

The Intersection between Cognitive Robotics and Human Robot Interaction

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I. EXTENDED ABSTRACT

Interaction between two entities is a mixture of social, cognitive, and embodied qualities. We know a great deal about interaction between people, but only recently have begun exploring whether people interact with robots and avatars the same way that people interact with each other.

In general, people do seem to interact with computers (and robots) the same way that people interact with each other [1]–[3]. Most of this work has suggested that people respond to robots as social actors simply by providing relatively surface-level cues about social behavior (e.g., a female voice).

Our approach has been to build high-fidelity cognitive models that match human-level data and that run on our robots [4], [5]. These models have focused on pure cognitive robotics with emergent interaction: the robot architecture is a cognitive architecture and the robot deals with the environment and people the same way that as people do. We have recently been working on taking our cognitive models and predicting what a person would do next or in the near future, and then improving interaction. I will discuss some of the challenges and the success of using a pure cognitive approach and a hybrid robotics/cognitive approach.

II. BIO

Greg Trafton is the head of the Intelligent Systems Section at the Naval Research Laboratory in Washington, DC. He has a B.S. in computer science and a second major in psychology from Trinity University and a Ph.D in cognitive science from Princeton University. He has been working on cognitively plausible human robot interaction as well as predicting and preventing procedural errors.

REFERENCES

- [1] T. Fong, I. Nourbakhsh, and K. Dautenhahn, “A survey of socially interactive robots,” *Robotics and autonomous systems*, vol. 42, no. 3-4, pp. 143–166, 2003.
- [2] V. Groom, L. Takayama, P. Ochi, and C. Nass, “I am my robot: The impact of robot-building and robot form on operators,” in *Proceedings of the 4th ACM/IEEE International conference on Human robot interaction*, 2009.
- [3] C. Nass, J. S. Steuer, and E. Tauber, “Computers are social actors,” in *Proceedings of the CHI 94 Conference*. New York: ACM Press, 1994, pp. 72–77.
- [4] J. G. Trafton, N. L. Cassimatis, M. D. Bugajska, D. P. Brock, F. E. Mintz, and A. C. Schultz, “Enabling effective human-robot interaction using perspective-taking in robots,” *IEEE Transactions on Systems, Man, and Cybernetics*, vol. 35, no. 4, pp. 460–470, 2005.
- [5] J. G. Trafton, A. C. Schultz, D. Perzanowski, W. Adams, M. D. Bugajska, N. L. Cassimatis, and D. P. Brock, “Children and robots learning to play hide and seek,” in *Proceedings of the 2006 ACM conference on human-robot interaction*, A. Schultz and M. Goodrich, Eds. ACM press, 2006.