepresented in computing, including first-generation college students, women, and members of underrepresented ethnic or racial minorities.

Image(s)/Caption(s)



The robot in Alex Stoytchev's lab uses a constrain detection algorithm developed by three undergraduate researchers to learn to swipe a credit card, a difficult task requiring a careful touch.

Video available at: http://www.youtube.com/watch?v=ahKiaTo9fVo
Other videos also available as well if this highlight is chosen.

Email address for owner of Image(s)

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