

# Dancing with ChairBots

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**Abstract**—Over the summer of 2018, CHARISMA Robotics Laboratory at Oregon State University invited a Theater Artist to collaborate on two interdisciplinary robot theater productions using ChairBots and human performers. Both productions shared in a three-week development period, the same development team and performing robots, and culminated in live performances. This paper acts as a companion to the video documentation of these productions, addressing the novelty and contributions, both technical and creative, of dancing with robot furniture.

**Index Terms**—Human-Robot Interaction, Interdisciplinary Performance, Robots, ChairBots.

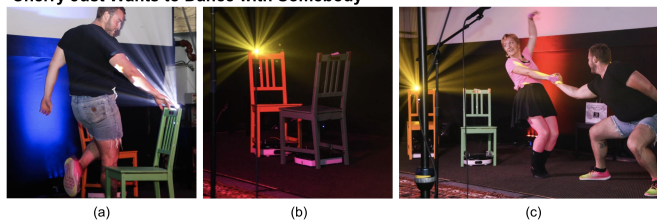
Few contributions to HRI have previously explored the insights robot-dance collaborations can provide social robotics. Following the many previous greats in robot performance from Louis-Phillipe Demers to Blanci Li, and many more, our humble research team was able to explore the social fluidity of minimal social robots, how such robots can utilize simple touch interactions, and the lessons human-robot performances can provide to anticipating and solving robot failures on stage.

Robotic chairs were selected as the robot performer platform precisely because of their limitations (design presented in [1]). Would the audience think of the chair as a character or an object? *Cherry Just Wants To Dance With Somebody* begins by converting an object to something alive. The chair begins to imitate a human dancers moves: forward, back, spin. A duet follows, in which the touch sensors on the chairs ‘shoulders’ let the human performer spin the chair around and move it back and forth on stage evoking typical partner dance.

Later, however, the chair smoothly transitions back into an object: a dancer sits on it while doing fancy footwork on the floor, both dancers put one leg on the chair, assuming a thinking pose with their elbow, and finally, one of the dancers hops over the back of the chair on stage. This segment of the production draws on chair-dancing as a genre of dance, but also represents the way that social robots should sometimes fall into the background to let the people focus on each other. The finale shifts the chairs (now two) back into characters again, all performers dancing together, ending in a tentative robot-robot collision, a.k.a., the final LED-lit ‘kiss’ (Fig 1, top).

*Kaleidoscope* brought the ChairBots into even greater abstraction, this time as interactive artwork with human co-performers recruited from bystanders in a public space (Fig 1, bottom). The geometrically- inspired piece took inspiration from Improv Everywhere, a entertainment organization, and “Do Triangles Play Tricks” a famous psychology experiment

Cherry Just Wants to Dance with Somebody



Kaleidoscope

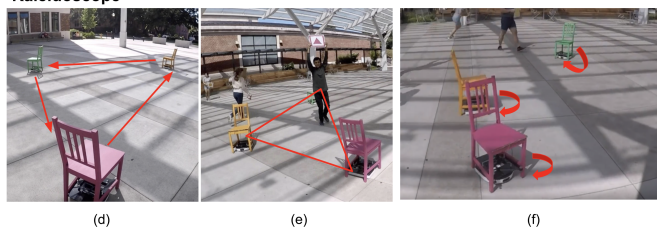


Fig. 1. (1) *Cherry Just Wants to Dance with Somebody* (top) was a narrative love-story using dance and non-verbal communication, while (2) *Kaleidoscope* was an improvisational geometry exploration where bystanders participated.

by Heider & Simmel. The theme of this piece was geometric shapes: squares, triangles, spheres, and spirals. The robots (and later human co-performers) followed paths comprised of one these shapes until they collided with themselves or a human, upon which they would either switch shapes, or all perform the same shape together. The public participated using shape signs similar to this ChairBot program.

Both of these productions also provided an opportunity to explore human-robot touch interactions. Five capacitive touch sensors on the top of the chairs allowed a human performer to move the chairs forward, back, clockwise and counterclockwise, at two different speeds (Fig 1, top left), which allowed for partner dancing as well as occasional corrections to a misbehaving robot performer. Bump sensors were also installed on the front panel of the chairs, and sent an on-off signal when the robot bumped into something else. The research team also learned useful lessons about preparing for failure. There’s not room to fully explain those insights here, but the tantamount directive was *The Robot Show Must Go On*. In our future work, we may invite you to take your seats, or we may just ask you to stand up and dance with them.

## REFERENCES

- [1] Knight, H. et al. “I get it already! the influence of ChairBot motion gestures on bystander response.” Ro-Man 2017.