ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Lecture with Computer Exercises:
Modelling and Simulating Social Systems with MATLAB

Project Report

Insert Title Here
...

Name 1 & Name 2

Zurich
May 2008

Agreement for free-download

We hereby agree to make our source code for this project freely available for download from the web pages of the SOMS chair. Furthermore, we assure that all source code is written by ourselves and is not violating any copyright restrictions.

Name 1

Name 2

Please wait...

If this message is not eventually replaced by the proper contents of the document, your PDF viewer may not be able to display this type of document.

You can upgrade to the latest version of Adobe Reader for Windows®, Mac, or Linux® by visiting http://www.adobe.com/products/acrobat/readstep2.html.

For more assistance with Adobe Reader visit http://www.adobe.com/support/products/acrreader.html.

Contents

1 Abstract

2 Individual contributions

3 Introduction and Motivations

4 Description of the Model

5 Implementation

5.1 Interaction forces

5.1.1 Pedestrian interaction force

There are two interaction forces that are calculated separately for every pedestrian in every timestep.

The first one is the so called pedestrian interaction force, which is initialized as a repulsive force and and therefore allows each pedestrian to keep a certain distance to all the other pedestrians.

In our simulation, the repulsive pedestrian interaction force has been specified according to the formula

$$\vec{f}_{\alpha\beta}(t) = A_{\alpha}^1 e^{\frac{r_{\alpha\beta}-d_{\alpha\beta}}{B_{\alpha}^1}} \vec{n}_{\alpha\beta} \cdot \left(\lambda_{\alpha} + (1-\lambda_{\alpha})\frac{1+\cos\phi_{\alpha\beta}}{2}\right) + A_{\alpha}^2 e^{\frac{r_{\alpha\beta}-d_{\alpha\beta}}{B_{\alpha}^2}} \vec{n}_{\alpha\beta} \quad (1)$$

,where $d_{\alpha\beta}(t) = \|\vec{x}_{\alpha}(t) - \vec{x}_{\beta}(t)\|$ is the distance between the two pedestrians α and β, $r_{\alpha\beta} = (r_{\alpha} + r_{\beta})$ is the sum of their radii and $\vec{n}_{\alpha\beta}(t) = [\vec{x}_{\alpha}(t) - \vec{x}_{\beta}(t)]/d_{\alpha\beta}$ is the normalized vector from β to α. $\phi_{\alpha\beta}(t)$ is the angle between $\vec{n}_{\alpha\beta}(t)$ and the direction of movement $\vec{e}_{\alpha}(t) = \vec{v}_{\alpha}(t)/\|\vec{v}_{\alpha}(t)\|$ of the pedestrian α.

6 Simulation Results and Discussion

7 Summary and Outlook

8 References