# New Tourist Service Based on Virtual Reality Glasses in the Town of Miskolc, Hungary

Júlia Nagy[1], Zsolt László Márkus[2], Gábor Kaposi[2], György Szántó[2], Tibor Szkaliczki[2], Norbert Vass[2]

[1] Miskolc Tourist Marketing Nonprofit Ltd. (MIDMAR)
[2] Institute for Computer Science and Control, Hungarian Academy of Sciences (MTA SZTAKI), H-1111 Budapest, Hungary, Kende u. 13-17.
julia.nagy@hellomiskolc.hu, {markus.zsolt, kaposi.gabor, szanto.gyorgy, szkaliczki.tibor}@sztaki.mta.hu

**Abstract.** The paper presents how the VR technology helps tourists in selecting their destinations. The current state-of-the-art service is the result of systematic development activities which has become available in the tourist information office (Tourinform) in the town of Miskolc. The visitors can discover the local sights either on the Web site of the tourist organisation, or in the GUIDE@HAND Miskolc smart phone application, or from now on, in a virtual space due to the Virtual Reality (VR) technology with the help of 3D VR glasses and spherical panorama pictures.

**Keywords:** Mobile Application, Tourism, Virtual Reality, VR Glasses, Panorama Pictures

## 1 Introduction

Let us imagine that guests go into the tourist information office (Tourinform) in the town of Miskolc. The staff of the office provides information kindly to the guests about the sightseeing opportunities. At least a five-day long programme can be set up from the offer depending on the weather and the mood of the guests. However, the guests have only one day to be spent in the city. And then the information provider invites the guests kindly to the Miskolc Café for "teleporting". After a short time, the guests take a virtual tour in the Cave Bath and the sights of Miskolc while sitting in the café, look around only for so long that they can choose which programme is the closest to them that day. Then they drink a Miskolc coffee and start to explore the selected sights.

This story is no longer a fiction or a tale but reflects the the latest results of systematic development activities, which has become available in the tourist information office (Tourinform) in the town of Miskolc due to the financial support of Miskolc City and Regional Tourist Marketing Nonprofit Ltd. and professional development of Institute of Computer Science and Control of the Hungarian Academy of Sciences (MTA SZTAKI).

MTA SZTAKI has a content development methodology that supports the presentation of the sights on several platforms e.g., Web, mobile, etc. for different target groups. The visitors can discover the local sights on the Web site [1] of the tourist organisation, in the GUIDE@HAND Miskolc [2] smart phone application, or from now on, in a virtual space due to the Virtual Reality (VR) technology with the help of 3D VR glasses and spherical panorama pictures (Fig.1.). The guests arriving at the Tourinform feel during the virtual travel as if they would move in the space of the sights. This special experience may help them to select even more deliberately the places closest to their interest areas.

The tourist organisation in Miskolc welcomes the visitors with an exciting continuously growing offer. For this reason, their aim is not to provide an experience that would substitute the reality by applying the VR technology. The guests receive only a short insight or a taster through the VR glasses in the Tourinform office. The true and real experience still waits for them at the attractions' site in the future, too.


**Fig. 1.** Using Virtual Reality in Miskolc Café.

The next section describes the technology related to panorama pictures presented through the VR glasses. The third section introduces the realisation of the VR project in Miskolc. The paper is concluded with a summary and future plans.

## 2 Presenting panorama pictures

The interactive panorama pictures can present sights indoors or outdoors, in real or virtual environments. MTA SZTAKI gained an experience in creating panorama

pictures and presenting them through the Web, mobile applications and VR glasses. They have a broad offer of cylindrical and spherical panorama pictures. Cylindrical panoramas are suitable to look around an object in 360 degrees while the spherical panoramas contain the top and bottom views in addition to the sides.

