

**Category:** Universal Design

**Project:** Inclusive Tactile Panoramic Relief of the City of Graz

**What was the challenge?**

To make the breathtaking view from the Schlossberg Graz also accessible for blind and visually impaired people.

In 2020, the Graz Museum opened a new branch in the former Stall- und Kanonenbastei on the iconic Schlossberg hill. Besides being an important part of Graz's history, the location also offers an outstanding view of the city. Many important landmarks are in close proximity, and the view extends into the surrounding countryside all the way to the mountains beyond the Slovenian border. As the museum is committed to being a *museum for all*, they wanted to make this special view accessible for everyone, including blind and visually impaired people. Together with the design team of Buero41a, Studio WG3, Ingrid Holzschuh and Graz Museum curator Martina Zerovnik, VRVis came up with the idea of creating a tactile panoramic relief mounted on the balcony that transforms the exact panoramic view into a 3D tactile version. It should not become a simple map of the city, but rather translate the visual qualities, the spatial proximity of the sights, the depth of perspective, etc., in a tactile way, mimicking how the human eyes perceive the world.



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**What was the solution?**

Since 2010, VRVis creates tactile translations of fine art and photography (e.g. for the Kunsthistorisches Museum and the Belvedere in Vienna) using an in-house developed tactile modeling software that follows a universal, inclusive design approach and involved participatory research with over 200 people with special needs and cultural institutions from all over Europe.

For this project, the software was extended to create a panoramic relief from various data sources such as terrain data, vegetation maps and 3D building models from the Stadtvermessungsamt Graz. All were precisely aligned to a panoramic photo taken from the mounting point of the relief and merged to create a true-to-life representation. Special transformations were applied to mimic the depth perception of the human eyes, and each building was tilted to maximize the sense of depth, by utilizing the full height of the relief. Important buildings were given additional depth for a more three-dimensional look and feel. Cranes have been edited out and construction sites have been completed to make it timeless.

Many details and over 60 chimneys were added to the coarse building models to match the actual view. Thin features, such as spires were reinforced for mechanical stability. Vegetation and water were specially filtered to create organic, soft shapes that contrast with the edgy buildings. Tactile markers (see image to the left) were designed to point out important landmarks without obstructing the view. The raised round shape is easy to recognize. A line points to the building. A Braille and raised type letter refers to the legend.

The lower left area would represent part of the hill and trees. It has been flattened to accommodate the legend that names the major landmarks. This avoids long hand movements during tactile exploration, as is often the case with a separate legend.

**What was the effect?**

The panoramic relief offers a tactile view for every visitor – even in bad weather one can “touch” the distant mountains.



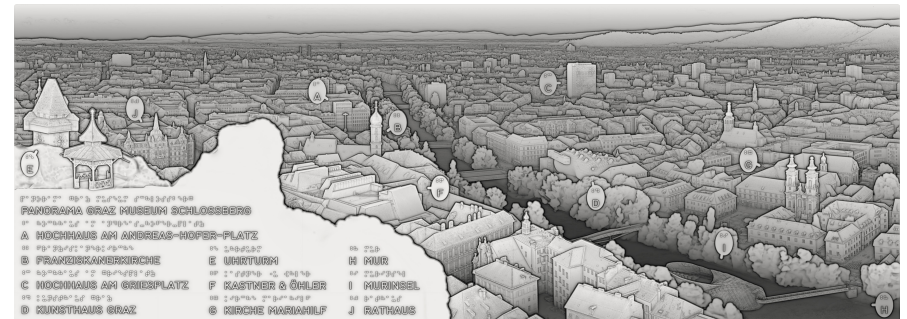
The Graz Museum is one of the first museums ever to create a lookout point for blind and visually impaired people that translates not only the city map itself, but also the actual view. The inclusive nature of the information design goes beyond this audience, as the relief is accessible for wheelchair users, and is placed at a height that is also suitable for children.



As part of the museum's permanent exhibition, the tactile panorama demonstrates how well tactile reliefs are suited to creating panoramic “views” for all people – and how well this offer is accepted by all audiences. The tactile panorama relief is to date unique in creating an actual perspective tactile image with depth of field by combining photo and model. With the modeling software developed, any other location or view can now be made tactile more easily than ever before. This is yet another important contribution to VRVis' research path in the field of inclusive digitization with the goal of advancing inclusive design and tactile solutions towards greater inclusion and accessibility in both art and public spaces.



This panoramic photo was the basis for the tactile version, and was taken at the exact spot on the cannon hall's balcony, where the relief is now mounted. Special filters were used to translate color into surface variations, adding detail and texture to the building models. Even windows, street markings, roof structures, and clouds are made tactile.



The final version of the CAD model. 3D renderings like these were used throughout the project to discuss progress with everyone involved. As perceived by the human eyes, close objects are not only larger, but also have a more pronounced depth. Nearby buildings, such as the city's landmark *Grazer Uhrturm* and the *Chinese Pavilion* (both on the left), were thus modeled in great detail. Bushes were virtually trimmed to free up the view of the unique clock hands. Even the roof shingles and windows can be felt.



The finished 1260x450mm<sup>2</sup> large and 32mm high relief was CNC machined from DuPont Corian™, a material that is weather resistant, pleasant to the touch, does not heat up excessively in direct sunshine and can be machined to a high level of detail, a tremendous advantage over currently existing 3D printing processes. It was produced at the Department of Three-Dimensional Design and Model Making, Institute of Art and Design, Vienna University of Technology, especially by Florian Rist.