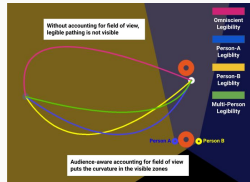


Audience-Aware Legibility for Social Navigation



Contact me to discuss more at adat+rss@cmu.edu



This material is based upon work supported by the National Science Foundation under Grant No. 1659774 and the Sony Group Corporation.

Motivation

Problem:

Robotic food service requires navigation through large multi-human environments. Robot intentions in these spaces are often unclear to observers.

Solution:

We create a definition of legibility for this domain, creating an *audience-aware* formulation.



Figure 1. Turk et al. and Schwartz et al. (2012) Legibility and predictability of robot motion. *Proceedings of Human-Robot Interaction*.

Incorporation into Legibility Formulation

Legible motion in a restaurant setting requires us to model:



Limited Field of View

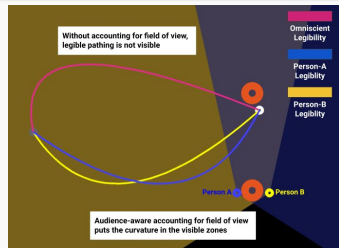


Balancing Multiple Audience Members



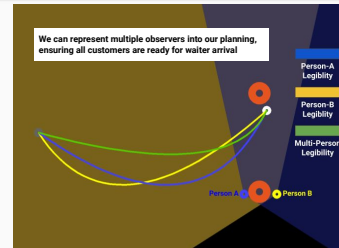
Social Interaction

Limited Field of View



How does this model of limited viewpoints improve audience reactions to paths?

Balancing Multiple Audience Members



How do we ensure all customers are all equally ready for waiter arrival?

Social Interaction



Path Efficiency



Heading



Gaze



Gestures

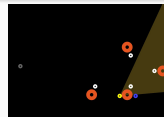
Which models of how observers infer the probability of approaching a particular goal are most relevant in a social navigation scenario?

Hypotheses

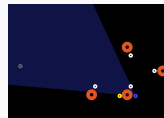
H1: A robot that plans its path taking into account the visibility of that path to all of its observers can create paths which are easier for viewers to understand.

H2: A path personalized for a specific perspective will be more legible than the average multi-perspective performance for that perspective but will be less legible for other perspectives.

Perspectives



Perspective A:
back to robot



Perspective B:
facing robot

Experimental Setup

Task:

Participants are shown videos of a robot server approaching different "goal tables" in the restaurant.

What is the server's goal?



Stimuli:

For each of the tables at our restaurant, we run this experiment for each of:

Perspective
Person A: Back-to-robot
Person B: Facing-robot

and

Planning Audience
Omniscient
For Person A
For Person B