# The effect on human-robot interaction of visible camera lenses on top of a tour guide robot

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In the EU FP7 project FROG (Fun Robotic Outdoor Guide) our aim is to develop a robotic tour guide to guide visitors through (outdoor) tourist sites. In the end, the tour guide robot should show engaging and intuitively understandable behavior, that makes the human-robot interaction feel natural. The appearance of a robot will impact how visitors perceive the robot. For the FROG robot, we know that two lenses of a stereo camera on top of the robot will be visible. Because people have the tendency to anthropomorphize, we want to know how visitors react to the camera, and how we can use the camera to increase the understandability of the robotic tour guide.



**STUDY** 



A robotic guide gave short tours in the "Hall of Festivities" in the Royal Alcázar (Seville, Spain). A stereo camera was visible on top of the robot. Participants of the study were visitors of the Royal Alcázar. At the entrances of the room, all visitors were informed with signs that a research was going on. By entering visitors gave consent to participate in the study, however it was up to them if they wanted to join a short tour given by the robot.

#### Visitors standing in the robot's angle of view;

The visitors are interested in the robot and try to make contact with it by standing in front of it and make sure the robot can see them. In the situations visible here, the visitors also bring their eyes on the height of the lenses of the camera on top of the robot, as if they try to make eye-contact.





Examples (given in pictures below and on the right) make clear that visitors act as if the lenses are the eyes of the robot. To make contact they stand in the angle of view, they follow the gaze of the robot to understand about what it tells a story, and when the robot breaks eye contact and turns away, visitors think the robot is not interested in them anymore. Combined with previous research on robot gaze behavior in which we found that people like the robot better when it shows human-like gaze patterns (the robot gaze behavior was based on gaze behavior human tour guides show), we came to the following design guideline:

## **DESIGN GUIDELINE**

FROG

FUN ROBOTIC

OUTDOOR GUIDE

Even if the intention is not to design a human-like robot, human-like features might improve the HRI. This means for the design of (eyes of) a robot that either the camera should be hidden in the design, or, if that is not possible, the camera should give functional cues resembling those of human eyes. In this way, the tendency of people to anthropomorphize features will be strengthened and therefore the interaction might be more intuitive.



SEVENTH FRAMEWOR



**/isitors follow the** gaze of the robot; When the robot is oriented towards the exhibit and tells about it, visitors intuitively seem to follow the robot gaze and also look into the exhibit.

#### Visitors waving to the robot's eyes;

The visitors are aware of the fact that the camera on top of the robot probably will record them, and that the robot might "see" with it. Therefore, people are waving or making gestures to the robot's camera.



#### Visitors find out where to look;

The visitors listen to the story of the robot, but don't know where to look. They follow the gaze of the robot, however, the robot stands in front of the exhibit it tells about. When the robot gives a cue where to look, one of the visitors also informs the others where to look.



## Which are the aspects of human-likeness that are more relevant for interaction?

Aspects of human-likeness in products that people tend to anthropomorphize should be designed very carefully. On this poster we describe how this functions for visible lenses of a camera on top of a robot. People already have an expectation of the function of the camera, therefore, if the function is different from what they expect, it can negatively influence the interaction.

In general, all features of a robot can be designed more human-like or more machine-like. When features tend to be anthropomorphized by people, they should either be designed differently, so that people will not anthropomorphize them anymore, or the function should resemble human behavior to certain level to make the human-robot interaction more intuitive.

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