HUMANITY CENTERED ROBOTICS INITIATIVE

BROWN

Tech Talk: Anca Dragan
Carnegie Mellon University

"Interaction as Manipulation"

Friday, December 12, 2014
12-1pm
CIT 477 Lubrano Conference Room

The goal of my research is to enable robots to autonomously produce behavior that reasons about function and interaction with and around people. I aim to develop a formal understanding of interaction that leads to algorithms which are informed by mathematical models of how people interact with robots, enabling generalization across robot morphologies and interaction modalities.

In this talk, I will focus on one specific instance of this agenda: autonomously generating motion for coordination during human-robot collaborative manipulation. Most motion in robotics is purely functional: industrial robots move to package parts, vacuuming robots move to suck dust, and personal robots move to clean up a dirty table. This type of motion is ideal when the robot is performing a task in isolation. Collaboration, however, does not happen in isolation, and demands that we move beyond purely functional motion. In collaboration, the robot's motion has an observer, watching and interpreting the motion – inferring the robot's intent from the motion, and anticipating the robot's motion based on its intent. My work develops a mathematical model of these inferences, and integrates this model into motion planning, so that the robot can generate motion that matches people's expectations and clearly conveys its intent. In doing so, I draw on action interpretation theory, Bayesian inference, constrained trajectory optimization, and interactive learning. The resulting motion not only leads to more efficient collaboration, but also increases the fluency of the interaction as defined through both objective and subjective measures. The underlying formalism has been applied across robot morphologies, from manipulator arms to mobile robots, and across interaction modalities, such as motion, gestures, and shared autonomy with assistive arms.

Anca Dragan is a PhD candidate at Carnegie Mellon's Robotics Institute, and a member of the Personal Robotics Lab. She was born in Romania and received her B.Sc. in Computer Science from Jacobs University Bremen in 2009. Her research lies at the intersection of robotics, machine learning, and human-robot interaction: she is interested in enabling robots to seamlessly work with, around, and in support of people. Anca is an Intel PhD Fellow, a Siebel Scholar for 2015, a Dan David Prize Scholar for 2014, and a Google Anita Borg Scholar for 2012, and serves as General Chair in the Quality of Life Technology Center's student council.

This tech talk is part of the HCRI's multidisciplinary speaking program that showcases diverse and groundbreaking research undertaken by leaders in science, technology, design, and impact of robotics on society.

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