

# Considerations about Social Norms Compliance in a Shared Elevator Scenario

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## Introduction

We investigate aspects of social robot navigation involving the use of shared elevators with humans. This context presents a range of challenges such as **negotiation of priorities** or **movement and coordination in reduced spaces**.



## Understanding the activity

Analysis of **16 hours of elevator lobby video** using an **ethnomethodological** analytic orientation [11] to understand the specific practices of waiting for, entering, and exiting an elevator.



*Example. A weak first-come-first-served principle is observed where people do not form proper queues.*

1. Seemingly obvious and easily accomplished human behaviors would present *serious technical challenges* for a socially competent robot to fully understand and mimic them.
2. We question how comfortable people would be with robots that fully mimic human-like behaviors and how these behaviors might contribute to an *illusion of social competence*.

## The challenge

**How can an agent effectively navigate shared spaces with people, focusing on safety and minimal disruption**, but without necessarily being burdened with the normative expectations of being perceived as a fully human-like socially competent agent?

## Our approach

We distance ourselves from following the strict approach of fully exploiting understanding and adherence to the elevator social norms and establish the notion of *machine-like yet human-friendly* interaction behaviors. Such behaviors respect human and social considerations relevant to this activity and social context without explicitly mimicking human behaviors.

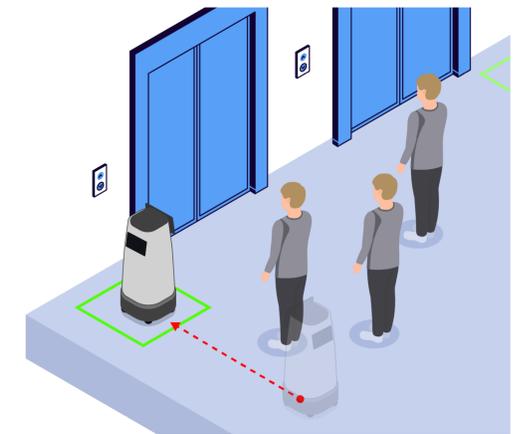
	Machine-like	Machine-like yet Human-friendly	Human-like
Social awareness	No. The robot is not able to differentiate humans from other obstacles.	Some. The robot can detect humans and is aware of people entering and exiting to decide its actions.	Yes. The robot detects humans and their intentions. It adopts queuing as done by humans and moves of position according to an understanding of situations.
Communication of intent	Non-verbal, e.g., sounds. The robot only gives information for consumption.	The robot uses subtle nonverbal interface elements to broadcast intent, which are deliberate design choices for information consumption only.	Verbal and non-verbal like gaze, body posture, etc. The robot and the humans acknowledge and exchange information.
Movement and position	The robot positions itself in front of the door and always enters first.	The robot takes a fixed waiting position and gives priority, except in urgency.	Mimics humans with queuing and position adjustments.

## Design proposal

The design of the activity is broken down into: *waiting, entering, riding, and exiting* the elevator. Each stage is further divided into several smaller actions performed by the robot. *Example:*

### Navigate to Waiting Position

Rather than queuing, the robot navigates to the fixed waiting position. It commits to an elevator, even if another elevator arrives first (unlike a human-like behavior).



## Evaluation

### HYPOTHESIS

1. In certain cases (especially related to positioning and movements), people will **understand and prefer machine-like yet human-friendly** robot actions rather than those mimicking humans, such as the subtle movements exhibited by people taking elevators.
2. Our proposed robot's behaviors for communicating intent (calling the elevator, waiting, entering) will be as **understandable and less intrusive** than fully humanlike ones, for the first use as well as for an extended period.

### LAYERED TESTING APPROACH

To assess our design proposal, we decided to adopt a layered testing approach consisting of three steps: (1) *online experiments*, (2) *in-situ experiments*, and (3) *naturalistic observations* of the robot working in context.

[11] H. Garfinkel. 1967. Studies in Ethnomethodology. Polity Press.