A number of spherical panoramas presenting both indoor and outdoor scenes are now available in the offer in Miskolc. The VR glasses display only a segment of the panorama picture (Fig. 2.) but you can look around or up and down as well by moving your head in the desired direction. The displayed segment always corresponds to the current direction of your view which makes the observer feel as if he/she was standing in the location of the presented sight.


**Fig. 2.** A view from the panorama picture created at Herman Ottó Museum, Miskolc

MTA SZTAKI has a large collection of panorama pictures which were made accessible at **the official website of Tourist Information Office** in Miskolc https://www.hellomiskolc.hu/english


**Fig. 3.** Tourist information office in Miskolc, Hungary

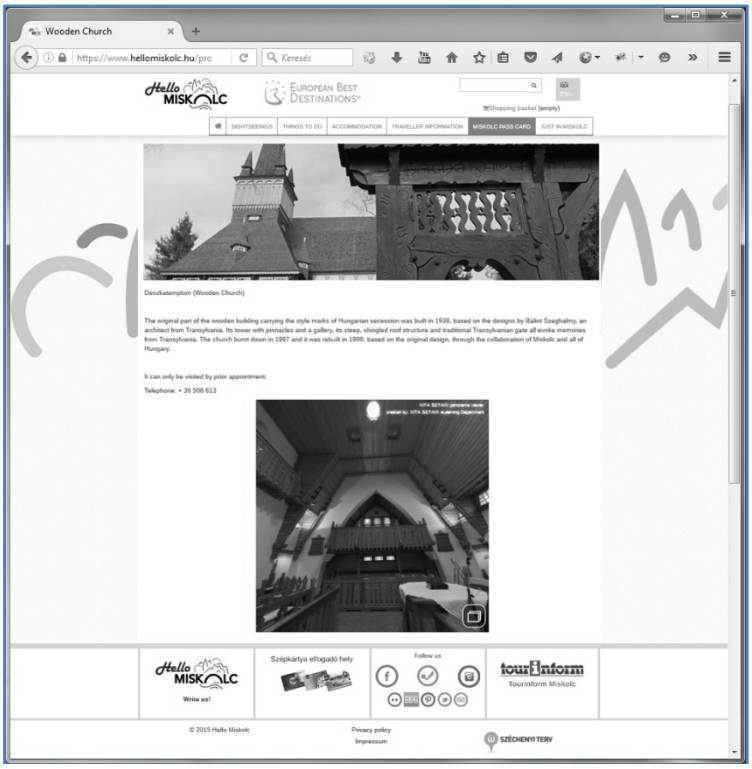


**Fig. 4.** Wooden Church in Miskolc, Hungary

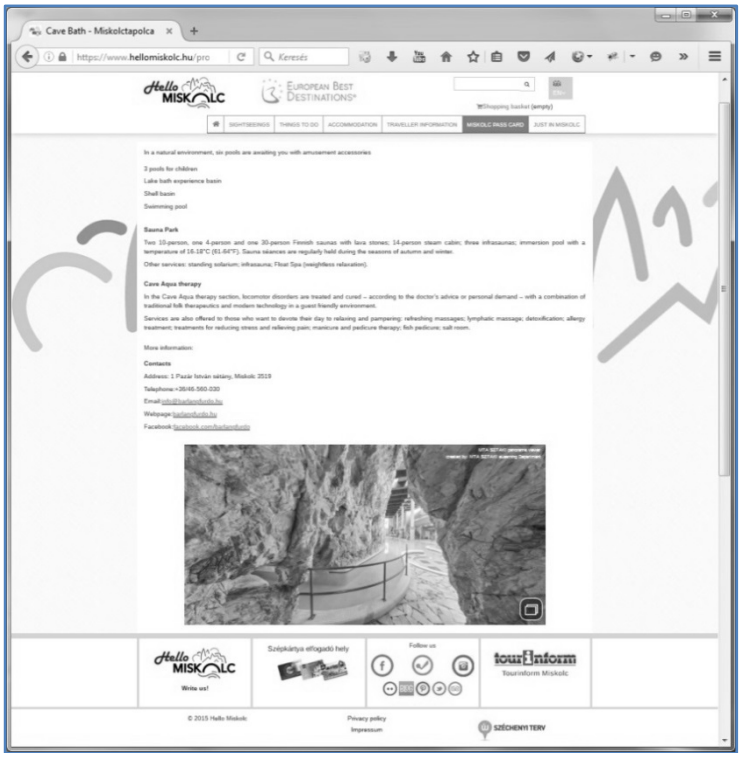


**Fig. 5.** Cave bath in Miskolctapolca, Hungary

and in the **GUIDE@HAND Miskolc** mobile application family [3-5].


**Fig. 6.** Tourinform Miskolc in panorama pictures


**Fig. 7.** Wooden Church in panorama pictures


**Fig. 8.** Cave bath in panorama pictures

The developers of MTA SZTAKI decided to create a **new presentation application** for VR glasses. The application is developed in Unity [6] which is a development environment for VR projects. The application contains the following functions, which are not available in the built-in panorama picture viewer of the VR glasses:

- Display full 360° **spherical panorama** pictures.
- **Offline panoramas**:

    - Support loading panorama pictures from the device storage or SD card.
    - Support for loading panoramas from cube faces.
- **Hotspots:** The user can set different viewing locations by selecting a hotspot within the panorama picture. The hotspot can
    - Load a **different panorama** picture simulating navigation in-between panoramas. The loaded panorama can take the starting angle of view to further simulate movement;
    - Open a **description pane** for the specified area of the panorama, providing further information about the selected hotspot.
- **Change panoramas from list:** The list is automatically built from the panoramas loaded to the device. The user can change between these panoramas anytime using the list.
