



## VISSIM Pedestrian Simulation

*»Pedestrian travel creates complex situations. The VISSIM pedestrian simulation was designed to be flexible enough to handle the complex interaction of vehicles and pedestrians, to make VISSIM, the longest established simulation tool, suitable for a broad range of applications.«*

Dr. Tobias Kretz, senior scientist at PTV AG, Karlsruhe



### Pedestrians and Traffic – an Interactive Relationship

Discover VISSIM: The first multi-modal microscopic simulation program to include real interaction between pedestrians and all means of transportation. Traffic lights, pedestrian crossings, and normal parts of streets as well as passengers alighting from and boarding to public transport can all be modelled and simulated microscopically in VISSIM. This includes for example road users who willingly infringe upon the traffic rules: pedestrians who do not obey red crossing signals.

Over the past two decades, VISSIM with its well-known vehicle simulation program has become the leading software for multi-modal simulation. Benefit from a broad range of fields of applications, such as traffic engineering and transportation planning, city planning, building design as well as evacuation and animation for information and communication.

**If you are interested in including fire smoke data in your evacuation simulation, please contact us at [info.vision@ptv.de](mailto:info.vision@ptv.de)**



3D pedestrian animation of the Brandenburger Gate area, Berlin, Germany



## Scope of Application

### Traffic Engineering and Transportation Planning

Both pedestrians and motorised modes of transport can be included in simulations of complex intersections or sequences of intersections, for example. Their impact on traffic can be modelled and the effect of traffic and signal control on their own delay times can be measured in the simulation.

### Evacuation

VISSIM "coming from the street" is nevertheless able to also simulate evacuations of pedestrians from buildings. VISSIM not only includes multi-story simulation, but also offers easy multi-story modelling and a convenient 3D display and animation that clearly shows the current situation, regardless of the building height or size.

### Animation

Communicating complex building or city construction plans to a non-professional public is crucial if the public is meant to actively take part in the discussion about urban development. In addition to assisting the process of engineering, planning and constructing, VISSIM also aims to help experts communicate their ideas and results to others.

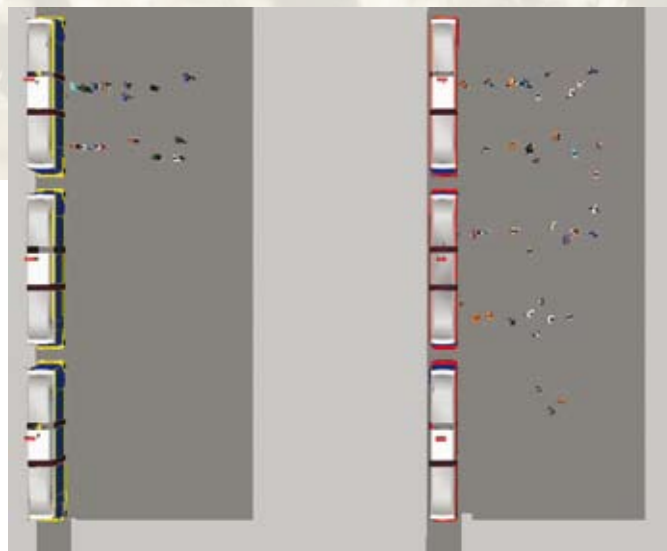
### The Social Force Model

The heart of VISSIM's pedestrian simulation is the Social Force Model, which was introduced in 1995 by Helbing et al. Since then, it has been enhanced for general use in a sequel of publications. In this model a pedestrian's movement is determined by an attractive force towards the destination and repulsive

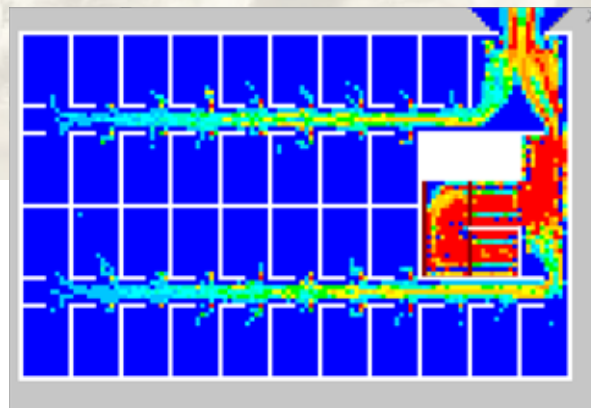
forces from other pedestrians and walls. The forces are translated into accelerations used for the calculation of velocities and new positions. With a time step of 0.05 seconds VISSIM's implementation of the Social Force Model achieves both a high spatial and a high temporal resolution.

