



UNIVERSITY OF SALERNO  
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Master Thesis in Computer Science

# Simulating the Idle Gaze Behavior of Pedestrians in Motion

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## Abstract

In everyday life people are involved in a wide range of social situations where they may exhibit one or more natural social behaviors and engage in multi-modal communication. Gaze plays one of the most important role in the interaction between people as well as a reaction cue to the surrounding environment.

In realistic looking game environments, such as the upcoming EVE Online space stations or in Start Trek Online, it is important that virtual characters behave naturally. They should foster a sense of co-presence: the sense of actually being with another person rather than a graphical object on a computer screen. From a “static” point of view, i.e. looking game screenshots, these kind of games are very advanced in their graphics and in their environments, but from the gaming point of view the characters behaviors are completely lifeless, in particular the gaze behavior is lacking in realism and naturalness.

The goal of this thesis is to produce a naturally looking idle-gaze behavior, using data from targeted video studies. We picked a particular environment and a particular social situation for our case study:

People idling “alone” walking.

We use the term “alone” to indicate that the people are not engaged in direct communication with anyone else, but they are still part of the dynamic social environment of a public place. For this case study we have chosen the following environment: Sidewalks along a street downtown in a city.

We decided to start with this public place because in this kind of environment the social situation mentioned above is very typical and easy to analyze. In addition the game environment we are looking at contains several public places that require avatars to exhibit this behavior.

Our first step was a literature review that had to include both prior research into the natural gaze patterns of humans as well as into the computer science of autonomous behavior control.

This review conducted us to depict a theoretical model in order to have a well structured organization and view of all the pre-existent literature about gaze behavior.

We decided to use this theoretical model as a starting point for our work but we didn’t go straight from the model to implementation. Instead, we video-recorded people involved in the chosen configuration and obtained observational data used as empirical input along with the general model.

Our study goals were to obtain some numerical data about human gaze behavior and to discover general gaze patterns through the following steps:

1. We video recorded people in public places that matched our chosen study situation;
2. We analyzed all the obtained video frame-by-frame with a video annotation software;
3. We analyzed the obtained annotations, summarized numerical data and some common patterns observed.

Observations of people through video studies produced a massive amount of data on human gaze behavior in the social situation studied. These data represented both a rich source of information for our autonomous generation process and a contribution for gaze behavior literature.

Finally, from our observations, we built a demo with the CADIA Populus multi-agent social simulation platform.