- **Music:** Background music can be played while the user is watching the panorama picture. The background music can be per panorama picture, simulating environment mood.
- **High resolution offline images:** The supported resolution of the panorama images is much higher than the ones for the built-in app. This allows compatibility for future higher resolution VR glasses and for zoom functionality.
- **Zoom (future development):** The user can magnify the panorama picture in order to explore the details.
- **Remote control (future development):** Certain control functions regarding the presented panorama picture can be accomplished from a remote device (PC, mobile phone or tablet). This allows for example instructors to set the a specified panorama they are talking about.

**Fig. 9.** Description pane

The built-in panorama picture viewer of the VR glasses (Oculus 360 Photos) features:

- Display full 360° spherical panorama pictures.
- Display full 360° spherical stereoscopic 3D panorama pictures,
- Automatic and manual **slideshow**.
- Online panoramas:
  - Support for different categories, countries.
  - Low resolution pictures,
  - Internet connection needed.
- Offline panoramas:
  - Support loading panorama pictures from the device storage or SD card.
  - Support for loading panoramas from equirectangular projected images and cube faces.
  - 1 level deep categories of offline panoramas based on directory structure.

## 3 Applying VR glasses in Miskolc

The VR solution for tourism purposes has become available due to the financial support of Miskolc City and Regional Tourist Marketing Nonprofit Ltd. and professional development of MTA SZTAKI.

Samsung Gear VR headset [7] was selected to implement VR glasses in Miskolc Tourinform office. The Gear VR headset is compatible with Samsung GALAXY smartphones. The panorama picture presentation application developed by MTA SZTAKI is installed on the VR glasses. The visitors can use the VR glasses at the sites of the tourist information office (Miskolc Café) and watch the panorama pictures available in the offer of the office. The sights of the panorama pictures were selected by the colleagues of Miskolc City and Regional Tourist Marketing Nonprofit Ltd. while the panorama pictures were created by MTA SZTAKI.

The VR glasses has become a new, efficient information providing tool in the practice of the tourist information office.