### The Pedestrians

The pedestrians in the simulation are individuals and can have individual parameters. A desired walking speed is drawn from a user-defined speed distribution – as for vehicles. And pedestrians have individual sizes. All other parameters are attached to the pedestrian type. Again as for vehicles, the user can define additional parameter sets and assign them to specific areas.



Boarding and alighting behaviour affects the dwell time of the public transport vehicles. Two trams arrive at the same time at a station. The same number of passengers get off the vehicles using different doors. Finally the train on the right side can leave the station earlier.



The Level of service (LOS) illustrates the pedestrian flow during the evacuation of a building

## Pedestrians-Public Transport Interaction

The trains, trams and busses of your model will populate the station and take passengers on board. This is made possible by the time-parallel simulation of pedestrian flows, vehicle flows and public transport. Please see how the boarding and alighting behaviour will affect the dwell time of the public transport vehicles and, consequently, the whole public transport system: Finally you can simulate and analyse traffic flows within the public transport infrastructure in order to develop effective solutions – such as traffic signal priority or appropriately sized pedestrian facilities.

## Editing

The editing process consists of three parts. First, you will have to specify the population: group pedestrians into types, classes and compositions, and set their properties, such as walking speed, behaviour parameters, colour, and 3D models. The next step is to define geometry using walking areas, obstacles, ramps, stairways, traffic lights, queue areas and levels. Finally, you have to add the inputs and routes of pedestrians to the geometry. VISSIM supports a number of image formats, such as jpg and dxf, which can be loaded as background images to assist the user in creating the geometry.

## Evaluation and Measurement

There are currently four basic measurement methods: Measuring travel time from one area to another, evaluating queues, measuring various parameters on an area and logging the trajectories in detail to one single file. For the last two methods the user can define which of the various parameters are to be written to the file. Another type of measurement is the production of graphical output, such as the Level of Service (LOS). The user can choose between pre-defined and well-acknowledged schemes or define his/her own scheme. Additionally, pedestrians can be coloured according to their speed, for example.

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# VISSIM – Multi-Modal Traffic Simulation with True Interaction of Vehicles and Pedestrians

## Your Advantages at a Glance

### ▶ The Simulation Model

Benefit from the Social Force Model by Helbing et al which is continuous in space and has a high time resolution of 0.05 seconds. This allows you to receive highly detailed results and smooth animations.

### ▶ Editing and Display

Build models quickly and easily from scratch and watch the simulation in 2D or 3D or by LOS display without extra work. Record 3D animations with just three clicks.

### ▶ Route Choice

Make pedestrians choose their routes with your fixed probabilities or let VISSIM calculate them dynamically based on travel time, density, velocity, queue length or signal state.

### ▶ Pedestrian-Vehicle Interaction

Investigate the vehicles' impact on the pedestrian flow and vice versa on any type of intersection.

### ▶ Pedestrian-Public Transport Interaction

Simulate and analyse traffic flows within the public transport infrastructure, populate the station and take boarding and alighting behaviour into account; it will affect the dwell time of the public transport vehicles and, consequently, the whole public transport system.

### ▶ Evaluation

Log results on your desired level of aggregation: from detailed trajectory data to average travel times, speeds or many other parameters.

### ▶ Area-based Walking Behaviour

Assign walking behaviour parameters to specific areas to keep full control of the simulation.

### ▶ Multi-Story Modelling

VISSIM supports the simulation of buildings with numerous stories and their connections.

### ▶ Animation

During simulation, the process can be followed by the user via a 2D and 3D animation as well as an LOS display following Fruin, Weidmann or HBS.

### ▶ Simulation Recording

Simulations can be recorded directly as AVI video animations or as ANI data for later evaluation.

### ▶ COM Support

VISSIM's COM programming interface is supported by the new pedestrian simulation functionality.

## Get in touch!

If you have any questions or comments, please feel free to contact us at [info.vision@ptv.de](mailto:info.vision@ptv.de)