Most of the guests are thinking in standard offers while collecting the programme items (e.g., Notre Dame and Mona Lisa have to be seen while in Paris; Cave Bath, Castle in Diósgyőr and Lillafüred have to be visited while in Miskolc). However, the VR glasses provide the opportunity to bring attention to sights which are at least as attractive and exciting as the well-known sights but they are less known in the offer of the city. For example the attractive family programmes of the museums for children and parents should be mentioned. When they realise that not a “traditional” museum offer waits for them but interactive programmes, they can be much easier attracted with the opportunity of the new experience.

All this explains why VR glasses offer an excellent opportunity to popularize Miskolc in exhibitions and fairs. There was, however, a fear that since the glasses offer the experience of “teleporting” to the guests they would check off the sight on their list of items to be visited after looking around at the particular location and will not be motivated any more to visit the given location personally. Our experience indicates the opposite: the VR glasses provide an insight into the particular sight which wakes up the interest and desire for a real experience.

It is storied about the first film experiences at the beginning of the 20th century that people were rushing out from the cinemas to escape from the train running in front of them on the canvas. We often had similar experiences with our guests at the tourist office, as well. While they were only looking around, their brains coordinated their perception properly but when they started looking down many of them had a fear or felt dizzy. When they used the glasses while sitting this problem did not occur. For this reason, we always suggest the user of the glasses to sit down.

A VR glasses presentation can make even the thematic tourist guide much more exciting. The VR glasses make it possible for the participants to "get" to locations which are e.g., closed or out of their track but the introduction of these sights would fit into the particular topic. Bridging the virtual and real worlds opens literally new dimensions in guiding tourists. However, it can be used only in case of small groups because we do not have enough devices.

The use of VR technology in a mobile application offers a very useful opportunity in case of offline presentations because we do not have the opportunity to bring the VR glasses to a presentation in many cases. However, the panorama pictures downloaded into the mobile application provide opportunity to guide the people from one sight to another by connecting the tablet or phone to a projector.

Further applications of the VR technology: by extending with AR technology, presenting the past of particular areas, even creating a complex "time machine" presenting the given location not only in 3D space but also in various ages. This will be a really exciting opportunity also in guiding tourists and presenting locations.

## 4 Conclusions

The development presented applies VR glasses and spherical panorama pictures for presenting tourist sights. The users wearing the glasses have the impression as if they would look around at the real place of the sights. The application opens new channels to attract visitors to tourist and cultural destinations.

The tourist organisation in Miskolc is going to make the VR glasses available soon in their further information offices in Lillafüred and Diósgyőr Castle and also at Cave Bath. Furthermore, they would like to achieve in midterm that the glasses are used for providing information at the receptions of hotels in Miskolc. The organisation would like to invite the **people interested not only for spatial but also** for **temporal "teleporting" within two years in order to evoke the past of particular sights in Miskolc.**

## References


1. Tourinform Miskolc https://www.hellomiskolc.hu/product_info.php?products_id=3208&language=en
2. GUIDE@HAND Miskolc http://guideathand.com/en/content/miskolc
3. GUIDE@HAND http://guideathand.com/en/index

4. Márkus, Zs.L., Wagner B. GUIDE@HAND: Digital GPS Based Audio Guide that Brings the Past to Life. In the Proceedings of International Conference on Digital Presentation and Preservation of Cultural and Scientific Heritage, Vol. 1, No 1, 2011, pp. 15-25
5. Zs. L Márkus, G. Kaposi, T. Szkaliczki, D. Luchev, R. Pavlov, BOOK@HAND BIDL: Mobile Exploring of the Bulgarian Iconography by Using Panorama Pictures, UNESCO International Conference on Digital Presentation and Preservation of Cultural and Scientific Heritage, September 28-30, 2015, Veliko Tarnovo, Bulgaria, pp. 109-120.
6. Unity – Virtual Reality http://unity3d.com
7. Samsung Gear VR https://www3.oculus.com/en-us/gear-vr/